



**YONKERS POLICE DEPARTMENT
THIRD PRECINCT LOBBY UPGRADES**

PROJECT SPECIFICATIONS

**ISSUED FOR BID
February 11, 2021**

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SECTION 01120

CONTRACT SUMMARY OF WORK

1. GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes a summary of each contract for the Project, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements for the work of each contract are also indicated in individual Specification Sections and on Drawings for each contract.
- C. Related Sections:
 - 1. Section 01310 - Project Management and Coordination.
 - 2. Section 01500 - Temporary Facilities and Controls.

1.3 DEFINITIONS

- A. Permanent Enclosure: As determined by the Owner, the condition at which roofing is insulated and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures equivalent in weather protection to permanent construction.

1.4 CONTRACTOR'S PROJECT MANAGER

- A. Contractor shall identify a project manager who shall be responsible for coordination with the Owner.
- B. Project Scheduler: The contractor shall provide a project scheduler to coordinate the scheduling activities of the Contract, to prepare an overall CPM schedule, and to monitor and update the CPM schedule periodically:

1.5 COORDINATION ACTIVITIES

- A. Coordination activities of Contractor's project manager include, but are not limited to, the following:
1. Provide overall coordination of the Work.
 2. Coordinate use of access shared with other contractors to workspaces and workspaces shared with other contractors.
 3. Provide overall coordination of temporary facilities and controls.
 4. Coordinate construction and operations of the Work with work performed by other Contractors and the Owner's construction forces.
 5. Prepare Coordinated Composite Drawings to coordinate the work of the Project.
 6. Coordinate sequencing and scheduling of the Work, including attendance at an Initial Coordination Meeting.
 7. Provide quality assurance and quality control services specified in Section 014000 – Quality and Code Requirements.
 8. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
 9. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
 10. Provide progress cleaning of all Contract work areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
 11. Coordinate cutting and patching.
 12. Coordinate protection of the Work.
 13. Coordinate firestopping.
 14. Coordinate completion of punch list items.
 15. Coordinate preparation of As-built drawings and specifications.
 16. Print and submit all required project turnover documents.
 17. Responsibilities of project manager for construction contract includes coordination for temporary facilities and controls.

1.6 SUMMARY OF WORK

- A. The work shall be as shown and called for in the contract documents, including:

1. Ceiling Demolition
2. Wall demolition
3. Installation of new walls and doors
4. Installation of new platform
5. Installation of new front desk and bullet proof glass partition
6. Replacement of existing windows with bullet proof glass windows.
7. Installation of new ceilings
8. Installation of new ceiling lighting fixtures
9. Modifications to the sprinkler system
10. Demolition of existing ducting; installation of new ducting
11. Demolition of existing baseboard heating and installation of new baseboard heating
12. Installation of new cameras connected to the existing camera system.
13. Installation of new intercom / speaker systems at new counter.

14. Repairs / replacement of exterior stucco, as per the stucco renovation specification section.

1.7 PERMITS

Contractor shall obtain all necessary permits from the Authorities-having-Jurisdiction.

2.PRODUCTS (Not Used)

3.EXECUTION

- 3.1 Project Working Hours: All work shall be performed during normal working hours defined as 8:00 AM to 5:00 PM Monday through Friday, excluding holidays, except for the following:
 - A. Transport of Equipment and Materials must be performed at a specific time approved by the Owner's Project Manager.
- 3.2 Contractor shall confirm mobilization timing from award.

END OF SECTION 01120

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SECTION 01300

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.
- B. Related Sections:
 - 1. Section 01320 – Construction Progress Documentation, for submitting schedules and reports, includes Contractor's construction schedule.
 - 2. Section 01770 – Contract Closeout Requirements, for documents required to closeout contract.
 - 3. Section 01782 – Operation and Maintenance Manuals, for submitting operation and maintenance manuals.

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.

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- 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:

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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.

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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, a sample of which is prepared by the Design Professional is attached following the end of this section. The Contractor shall complete the submittal schedule and 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.

SAMPLE SUBMITTAL SCHEDULE

SECTION	DESCRIPTION	Submitted Date	Approved Date
	DIVISION 21 Fire Protection		
210529	Pipe Hangers		
	Shop Drawings		
	Product Data		
211300	Sprinklers and Standpipe Piping		
	Product Data		
211313	Sprinkler Systems		
	Product Data		
	Shop Drawings		
	Quality Control Submittals		
	Contract Close Out Submittals		
	DIVISION 23 HVAC		
230000	Basic HVAC Requirements		
	Product Data		
	Shop Drawings		
	Maintenance Data		
	Diagrams		
	Coordination Drawings		
230523	Valves		
	Product Data		
	Schedule		
230529	Pipe Hangers		
	Shop Drawings		
	Product Data		
230553	Pipe Identification		
	Product Data		
230594	Testing and Balancing		
	Reports		
230700	Piping Insulation		
	Product Data		
	Installer Qualifications		
230719	Insulation		
	Product Data		

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	Installer Qualifications		
232000	HVAC Piping		
	Product Data		
	Installers Qualification Data		
	Welding Procedures and Certificates		
	Contract Close-out		
232006	Hydronic Specialties		
	Product Data		
	Contract Close-out		
233113	Metal Ductwork		
	Shop Drawings		
	Product Data		
238233	Convectors		
	Schedule		
	Product Data		
	DIVISION 26 Electrical		
260519	Wiring		
	Product Data		
	Shop Drawings		
260526	Grounding and Bonding		
	Product Data		
260529	Fasteners		
	Product Data		
260534	Outlet Boxes		
	Product Data		
260925	Wireless Lighting Control Devices		
	Product Data		
	One-Line Diagram		
	Specification Conformance Document		
	Field Test Data		
	Warranty		
262726	Wiring Devices		
	Product Data		
265100	LED Interior Building Lighting		
	Product Data		
	Mounting Details		
	Samples		
	Submission of Substitute Luminaires		
	Manufacturer Qualifications		
	Mock Up		

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	Spare Parts		
	Warranty		

END OF SECTION 01330

SECTION 01310

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.
- C. Related Sections:
 - 1. Section 01120 - Contract Summary of Work, for a description of the division of work among separate contracts and responsibility for coordination activities not in this Section.
 - 2. Section 01320 - Project Scheduling and Progress Documentation, for preparing and submitting Contractor's construction schedule.
 - 3. Section 01770 – Contract Closeout Requirements, for coordinating closeout of the Contract.

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.

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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.

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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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

SECTION 01320

PROJECT SCHEDULING AND PROGRESS DOCUMENTATION

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.
- C. Related Sections:
 - 1. Section 01120 – Contract Summary of Work, for preparing a combined CPM Schedule.
 - 2. Section 01310 - Project Management and Coordination.
 - 3. Section 01330 – Submittal Procedure, for submitting schedules and reports.
 - 4. Section 01400 – Quality and Code Requirements, for submitting a schedule of tests and inspections.

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:

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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 2010.
- 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 in MS Project 2010 format.
- 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.

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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 01320

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SECTION 01400

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 01400

SECTION 01500

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.
- B. Related Sections:
 - 1. Section 011200 – Contract Summary of Work, for work restrictions and limitations on utility interruptions.

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 park 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.

Yonkers Police Third Precinct
Lobby Upgrades

- 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 01500

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SECTION 01600

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 01300 – 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.
- B. Comparable Products Costs: Any costs savings to an approved Comparable Product identified and realized by the Contractor shall be shared equal between the Owner (50%) and Contractor (50%).

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

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SECTION 01732

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.

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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 01732

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SECTION 01770

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

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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.	_____	_____																													
5.	_____	_____																													
6.	_____	_____																													
<p>NOTE: Attach additional pages if necessary.</p>																															
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; padding: 5px;">Status of Contract Turnover Documents:</th> <th style="width: 15%; padding: 5px;">Provided- Yes/No</th> <th style="width: 15%; padding: 5px;">Due Date</th> <th style="width: 20%; padding: 5px;">Not Applicable</th> </tr> </thead> <tbody> <tr> <td style="padding: 5px;">As-Built Drawings & Specifications transmitted to DP</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Permits, Licenses and certificates transmitted to Owner</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">O&M Manual submitted to Owner</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Identify other documents</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Identify other documents</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> <tr> <td style="padding: 5px;">Final Cleaning</td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> <td style="padding: 5px;"></td> </tr> </tbody> </table>				Status of Contract Turnover Documents:	Provided- Yes/No	Due Date	Not Applicable	As-Built Drawings & Specifications transmitted to DP				Permits, Licenses and certificates transmitted to Owner				O&M Manual submitted to Owner				Identify other documents				Identify other documents				Final Cleaning			
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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 01770-1 are to be provided to the DP before final acceptance of the work.

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Item	Description	Status	Party
1	Work Permit		GC
2	Record Drawings in CAD		GC/ DP
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 01770

SECTION 01783

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 01330 – 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.

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 01783

SECTION 02080
ASBESTOS REMOVAL AND DISPOSAL

PART 1 - GENERAL

1.01 Work Included

- A. The Contractor shall furnish all labor, materials, services, insurance, patents, and equipment necessary to perform the Work of this Contract. All work will be conducted in compliance with EPA, OSHA, and NYS regulations, any other applicable federal, state, and local regulations and in accordance with these specifications. In the event, there is a conflicting point between these provisions, the most stringent one shall apply.
- B. The work will involve the removal of all Asbestos Containing Materials and all Asbestos Waste from within the Work Zones in accordance with all applicable rules and regulations and this specification. Location of asbestos indicated is provided for guidance only. The Contractor shall be responsible for establishing quantities and locations. The project will take place at 3rd Precinct, 435 Riverdale Avenue, Yonkers, NY 10705.

3rd Precinct – Firing Range

- **600 SF 12X12 Brown Floor Tile**
Removal and disposal of approximately 600 SF of asbestos containing 12X12 brown floor tile shall be performed in accordance with New York State Industrial Code Rule 56 and the Contract Documents.
- **Unknown SF Duct Insulation**
Duct insulation located in an inaccessible area should be tested after drop ceiling is removed.

NOTE:

- 1) The abatement areas shown on the drawings are provided for guidance only and no claims are made as to their accuracy. **The Contractor is alone responsible for determining the actual abatement quantities. If quantities differ the Contractor is responsible for bringing the discrepancy to the Construction Manager/Engineer's attention before any removal work proceeds.**
- 2) **In the event that clearance samples do not pass, the Asbestos Abatement Contractor will be responsible for all costs associated with resampling until acceptable clearance levels have been obtained.**
- 3) Removal of the asbestos containing materials from this building will be conducted in accordance with NYS Industrial Code Rule 56 and the contract documents. The

contractor may use project specific variances from NYS ICR 56 to perform the asbestos abatement work. To utilize a project specific variance, the contractor shall submit a copy of the proposed variance that outlines the removal procedures to the engineer for review and approval before the commencement of any work.

- 4) Removal of the asbestos containing materials from this building will be conducted in accordance with NYS Industrial Code Rule 56, applicable variances, a site-specific variance (if required) and the contract documents.
- 5) During the project, other trades will be working in the building, the Asbestos Contractor shall coordinate all of his work with the other trades as required.
- 6) The Contractor is responsible for using " standard of care " when applying or removing tape, spray adhesive or any other type of bonding material from the walls, floors or ceilings. If damage is sustained to an area during the work procedure directly related to the negligence of the contractor, then that Contractor is responsible for returning the area back to its original condition unless otherwise noted.
- 7) Critical barriers and the doorways shown on the drawing shall be covered with three layers of at least six-mil polyethylene sheeting sealed with tape.
- 8) The Contractor shall be responsible for all utility cable protection within the Work Zone Limits.
- 9) The Contractor is required to abide by the most current Prevailing Wage Rates at the time of the abatement project.
- 10) The Contractor shall furnish all labor, materials, services, insurance, patents, and equipment necessary to carry out the removal operation. All work will be conducted in compliance with EPA, OSHA, and NYS regulations, and any other applicable federal, state, and local regulations and in accordance with these specifications. In the event, there is a conflicting point between these provisions, the most stringent one shall apply.

1.02 Definitions

- A. **ABATEMENT**: Procedures to control fiber release from Asbestos-Containing Materials. This includes encapsulation, enclosure, and removal.
- B. **AIRLOCK**: A system for permitting egress without permitting air movement between a contaminated area and an uncontaminated area, typically consisting of two Curtained Doorways at least 3 feet apart.

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- C. AIR MONITORING: The process of measuring the fiber content of a specific volume of air in a stated period of time.
- D. AREA MONITORING: Sampling of asbestos fiber concentrations within the asbestos control area and outside the asbestos control area, which is representative of the airborne concentrations of asbestos fibers in the breathing zone.
- E. AMENDED WATER: Water containing a wetting agent or surfactant.
- F. ASBESTOS: Any hydrated mineral silicate separable into commercially usable fibers, including but not limited to chrysotile (serpentine), amosite (cumington-grunerite), crocidolite (riebeckite), tremolite, anthophyllite, and actinolite.
- G. ASBESTOS CONTAINING MATERIAL (ACM): Any Asbestos or any material containing more than one percent of Asbestos by weight or volume.
- H. ASBESTOS CONTAMINATED OBJECTS: Any object which has been contaminated by Asbestos or Asbestos Containing Material. This shall include all unprotected porous materials in an Asbestos Work Area.
- I. ASBESTOS CONTROL AREA: An area where Asbestos Abatement operations are performed, which is isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris.
- J. ASBESTOS WASTE: Any Asbestos Containing Material or Asbestos Contaminated Objects requiring disposal.
- K. AUTHORIZED VISITOR: The Owner, the Engineer, or a representative of any regulatory or other agency having jurisdiction over the project.
- L. CLEAN ROOM: An uncontaminated area or room which is part of the Worker Decontamination Enclosure System, with provisions for storage of workers' street clothes and protective equipment.
- M. COMPETENT PERSON: One who is capable of identifying existing asbestos hazards in the Work place and who has the authority to take prompt corrective measures to eliminate them as specified in 29 CFR 1926.32(f); Reference 29 CFR 1926.58(b) for duties and responsibilities.
- N. CRITICAL BARRIER: Any windows, HVAC diffusers (exhaust or return), pipe sleeves, penetrations, doorways or any other openings leading to an occupied area of the building or to the outside.
- O. CURTAINED DOORWAY: A device to allow egress from one room to another while permitting minimal air movement between the rooms, typically constructed of three overlapping sheets of plastic over an existing or temporary door frame. Attach a weight to each sheet and seal at alternating edges so as to produce a zig-zag pattern of entrance or exit.

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- P. ENCAPSULANT: A liquid material which can be applied to Asbestos-Containing Material and which controls the possible release of Asbestos fibers from the Asbestos Containing Material either by creating a membrane over the surface (bridging encapsulant) or by penetrating into the material and binding its components together (penetrating encapsulant). This may also be used to seal surfaces from which asbestos containing materials have been removed.
- Q. ENCAPSULATION: All herein specified procedures necessary to coat materials with an encapsulant to control the possible release of Asbestos fibers into the ambient air.
- R. ENCLOSURE: All herein specified procedures necessary to complete enclosure of Asbestos Containing Materials behind an airtight and impermeable barrier.
- S. EQUIPMENT ROOM: A contaminated area or room which is part of the Worker Decontamination Enclosure System, with provisions for the storage of contaminated clothing and equipment.
- T. FIXED OBJECT: A unit of equipment or furniture in the Work Zone which cannot be removed from the Work Zone.
- U. FRIABLE ASBESTOS MATERIAL: An Asbestos Containing Material that can be crumbled, pulverized, or reduced to powder when dry, by hand pressure or will crumble, be pulverized or produce powder when subjected to specific mechanical operation.
- V. HEPA FILTER: A high efficiency particulate air (HEPA) filter capable of trapping and retaining 99.97% of asbestos fibers greater than 0.3 micrometers in diameter.
- W. HEPA VACUUM EQUIPMENT: High efficiency particulate air (absolute) filtered vacuuming equipment with a filter system capable of collecting and retaining asbestos fibers. Filters shall be of 99.97% efficiency for retaining fibers of 0.3 micrometers or larger.
- X. HOLDING AREA: A chamber between the Washroom and an uncontaminated area in the Waste Decontamination Enclosure System. The Holding Area comprises an airlock.
- Y. MOVABLE OBJECT: A unit of equipment or furniture in the Work Zone which can be removed from the Work Zone.
- Z. NEGATIVE PRESSURE SYSTEM: A local exhaust system equipped with HEPA filtration that is capable of maintaining a minimum pressure differential of minus 0.05 inch of water column relative to adjacent unsealed areas.
- AA. NON-FRIABLE ASBESTOS MATERIAL: An Asbestos Containing Material in which the fibers have been locked in by a bonding agent, coating, binder, or other material so that the Asbestos is well bound and that when dry cannot be crumbled, pulverized or reduced to powder by hand pressure and will not be subject to mechanical operations.

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- BB. PERSONNEL DECONTAMINATION ENCLOSURE SYSTEM: A Decontamination Enclosure System for Workers, typically consisting of an Airlock, an Equipment Room, a second Airlock, a Shower room, a third Airlock, and a Clean Room.
- CC. PERSONAL MONITORING: Sampling of airborne asbestos fiber concentrations within the breathing zone of an employee.
- DD. REMOVAL: All herein specified procedures necessary to strip all Asbestos Containing Materials from the designated areas.
- EE. SHOWER ROOM: A room between the Clean Room and the Equipment Room in the Worker Decontamination Enclosure System, with hot and cold running water and suitably arranged for complete showering during decontamination. The Shower Room comprises an airlock between the Equipment Room and the Clean Room.
- FF. SURFACTANT: A chemical wetting agent added to water to improve penetration of water into the Asbestos Containing Materials.
- GG. TIME WEIGHTED AVERAGE (TWA): An 8-hour time weighted average of airborne fiber concentration per cubic centimeter of air. Three samples are required to establish the 8-hour time weighted average.
- II. WASHROOM: A room between the Work Zone and the Holding Area in the Waste Decontamination Enclosure System. The Washroom comprises an airlock.
- JJ. WASTE DECONTAMINATION ENCLOSURE SYSTEM: A Decontamination Enclosure System for materials and equipment, typically consisting of an Airlock, a Washroom, a second Airlock, and a Holding Room.
- KK. WET CLEANING: The process of eliminating Asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools which have been dampened with water, and by afterwards disposing of these cleaning tools as Asbestos Waste.
- LL. WORK SITE: Premises where Asbestos Abatement is taking place. The Work Site includes, but is not limited to the Work Zone, the Personnel and Waste Decontamination Systems, the staging area, the disposal route and the loading dock.
- MM. WORK ZONE: Any area indicated on the Drawings as Asbestos Abatement areas or as areas with Asbestos Containing Material.

1.03 Submittals

- A. Submit the following items to the Engineer for review twenty (20) days prior to the commencement of Work associated with this section:

1. EPA Notification: The form required by the Environmental Protection Agency in accordance with the National Emission Standard for Asbestos, 40 CFR Part 61.
2. New York State Department of Labor Notification: The form required by the State of New York Asbestos Control Program in accordance with Article 30 of the New York State Labor Law.
3. Any proposed project specific variance to any of the applicable regulations.

Upon return of submittals from the Engineer with an action stamp indicating that the submissions have been reviewed and comply with the contract documents, file all notifications with the appropriate agencies in accordance with all applicable regulations and these specifications. Pay the appropriate fees. All filing fees and associated costs shall be borne by the Contractor.

- B. Submit the following items to the Engineer for review ten (10) days prior to the commencement of Work associated with this section. No Work shall begin until ALL submittals are returned with an action stamp indicating that the submission is in accordance with these specifications.

1. NOTIFICATIONS: Stamped received copies of the notifications (EPA only) and variances listed above in item A, as well as copies of the canceled checks used to pay all associated fees.
2. CONTRACTOR'S CERTIFICATION: Documentation confirming licensing by New York State Commission of Labor for asbestos Work in accordance with Industrial Code Rule 56.
3. WORKER DOCUMENTATION: Current copies of the AHERA certificates, New York State Department of Labor Asbestos Handling Certificates, Medical Exams and Respirator Fit Tests for all employees performing the Work of this Section.
4. EMPLOYEE RELEASE FORM: Prior to allowing an employee to perform any Work on the project, submit the properly executed Employee Release Form for each employee. A copy of this form is included herein.
5. CONTINGENCY PLANS: A copy of emergency, security, and contingency plans as follows:
 - a. A plan to provide for emergency and fire evacuation of personnel from the Work Zone in an emergency. File a copy of this plan with the local fire and/or ambulance unit;
 - b. A plan for maintaining the security of the Work Zone. The security plan shall provide a means of preventing accidental or unauthorized entry. Provide security to the

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decontamination facility and all points of potential access to the Work Zone 24 hours per day during abatement. Submit the form of security and safety log that will be maintained on the project;

- c. A contingency plan addressing emergencies, equipment failures, and barrier failure. Include the telephone numbers of at least three (3) responsible persons who shall be in the position to dispatch men and equipment to the project in the event of an emergency.
6. LANDFILL: Written evidence that the landfill to be used for disposal of asbestos is approved for disposal of asbestos by the New York State Department of Environmental Conservation (NYS Part 360 Permit) and by the US EPA. In the event the landfill is not located in New York State, approval from the agency having jurisdiction over the landfill must be received. Documentation that the proposed hauler and landfill have the proper permits and are willing to accept the asbestos waste.

The hauler must have a Waste Transporter Permit pursuant to Article 27, Titles 3 and 15, of the Environmental Conservation Law from the New York State DEC, Division of Hazardous Substance Regulations (NYS Part 364 Permit).
7. MATERIAL SAFETY DATA SHEETS: For all products intended to be used on the project, a Materials Safety Data Sheet in accordance with the OSHA Hazard Communication Standard 29 CFR 1910.1200. Include a separate attachment indicating the specific worker protection equipment required for each material.
8. PRESSURE MONITORING DEVICES: Manufacturer's data on type of equipment to be used to provide a continuous record of pressure differentials. Provide a drawing showing locations and number of units to be used.
9. AIR FILTRATION DEVICES: Manufacturer's data on type of equipment to be used to remove airborne asbestos.
10. ROOM INSPECTION: Inspect all areas in which Work is to be performed. Inspection shall occur in the presence of representatives of the Owner and Engineer. Record any existing damage to components, such as walls, doors, windows, carpeting, fixtures, and equipment. Any damaged components found after completion of the Work will be repaired at the Contractor expense. Make arrangements for the inspection, notify the participants, record the findings, and issue minutes of the inspection to all participants.
11. SCHEDULES: A copy of construction, staffing, and equipment schedules:
 - a. A construction schedule stating critical dates of the job including start and completion of mobilization, activation, deactivation, and demobilization of all Work activities (including mobilization, Work Zone preparation, asbestos abatement,

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inspection and clearance monitoring, each phase of refinishing, and final inspections). Update schedule with each partial payment request. Changes in schedule are subject to the Engineer's approval and require three (3) days prior notice.

- b. A schedule of staffing stating number of workers per shift, name and number of supervisor(s) per shift, hours per shift, shifts per day, and total days to be worked;
 - c. A schedule of equipment to be used including numbers and types of all major equipment such as high efficiency particulate absolute (HEPA) air filtration units, HEPA vacuums, and airless sprayers.
12. INSURANCE POLICIES: A copy of all Insurance policies required by this contract, including the *Asbestos Abatement General Liability Occurrence Insurance*, without a sunset clause, in amounts not less than \$1,000,000, each occurrence, naming the Owner as the Certificate Holder. Also, include insurance policies of any subcontractor, including the Sudden and Accidental Pollution Liability Insurance required of the Hauler. The following list of Additionally Insured must be included under insurance policies held by the Contractor on this project:
- a. City of Yonkers Engineering Department and its employees
 - b. Warren Panzer Engineers P.C. and its Employees
13. AIR SUPPLY SYSTEM: Manufacturer's product information for each component used in the Type "C" supplied air respiratory system, including NIOSH and MSHA Certifications for each component in an assembly and/or the entire assembly. Provide a notarized certification that the system is capable of providing Grade "D" breathable air. Submit a copy of the manufacturer's operations manual for the air purification system and the carbon monoxide monitor.

Prepare a drawing showing the assembly of components into a complete supplied air respiratory system. Document the number and size of electric air pumps and/or air supply tanks to be kept at the site at all times to ascertain that sufficient air is being supplied to the maximum number of users. Prepare a diagram showing the location of the electric air pumps, the air supply tanks and the hose line connections. The use of gas compressors will not be allowed. Submit complete operating and maintenance instructions for all components and systems as a whole. Bind manual in a form suitable for field use.

- C. Daily during the conduct of abatement activities, submit to the Engineer the following:

Printouts from pressure differential monitoring equipment marked with date and Work start/stop times for each day. Use printout paper that indicates elapsed time in intervals no greater than one hour. Indicate on each day recording times of starting and stopping abatement Work, type of Work in

progress, breaks, and filter changes. Cut printout into segments by day and label with project name, Contractor's name and date;

- D. Within thirty (30) days of removal from the premises, submit to the Owner the disposal certificate(s) from the landfill receiving the Asbestos Waste stating dates and quantities received.
- E. Within seven (7) days of completion of all Work associated with this Section submit to the Owner, the following:
 - 1. A bound copy of the job log book showing sign in and sign out of all persons entering the Work Zone, including name, date, time, and position or function and a general description of daily activity. Keep these records on file for the duration of employment plus 30 years;
 - 2. A notarized statement attesting that all personnel performing any work under this Contract were compensated in accordance with the prevailing wage rates contained herein.

1.04 Special Reports

- A. Except as otherwise indicated, submit special reports directly to the Owner and the Engineer within one (1) day of the occurrence requiring the special report, with copies to all others affected by the occurrence.
- B. When an event of unusual and significant nature occurs at the site (examples: failure of negative pressure system, rupture of temporary enclosures, unauthorized entry into Work Zone), prepare and submit a special report listing date and time of event, chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information.
- C. Report any accidents, at the site and anywhere else Work is in progress related to this project. Record and document data and actions. Comply with industry standards.

1.05 Quality Assurance

- A. Where methods or procedures are specified, they shall constitute minimum measures and shall in no way relieve the Contractor of sole responsibility for the means, methods, techniques, sequences, or safety measures in connection with the Work.
- B. Provide foremen who speak fluent English to supervise all abatement activities. Foremen shall be certified as handler supervisors in accordance with Section 902 of the New York State Labor Law Article 30, and have experience in this field and can furnish a record of satisfactory performance on at least three (3) projects for Work of comparable type.
- C. Any proposed Subcontractor performing any Work under this Section "Asbestos Removal and Disposal" shall have similar qualifications. Submit qualifications with the BID for any proposed Subcontractor. Submit Subcontractor qualifications in the same form and quantity as required for the Contractor.

1.06 Applicable Standards and Regulations

- A. Perform all Work in compliance with the most current version of all pertinent laws, rules, and regulations, existing at the time of Work, including, but not limited to:
1. Code of Federal Regulations
 - a. Title 29 CFR Parts 1910.1001, 1910.1200, 1910.134 1926.58 and 1926.1101;
[The Occupational Safety and Health (OSHA) Standards]
 - b. Title 30 CFR Part 61, Subpart G;
[The Transport and Disposal of Asbestos Waste]
 - c. Title 40 CFR, Part 61, Subparts A and M;
[The EPA National Emission Standard for Hazardous Air Pollutants, and the National Emission Standard for Asbestos]
 - d. Title 40 CFR, Part 763,
[Asbestos Containing Materials in Schools; Final Rule and Notice]
 - e. Title 49 CFR Parts 106, 107, and 171-179.
[The Transportation Safety Act of 1974 and the Hazardous Material Transportation Act]
 - f. Public Law 101-637
[ASHARA]
 2. New York State Official Compilation of Codes, Rules and Regulations.
 - a. Title 12 Part 56
 - b. Title 10 Part 73
 - c. Title 6 Parts 360-364
 - d. Labor Law - Article 30 and Sections 900-912.
 - e. All applicable Additions, Addenda, Variances and Regulatory Interpretation Memoranda.
 3. Applicable Standards
 - a. The American National Standard Institute (ANSI) Practices for Respiratory Protection ANSI Z88.2-1980.

- b. The American National Standard Institute (ANSI) Fundamentals Governing the Design and Operation of Local Exhaust Systems.
 - c. UL 586 Test Performance of High Efficiency Particulate Air-Filter Units.
- B. In the event, there is a conflicting point between these provisions, the most stringent one shall apply.

1.07 Air Monitoring

- A. Conduct personnel air monitoring in accordance with OSHA requirements. Collect a sufficient number of samples to determine the Time Weighted Average exposure of twenty percent (20%) of the work force.
- B. The Owner will provide area air monitoring as follows:

<u>Sample Type</u>	<u>Analysis Method</u>
Pre-abatement	PCM
During abatement activities	PCM
Clearance air monitoring	PCM & TEM

The Contractor shall cooperate with the Owner's designated representatives with regard to air monitoring and project monitoring procedures. Ensure that employees and Subcontractors do the same.

- C. If analysis of any of the air samples collected during abatement indicates that the airborne asbestos concentration outside the Work Zone is greater than or equal to 0.01 f/cc or the background level, whichever is greater:
 - 1. Stop Work immediately;
 - 2. Inspect the integrity of the barriers;
 - 3. Wet clean and vacuum the location where elevated fiber counts were reported; and
 - 4. Do not resume Work until such time when the airborne asbestos concentration outside the Work Zone is once again less than the above limit.
 - D. In order to pass PCM clearance testing, the analysis of each and every sample collected shall indicate that the airborne fiber concentration is less than 0.01 fibers per cubic centimeter or the background level whichever is greater.
 - E. In order to pass TEM clearance testing, each and every sample collected shall indicate that the airborne structure concentration is less than 0.01 structures per cubic centimeter or the background

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level whichever is greater and the average structure concentrations inside the Work Zone shall not be statistically larger than the average of ambient levels as determined by the Z-test.

- F. The method of sampling shall be aggressive or nonaggressive depending on the requirements of applicable regulations. The method of analysis for pre-abatement and during abatement shall be NIOSH 7400 using Phase Contrast Microscopy (PCM). Post-abatement samples shall be analyzed by Transmission Electron Microscopy (TEM) for AHERA compliance projects, in accordance with Appendix A to Subpart E-Interim TEM Analytical Methods. For non-AHERA projects, the decision of testing with either PCM or TEM for final air clearance monitoring will be made by the Engineer. The testing laboratory will be a member of the Environmental Laboratory Approval Program (ELAP).
- G. In case of failure of the initial final air clearance monitoring, the work zone will be retested following immediate relearning. This process will be repeated as necessary until final air clearance is obtained. All costs and expenses resulting from the additional relearning and retesting (including sampling and analysis) due to failure of the initial final air clearance shall be borne by the Contractor. The expenses thereby incurred will be deducted from any monies due or that may become due to the Contractor.
- H. The Contractor shall provide security personnel to watch the decontamination facility and all points of potential access to the Work Zone.

- END OF PART 1 -

PART 2 - PRODUCTS

2.01 Air Filtration Unit

- A. Use only Air Filtration Units in compliance with ANSI Z9.2 (1979), Local Exhaust Ventilation. The final filter in each unit shall be of the HEPA type. Use only Air Filtration Units certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 micron dioctylphthalate (DOP) particles.
- B. Equip the system with the following:
 - 1. An automatic shutdown that will stop the fan in the event of a rupture in the HEPA filter or blocked air discharge;
 - 2. Warning lights and/or alarms to indicate an excessive pressure drop across the filters or an insufficient pressure drop across the filters;
 - 3. A non-resettable elapsed time meter to indicate the total accumulated hours of operation;
 - 4. A gauge or manometer to measure the pressure drop across the filter.

2.02 Asbestos Caution Signs

- A. Use Asbestos Caution Signs as specified in OSHA Title 29 CFR 1910.1001(j) and 1926.58(k). Posting of warning signs in and around the work site should be in cooperation with the Department of Correction and with approval by the Department of Correction.

2.03 Asbestos Caution Labels

- A. Use Asbestos Caution Labels as specified in OSHA Title 29 CFR 1910.1001(j) and 1926.58(k).

2.04 Disposal Bags

- A. Use Disposal Bags which are a minimum six (6) mil in thickness, clear in color and preprinted with the Asbestos Caution Label.

2.05 Encapsulating Material

- A. All Encapsulating Materials shall be approved by UL for use in class 1A buildings and shall have composite fire and smoke hazard ratings as tested under procedure ASTM E- 84, NFPA 255 and UL 723

Flame Spread	25
Smoke Developed	50

- B. If the removal of fireproofing materials is included in this Contract, select an encapsulant from those approved by UL for use with the new fireproofing. If Retro-Guard Type RG or RG-1 manufactured by W.R. Grace & Co. is to be applied, use American Coatings 22P & 22 Power lock, or Fiber lock Fiber set FT and Fiber set PM, or Certane 909 and 1000, or H.B. Fuller 32-60 and 32-61, or IPC Serpliflex and Serpiloc.

2.06 Equipment

- A. Temporary lighting, heating, hot water heating units, ground fault interrupters, and all other equipment on site shall be UL listed and shall be safe, proper, and sufficient for the purpose intended.
- B. All electrical equipment shall be in compliance with the National Electric Code. Attention is specifically called to Article 305 Temporary Wiring.

2.07 First Aid Kits

- A. Maintain adequately stocked first aid kits in the Clean Room and Work Zone, in accordance with OSHA requirements.

2.08 High Efficiency Particulate Air (HEPA) Filters

- A. Employ filters which have been individually tested and certified by the manufacturer to have an efficiency of not less than 99.97 percent when challenged with 0.3 micron dioctylphthalate (DOP) particles, in accordance with Military Standard Number 282 and Army Instructional Manual 136-300-175A. Each filter shall bear a US 586 label to indicate ability to perform under the specified conditions.
- B. Each HEPA filter shall be marked with the name of the manufacturer, serial number, air flow rating, efficiency and resistance, and the direction of air flow.

2.09 Glove bags

- A. Use only commercially available Glove bags. Use Glove bags constructed of clear fire retardant plastic, which have a minimum thickness of six (6) mil.
- B. Use Glove bags appropriately sized for the pipe. Use Glove bags, the dimensions of which exceed the pipe insulation diameter by a factor of four (4).

2.10 Plastic

- A. Use only new fire retardant plastic sheets of polyethylene, which has a minimum thickness of 6 mil, true grade.

- B. For the initial floor, protective layer use only new reinforced plastic sheets of polyethylene, which has a minimum thickness of ten (10) mil, true grade. As an alternative, apply a ten (10) mil thick layer of "Spray-Poly" by Isotek or as approved.

2.11 Plywood

- A. Use only fire-rated CDX plywood, which is at minimum one half inch (1/2") in thickness.

2.12 Respirators

- A. Use only respirators approved by the Mine Safety and Health Administration (MSHA), Department of Labor, or the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

2.13 Sealants

- A. Use a combination fire stop foam and fire stop sealant. Use Dow Corning Fire Stop Foam and Dow Corning Fire Stop Sealant or as approved. Apply in accordance with manufacturer's recommendations.

2.14 Studs

- A. Use only 2" x 4" fire-rated CDX or metal studs.

2.15 Supplied Air System

- A. At all times, air supplied to the type "C" respirators shall be Grade "D" Breathable Air as described by OSHA Regulation 29 CFR 1910.134(d)(1), containing less than the following:

Carbon Monoxide :	20 parts per million
Carbon Dioxide :	1,000 parts per million
Condensed Hydrocarbons:	5 milligrams per cubic centimeter
Objectionable odors:	None

- B. Provide a minimum of one (1) hour of reserve air for emergency evacuation. Post, in the Work Zone, emergency evacuation procedures to be followed in the event of breathing air system failure. Explain procedures to all workers prior to commencement of the Work.
- C. Water content shall be less than 66 parts per million in order to protect the air purification unit. Certify the air quality of the system prior to beginning asbestos abatement Work and every two weeks during asbestos abatement Work by an independent laboratory certified by the American Board of Industrial Hygiene. Collect samples under the supervision of a Certified Industrial Hygienist. Submit copies of certified test results to the Engineer within five (5) days of the sample collection.

2.16 Vacuums

- A. Use only vacuums equipped with HEPA filters.

2.17 Wetting Agents

- A. The wetting agent shall be water amended with one (1) oz. of a chemical surfactant per five (5) gallons of water. The composition of the surfactant shall be approximately 50% polyoxyethylene ether and 50% polyoxyethylene esters.

- END OF PART 2 -

PART 3 - EXECUTION

3.01 Personnel Protection

- A. Satisfy all applicable Worker protection requirements.
- B. Provide protective equipment for use by Workers and designated representatives of the Owner including disposable full body coveralls, respirators and approved cartridges, gloves, hard hats, and goggles. Maintain on site, two (2) sets of protective equipment for the exclusive use of representatives of the owner.
- C. At all times, provide all persons with personally issued and marked respiratory equipment suitable for the asbestos exposure level in the Work Zone. Ensure that all persons properly use this equipment at all times.
- D. As a minimum, half face negative pressure type respirators must be worn by all personnel during Work Zone preparation. If airborne concentrations of asbestos inside the Work Zone exceed 0.1 fibers per cubic centimeter, employ either PAPR or type "C" respiratory protection whichever is appropriate.
- E. PAPRs (Powered Air Purifying Respirators) shall constitute the minimum level of respiratory protection for all persons entering that Work Zone from the time the Work Zone is activated until acceptance.
- F. Should airborne concentrations of asbestos inside the Work Zone exceed 2.0 fibers per cubic centimeter, supply all personnel with personally issued and marked Type "C" supplied air respirators operated in the positive pressure demand mode.
- G. If the permissible respirators fail to provide sufficient protection against volatile substances emitted by any sealants or other chemicals used, the services of a certified industrial hygienist will be procured, at the Contractor's expense, to determine proper respiratory protection. The Owner will not be liable for the cost of increased respiratory protection.
- H. Maintain surveillance of heat stress conditions in the Work Zone. The prevailing Threshold Limit Values (TLVs) for heat stress and the method of heat stress measurement adopted by the American Conference of Governmental Industrial Hygienists (ACGIH) shall govern worker exposure to heat stress.

3.02 Decontamination

- A. Construct and operate the Personnel and Waste Decontamination Enclosure Systems in conformance with all applicable rules and regulations. Locate decontamination units outside of the Work Zone.

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- B. Construct the Personnel Decontamination Enclosure System (PDES) as a series of six (6) completely enclosed and connected rooms: An Airlock, an Equipment Room, a second Airlock, a Shower, a third Airlock, and a Clean (locker) Room. Separate rooms with curtained doorways.
1. Ensure that all egress from the Work Zone is through the PDES.
 2. Ensure that all persons leaving the Work Zone vacuum themselves of asbestos in the Work Zone and disrobe in the Equipment Room, shower (including washing of hair) with respirator on, and redress in the Clean Room.
 3. Ensure that all persons entering the Work Zone wear clean and new protective clothing and equipment prior to entrance.
 4. Equip the Shower with hot and cold water adjustable at the tap, liquid soap, shampoo and disposable towels.
 5. Leave all contaminated clothing and equipment in the Equipment Room in barrels or bags. Sanitize respirators in the showers. Equip with fresh cartridges in the Clean Room.
 6. No more than one curtained doorway shall be opened at the same time.
- C. Remove all asbestos containing waste materials, equipment, or any other materials through the Waste Decontamination Enclosure System (WDES). The WDES shall consist of a series of four (4) completely enclosed and connected rooms: An Airlock, a Washroom, a second Airlock, and a Holding Area. Separate rooms with curtained doorways. Remove materials, waste and equipment as follows:
1. No more than one curtained doorway shall be opened at the same time.
 2. Before removing any equipment or asbestos from the Work Zone,
 - a. Containerize (or bag) all asbestos;
 - b. Wet clean all equipment and packaged asbestos.
 3. Place equipment and asbestos in the first Airlock. Workers in the Work Zone shall not enter the Airlock and the Curtained Doorway between the Airlock and the Washroom shall remain closed during this procedure.
 4. Uncontaminated Workers in clean new protective equipment shall enter the WDES from outside the Work Zone and enter the Washroom.
 5. While in the Washroom:

- a. Remove Waste and Equipment from the first Airlock;
 - b. Wet clean all equipment and all packaged asbestos containing waste;
 - c. Place bags and other containers into an additional completely clean bag or wrap in plastic. Bags and plastic used for this purpose shall not enter the Work Zone;
 - d. Place equipment and asbestos in the second Airlock. Workers in the Work Zone shall not enter the Airlock and the Curtained Doorway between this Airlock and the Holding Area shall remain closed during this procedure.
6. Uncontaminated Workers in clean new protective equipment shall enter the Holding Area from the outside area and remove containerized materials from the airlock.
 7. All workers shall proceed into the Work Zone for exiting by way of the PDES. Ensure that personnel do not leave the Work Zone through the WDES.

3.03 Work Zone Preparation

- A. Electrical Power: Unless otherwise indicated, shut down all electric power within the Work Zone, as follows:
 1. Lock all circuits, which have been shut off, in the off position and label with a printed tag which reads as follows:

"TEMPORARY DISCONNECT
Due to Asbestos Removal Project
DO NOT ACTIVATE THESE CIRCUITS"
 2. Provide temporary power and lighting and ensure safe installation of temporary power sources and equipment per applicable electrical code requirements. Provide all equipment which must remain operable, as well as all temporary ground-fault interrupter circuits for lights and electrical equipment. Individually protect all power equipment used inside each Work Zone with in-line ground fault interrupters. Locate ground-fault interrupter outside of the Work Zone.
 3. Provide all electrical tie-ins and extensions. Provide a temporary panel board, connected to an electric panel designated by the Owner.
- B. Heating Ventilation and Air Conditioning (HVAC): Employ all means necessary to prevent contamination and fiber dispersal to other areas of the structure, as follows:

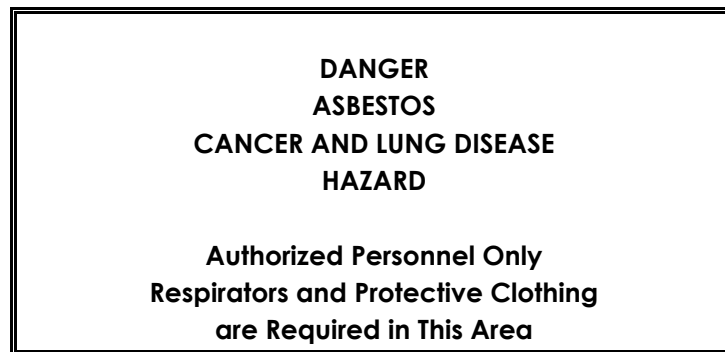
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1. Thoroughly clean all HVAC Equipment and ductwork in the Work Zone. Seal all vents within the Work Zone with tape and plastic. Seal all HVAC duct seams. Wrap all ductwork in two (2) layers of plastic.
2. Remove all HVAC filters. Pack disposable filters in sealable double plastic bags for disposal at the approved landfill. Replace with new filters after final cleanup. Wet-clean permanent filters; reinstall after final cleanup.
3. Remove all heating and ventilating equipment grills, diffusers, returns, and other items located on the asbestos bearing surfaces. Wet clean all such items, seal in two (2) layers of plastic and remove from the Work Zone. Reinstall all displaced items after satisfactory clearance air testing.
4. HVAC systems shall be treated as follows:
 - a. Unless otherwise indicated, shutdown and lockout all heating, ventilating and air conditioning systems. Isolate system at points of entry to the Work Zone; use two (2) layers of plastic.
 - b. In cases where the HVAC system serving the Work Zone also serves other areas of the building which must remain in operation,
 - i. Isolate the ductwork entering the Work Zone from the remainder of the system. Cap all ductwork where it passes in or out of the Work Zone with galvanized steel ASTM 5261 in accordance with SMACNA HVAC Duct Construction Standards. Cover with two (2) layers of plastic.
 - ii. Operate the affected HVAC system twenty-four (24) hours per day from the initiation of Work Zone activation until successful final air clearance. Maintain a positive pressure within the operational portion of the HVAC system of 0.05-inch water gauge or greater with respect to the ambient pressure outside of the Work Zone. Install pressure monitoring devices.
 - c. In cases where it is necessary for ductwork passing through the Work Zone to remain active, the following conditions are to be maintained:
 - i. Maintain a positive pressure within the HVAC system of 0.05-inch water gauge (or greater) with respect to the ambient pressure outside of the Work Zone: the conditions for this system shall be maintained and be operational twenty-four (24) hours per day from the initiation of Work Zone preparation until successful final air clearance.
 - ii. Test, inspect and record the positive pressure in the duct both at the beginning and at the end of each shift.

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- iii. Monitor the positive pressurization of the duct using instrumentation that will trigger an audible alarm, if the static pressure falls below the set value.
 - iv. Place the supply air fan and the supply air damper for the active positive-pressurized duct in the manual "on" position to prevent shutdown by fail safe mechanisms.
 - v. Shut down and lock out the return air fan and the return air dampers.
 - vi. Cover all active HVAC ducts that pass through the Work Zone with two (2) layers of plastic.
- C. Steam Systems: Unless otherwise noted on the Drawings, shut down all steam systems passing through the Work Zone prior to activation.
- D. Utilities: Provide all water, electrical and waste facility connections, as well as all sanitary drains. The Contractor will not be charged for water used, electricity consumed, or discharges made to sanitary sewers as a part of this project.
- E. Temporary Service Lines: Upon completion of abatement activities, remove all temporary service lines and restore to their original conditions, in a manner acceptable to the Engineer. Repair any part of the permanent service lines, equipment and building facilities disturbed or damaged as a result of the installation or removal of the temporary service lines.
- F. Temporary Heating: Provide temporary heating in the Work Zone, as needed to maintain a minimum temperature of 50°F. Heating equipment shall be approved by the Engineer.
- G. Movable Objects: Before Work is initiated, clean all items which can be removed without disrupting any asbestos material. Pre-clean movable objects within the proposed areas using HEPA filtered vacuum equipment an/or wet cleaning methods as appropriate; remove such objects from Work Zones to a temporary location, as directed by the Engineer.
- H. Fixed Objects: Pre-clean non-removable objects within the proposed Work Zones, using HEPA filtered vacuum equipment and wet cleaning methods as appropriate prior to abatement activities, and enclose with two (2) layers of plastic sealed with tape.
- I. Openings: Prior to placing plastic on walls, floors and ceilings, seal off all openings, including, but not limited to corridors, doorways, windows, skylights, ducts, grills, diffusers, and any other penetrations of the Work Zones, with two (2) layers of plastic sealed with tape.
- J. Floor, Wall and Ceiling Penetrations: Prior to any abatement activities fire stop all openings or penetrations that have not already been sealed. This includes both empty holes, expansion joints and holes accommodating items such as cables, pipes, ducts, conduit, etc.

- K. Fire Exits: Maintain emergency and fire exits from the Work Zones, or establish alternative exits satisfactory to the local fire officials. Provide panic exit devices for security and egress. Establish this exit in accordance with all applicable codes and regulations.
- L. Signs: Outside of the perimeter barrier and at all entrances and exits to the Work Zone, post signs in English, Spanish and any other language spoken at the project location.
1. The signs shall read:



2. Demarcate the regulated area. Post signs at such a distance from the area that an employee will read these signs before entering the area.
- M. All of the above procedures shall be completed prior to the disturbance of any asbestos containing material.

3.04 Engineering Controls

- A. Maintain the Work Zone at an air pressure that is lower than that in any surrounding space in the building, or at any location in the immediate proximity outside of the building envelope. This pressure differential when measured across any physical or critical barrier must equal or exceed a static pressure of 0.05 inches of water.
- B. From the start of abatement activities:
1. Operate air filtration units continuously during the project, twenty-four (24) hours a day, from the start of abatement through successful clearance air monitoring, in accordance with "Specifications and Operating Procedures for the Use of Negative Pressure Systems for Asbestos Abatement", Guidance for Controlling Asbestos-Containing Materials in Buildings, EPA Report Number 560/5-85-024 (1985).
2. Install the air filtration units in quantities and locations as required in order to achieve the required negative pressure.

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3. Provide a minimum of one air change every ten (10) minutes for the area under negative pressure. Assume Air Filtration Units will operate at 50% of their rated capacity. Maintain on site, one (1) spare air filtration unit for every five (5) in use.
4. Locate the exhaust unit(s) so that makeup air enters the Work Zone primarily through the Decontamination Systems and traverses the Work Zone as much as possible. Provide the specified number of air changes throughout the Work Zone. Place the end of the unit or its exhaust duct through an opening in the plastic barrier or wall covering. Seal the plastic around the unit or exhaust duct with tape.
5. Whenever possible, exhaust air filtration units to the outside of the building away from occupied areas in such a manner so that the air intake ports, louvers, or entrances for the building or adjacent buildings will not be adversely affected. In cases where it is impossible to exhaust outside of the building, provide a second air filtration unit in series. For runs longer than 150 feet install additional air filtration units every 150 feet.
6. Use ducting, of equivalent or larger dimension as that of the air filtration unit exhaust port, to exhaust to the outside of the structure. Ducts shall exhaust, at minimum fifty (50) feet from all intakes or entrances to the building or adjacent buildings. Seal and brace all ductwork. Maintain airtight joints. Prevent fiber release into uncontaminated building areas.
7. Place the air filtration system exhaust ducts overhead in an inconspicuous, non-restricting fashion. Connect the ducts to a 14" flange, as shown on the Drawings.
8. All filters shall be accessible from the Work Zone or contaminated side of the barrier. Prior to initial use, replace all filters in air filtration units in the presence of the Engineer with new and unused filters.
9. Use a dedicated power supply for the air filtration units.
10. In the event of loss of negative pressure or electric power to the negative pressure ventilating units, stop all abatement Work immediately. Do not resume Work until power is restored and negative pressure equipment is operational. Under no circumstances shall any Asbestos abatement take place without having the negative air pressure system fully operational.
11. When loss of negative pressure equipment lasts, or is expected to last longer than one-half hour:
 - a. Seal airtight all auxiliary make-up air inlets;
 - b. Seal all Decontamination Systems airtight after the evacuation of all personnel from the Work Zone;

- c. All adjacent areas will be monitored by the Engineer at the Contractor's expense for asbestos fiber concentration.
- 12. Use ventilation smoke tubes to check the system performance.
- 13. Monitor and record the pressure differential between the Work Zone and the outside of the Work Zone with a monitoring device incorporating a continuous recorder (e.g. strip chart). Equip with an audible alarm which will signal if the pressure differential drops below 0.05 inches of water.

3.05 Asbestos Removal

Modified Containment Procedures (Floor Tile and Mastic)

Work in this part shall be performed in accordance with ICR 56, Applicable Variances AV-120 and the contract documents.

The sequence of abatement activities shall be as follows:

- A. Modified Containment, completely isolate the Work Zone as shown on the Drawings. Extend the Work Zone to such limits as to permit the removal of all asbestos containing materials within the Work Zone. Isolate the Work Zone as follows:
 - 1. Construct the Remote Decontamination Units for personnel and waste, as shown on the Drawings. Use studs, sixteen inches on center, covered with plywood and two (2) sheets of plastic.
 - 2. Construct isolation barriers. Where feasible, use existing walls and partitions. Where necessary, frame temporary partitions with studs sixteen (16) inches center on center. To support plastic for all areas larger than thirty-two (32) square feet, except where one of the dimensions is less than one (1) foot, reinforce temporary partitions with plywood. Test the negative pressure system to ensure that the 0.05-inch differential is present.
 - 3. Construct an entrance/exit airlock chamber, a minimum of 5' X 5' in size, at the entrance to each work zone so as to allow each worker to remove their outer suit, wipe off their inner suit and don a clean suit before proceeding to the remote decontamination enclosure system. ACM shall be bagged and brought to the Decontamination Enclosure System. At the Decontamination Enclosure, the bags will be wet wiped and the waste double bagged.
 - 4. Cover the floor of the decontamination unit and airlock with reinforced polyethylene sheeting.
 - 5. Cover interior surfaces of the Work Zone with a layer of plastic sealed with tape. Cover the walls with plastic from the floor level to a height of 4' minimum. Overlap seams in plastic 12" minimum and seal with tape. In areas where floor carpet is to remain, cover the floor with an

additional layer of reinforced polyethylene sheeting. The plastic shall be attached with adhesives, furring strips and screws, tape, staples, etc., sufficient to prevent collapse or sagging of any plastic covering. **Inspect all plastic three times a day for sagging and repair all such sags or failures immediately.**

6. Install a second layer of plastic on all interior Work Zone Surfaces. Repeat procedure detailed above in 3.05. A.5.
7. Where required, electrical, telephone equipment, ductwork, etc. shall be covered with three (3) layers of six (6) mil polyethylene sheeting. Energized circuits will be posted with signs warning 'CAUTION - ELECTRICALLY ENERGIZED', in three-inch-high letters.
8. Secure a source of water within the Work Zone (other than the Shower within the Decontamination Zone) for wetting and cleaning.
9. Test the negative pressure system prior to any abatement actions to ensure that the 0.05-inch differential is present. Wait twelve (12) hours. Test system again. If the test results are acceptable to the Engineer, the Work Zone will be activated. Do not disturb Asbestos containing materials prior to activation.
10. Wet all Asbestos prior to removal using a wetting agent. Maintain asbestos wet until packaged for disposal.
11. Upon removal of the floor tile and mastic, directly bag or drop into a flexible catch basin all asbestos containing waste material.

ALL ACM shall be bagged immediately and brought to the Waste Decontamination Enclosure System. At the Decontamination Enclosure, the bags will be wet wiped and the waste double bagged.

3.06 Encapsulation

- A. Apply Encapsulating material using an airless sprayer. Comply with manufacturer's recommendations. The Encapsulating material shall be mixed with contrasting color paint to assure proper application.

3.07 Disposal Practices

- A. Wet and properly package all Asbestos prior to removal from the Work Zone via the Waste Decontamination Enclosure System. Remove all residual asbestos from the exterior of any package, drum, bag, or other container of Asbestos prior to removal from the Work Zone. Affix the ASBESTOS CAUTION label, the name of the Owner, the name of the Contractor, the name of any Tenant and the location where generated to all packages, drums, bags or other containers used for Asbestos disposal.

- B. Store all Asbestos Waste in a totally secure manner. Transport all Asbestos Waste to the disposal site within seven (7) days after completing the Work of this section or thirty (30) days after removal, whichever comes first.
- C. Transport Asbestos Waste through the building at the direction of the Engineer at times designated by the Owner. Use sealed carts.
- D. During the transport of Asbestos Waste, on or across public thoroughfares, employ a hauler bearing all required permits for the hauling of asbestos. The haulers shall carry insurance in the same types and amounts as the Contractor. In addition, the hauler shall carry "Sudden and Accidental Pollution Liability Insurance in an amount not less than \$1,000,000.
- E. Dispose of Asbestos Waste at approved landfill bearing all appropriate licenses and permits for asbestos disposal and operated in compliance with all applicable rules and regulations. The Landfill used shall be dedicated for asbestos materials only and shall not accept any other hazardous substances.
- F. Within thirty (30) days of removal from the premises, the Contractor shall provide the Owner with disposal certificate(s) from the approved waste disposal site. Final payment will not be approved until all disposal certificates have been provided.

3.08 Clean-up Procedures

- A. Daily, during abatement activities:
 - 1. Clean-up visible accumulations of loose Asbestos Waste whenever a sufficient amount of Asbestos Containing Material to fill a single asbestos waste bag has been removed. Removal all waste materials from the Work Zone at the end of each work shift. Maintain visible material wet until after clean up.
 - 2. Place visible accumulations of Asbestos Waste in containers utilizing non-metallic dust pans and non-metallic squeegees or vacuums.
 - 3. Do not use metal shovels.
 - 4. Wet clean and vacuum all surfaces of the Work Zone on a daily basis.
 - 5. Upon completion of waste removal, wet clean the WDES twice. When the PDES Shower Room alternates as a Washroom, wash the Shower Room immediately with cloths or mops saturated with a detergent solution prior to wet cleaning.
 - 6. Wet clean and vacuum the WDES as appropriate, as a minimum after each shift change and meal break.

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7. If excess water accumulates in the Work Zone, stop Work until the water is collected and disposed of properly.
 8. If Asbestos Waste is spilled in an elevator shaft:
 - a. Immediately evacuate, shut down and isolate all of the elevators in the affected elevator bank.
 - b. Place all spilled visible accumulations of Asbestos Waste in clean and unused containers.
 - c. Vacuum and wet clean all of the contaminated surfaces in the elevator car and shaft in repetitive cycles until clearance air levels are achieved in the car and at each terminus of the shaft.
- B. Final Clearance, The Work Zone will be considered acceptable when it has passed both visual inspections and air testing performed by the Engineer according to the criteria and sequence below:
1. In order to pass each of the visual inspections, the Work Zone and adjacent areas shall be free of all visually apparent asbestos. Any disputes over the results of any visual inspection shall be resolved by the Contractor submitting the results of bulk sample analysis demonstrating the contents of the material in question. Remove all Asbestos materials and all asbestos contaminated materials; non-asbestos materials may remain. The laboratory performing such analyses shall be a regular participant in the ELAP Quality Assurance Program for bulk sample analyses with performance results satisfactory to the Engineer. The Engineer reserves the right to independently verify the bulk results.
 2. If the Work Zone is not suitable for acceptance for any reason, promptly perform the Work requested by the Engineer.
 3. Keep each Work Zone isolated and posted with ASBESTOS CAUTION and CAUTION KEEP OUT signs until after acceptance.
 4. Typical acceptance sequence shall be as follows:
 - a. After removal of visible accumulations of Asbestos Waste, vacuum all surfaces;
 - b. Remove all bagged materials from the Work Site;
 - c. Wet clean and vacuum all objects and surfaces in the Work Zone;
 - d. Visual inspection by the Engineer;

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- e. Encapsulate all plastic within the Work Zone limits, do not encapsulate surfaces from which asbestos was removed;
- f. Remove, bag, and remove from the Work Site the first layer of plastic;
- g. Vacate the Work Zone for four (4) hours;
- h. Wet clean and vacuum all objects and surfaces in the Work Zone for a second time;
- i. Visual inspection by the Engineer;
- j. Vacate the Work Zone for four (4) hours;
- k. Remove, bag and remove from the Work Site the second layer of plastic;
- l. Wet clean and vacuum all surfaces in the Work Zone for a third time;
- m. Vacate the Work Zone for four (4) hours;
- n. Visual inspection by Engineer to verify the absence of Asbestos Waste, dust and or debris;
- o. Clearance Air Monitoring;
Clearance air monitoring shall consist of five air samples taken inside of the work area and five air samples taken outside of the work area.
- p. Upon successful clearance air testing, encapsulate surfaces from which Asbestos was removed;
- q. Wait for encapsulant to dry;
- r. Final Acceptance will be granted provided that items a thru n have been met to the satisfaction of the Engineer;
- s. Shut down air filtration units (demobilization);
- t. Remove the isolation barriers in conjunction with the use of HEPA vacuums;
- u. After all Work and decontamination is complete, relocate and secure objects moved to temporary locations in the course of the Work to their former positions and assure that they are in working order.

- END OF PART 3 and SECTION 02080 -

SECTION 02223

SELECTIVE DEMOLITION

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Removal of designated building equipment and fixtures.
- B. Removal of designated construction.
- C. Disposal of materials.
- D. Identification of utilities.
- E. By definition, for the purposes of this Section, "Demolition" shall include work described as "Removals", "Removal and Salvage" and may include cutting and patching as described in another Section.

1.02 RELATED SECTIONS

- A. Section 01100 - Summary: Work sequence, continued occupancy of the building and handling of regulated materials.
- B. Section 01450 - Cutting and Patching
- C. Section 01500 - Temporary Facilities and Controls: Temporary enclosures.
- D. Section 01700 - Execution Requirements: Re-installation of removed components.
- E. Section 01780 - Closeout Submittals: Project record documents.

1.03 DEMOLITION PLANS

- A. The Demolition Plan(s) included in the Drawings shows only the general extent of the demolition required for the Project. Additional demolition and removals, not specifically indicated on the construction documents may be necessary for the proper execution of the Work and shall be assumed to be included in the Work of this Section.
- B. Prior to proceeding with any demolition, review the Demolition Plan comparing it to the new Work indicated in the other Contract Documents to ascertain the specific extent and nature of the demolition.
 - 1. Determine the need for temporary shoring, bracing or other form of stabilization which may be necessary to support the remaining structure until new work is installed or until work of future Phases of the project are completed.
 - 2. Determine the relationship of the new work to the demolition to ascertain where new structural support or reinforcement may be required to accommodate the new work and which is necessary to support the existing structure to remain.
 - 3. Determine the relationship of existing Plumbing, HVAC, Electrical, Communications and Security systems to the requirements of the new work to ascertain what portions of the existing system must be maintained for incorporation into the new work. Review, where applicable, demolition drawings for the Plumbing, HVAC and Electrical Work and refer to notes regarding demolition which may be contained in the Drawings or Specifications

- C. Coordinate the demolition work required for each stage of the Project with the requirements for future stages in order to identify the extent of the demolition for each stage.
 - 1. Provide temporary support or other provisions to maintain the integrity of the existing structure until the work of future phases is complete.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate demolition, removal sequence, and location of salvageable items; location and construction of temporary facilities.
 - 1. Failure to provide a Demolition Shop Drawing shall not relieve the contractor of compliance with the project requirements.
- C. Project Record Documents: Accurately record actual locations of capped utilities.

1.05 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for demolition work, dust control, products requiring electrical disconnection and reconnection, and mechanical (HVAC and plumbing) equipment requiring disconnection and reconnection.
- B. Obtain required permits from authorities.
- C. Do not close or obstruct egress from any building exit or site exit.
- D. Do not disable or disrupt building fire or life safety systems without 3 days prior written notice to Owner.
- E. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.
 - 1. In buildings where Asbestos Containing Materials (ACM) have been identified, review the Owner's documents and coordinate work according such that no ACM is disturbed during the course of demolition.
 - 2. Where asbestos abatement is to be performed as part of this project, coordinate the scheduling of the demolition work so that the asbestos abatement work has been completed prior to the commencement of the demolition work.
 - 3. Follow provisions of the specifications and applicable laws regarding asbestos and lead paint if these materials are encountered.

1.06 SEQUENCING

- A. Sequence work under the applicable provisions of Section 01100.
- B. In areas of the building which are currently in use, perform demolition immediately prior to the time when new work is scheduled thereby permitting the Owner the maximum time to use the existing portions of the building.
- C. Coordinate planned sequence of the demolition with the Owner's Asbestos Abatement Plan.

1.07 SCHEDULING

- A. Schedule work under the provisions of Section 01325 Construction Progress Schedule.

- B. Schedule work to coincide with new construction.
- C. Schedule work to permit the Owner access to and use of all parts of the existing building up to the time where the Project Schedule indicates that new work shall commence.
- D. Describe demolition removal procedures and schedule.
- E. Perform noisy, malodorous, or dusty work which is deemed disruptive to the operation of the occupied portions of the building:
 - 1. "OFF Hours" unless other arrangements are approved, in writing, by the Owner's Representative.
 - a. Comply with the provisions for work outside of "OFF Hours" as described in Section 01100 Summary.
 - b. Do not perform such work during periods of after hour or evening activities, unless permitted, in writing, by the Owner's Representative.
 - c. Obtain, from the Owner's Representative, the schedule of such activities and schedule the demolition accordingly.

1.08 PROJECT CONDITIONS

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Cease operations immediately if, in the opinion of the Owner's Representative, the work is disruptive to, or in conflict with the use of the occupied portions of the building.
- C. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide, erect, and maintain temporary barriers at locations indicated and at other locations as may be required to isolate the area of demolition and allow the balance of the building to be used by the Owner.
- B. Erect and maintain weatherproof closures for exterior openings.
- C. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued building occupancy.
- D. Protect existing construction, finishes, plumbing, mechanical, electrical, communication, fire detection and other building systems that are not to be demolished.
 - 1. Where demolition disrupts the operation of an essential safety related building systems (communications, fire detection, security, emergency lighting, etc.) provide temporary means to maintain the operation of the system until the operation of the system(s) is restored.
- E. Prevent movement of structure; provide bracing and shoring.

- F. Notify affected utility companies before starting work and comply with their requirements.
- G. Mark location and termination of utilities.
- H. Provide appropriate temporary signage including signage for exit or building egress.

3.02 DEMOLITION

- A. Disconnect, remove or cap as indicated on the drawings, and identify designated utilities within demolition areas.
 - 1. Where existing utilities are not identified on the drawings as being capped or removed, terminate or relocate same in a code complying manner as required to accommodate the new work.
- B. Demolish in an orderly and careful manner. Protect existing supporting structural members and maintain the structural integrity of all structure which shall remain.
- C. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.
- D. Remove materials as demolition progresses. Upon completion of demolition, leave areas in clean condition.
- E. Remove temporary facilities.

3.03 SCHEDULES

- A. Remove, store and protect the following materials and equipment:
 - 1. Items identified on the drawings or on schedules.
- B. Remove the following equipment and materials for Owner's retention. Deliver to location designated by Architect.
 - 1. Items identified on the drawings or schedules to be removed or salvaged and returned to the Owner.
- C. Owner will remove and keep the following material and equipment:
 - 1. Existing unfixed furniture, furnishings, wall mounted items, furnishings, unfixed finish materials and similar items.
- D. Protect the following materials and equipment to remain in place:
 - 1. Items identified as to remain in place, or if not so identified, which, in their existing condition, do not conflict with the new work.

END OF SECTION 02223

SECTION 04902

STUCCO RESTORATION

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Project Scope of Work: Work includes all labor, materials, and equipment necessary to install all aspects of a Portland cement plaster (stucco) assembly repairs or replacement.

The contractor shall “sound” the existing stucco using a hammer with a maximum weight of 16 ounces in the presence of COY in order to quantify the amount of repairs as well as determine if the existing conditions allow for repairs of the stucco and not full replacement in kind. Contractor shall also remove all existing “ivy vines” which are growing along the North and West elevations of the facility, prior to inspection and quantifying of the stucco repairs.

See photos at the end of this specification section showing the existing conditions.

The estimated quantity of repairs for Bidding purposes, is five hundred (500) square feet, based on visual inspections at the time of the design. Contractor shall use this amount to provide a “Unit Cost” for repairs. City of Yonkers and / or EOR will be present to verify existing conditions at the time of testing and to help quantify the final amount of repairs necessary.

- B. This Section includes the following:
04902 Stucco Restoration.

1.3 REFERENCES

- a. ASTM C150 – Portland Cement
- b. ASTM C847 – Standard Specification for Metal Lath
- c. ASTM C144/C897 – Aggregate for Job-Mixed Portland Cement-Based Plaster
- d. ASTM C926 – Application of Portland Cement-Based Plaster
- e. PCA (Portland Cement Association) – Plaster (Stucco) Manual
- f. SMA Details and Technical Bulletins

1.4 ASSEMBLY DESCRIPTION

- a. General: Portland cement plaster over masonry with lath (optional), scratch (when lath is applied), brown coat, and a finish coat. Nominal thickness is ½ to 5/8 inch for no lath and ¾ to one inch with lath. Thickness to match existing unless full replacement in kind, in which case nominal thickness to be 5/8”.

- b. Application Methods: The plaster may be applied by hand tools or machine pumps but must be applied with sufficient pressure to adhere to the substrate.
- c. Masonry and concrete shall be sound, free of coatings, cured minimum 28 days.
- d. Thickness of plaster are considered maximum nominal measurements.

1.5 SUBMITTALS

- a. Product Data: All product data sheets, evaluation reports, details, and warranty information that pertain to the project.
- b. Samples: Submitted upon request.
- c. Samples of the finish coat shall be of an adequate size as required to represent each color and texture to be utilized on the project and produced using the same techniques and tools required to complete the project. No sample shall be less than 12" by 12".
- d. Retain approved samples at the construction site throughout the application process.
- e. Submit a unit square foot price for a "Stucco Crack Reduction System"

1.6 QUALITY ASSURANCE

- a. Qualifications:
 - i. Manufacturer: All component materials shall be SMA approved and shall be distributed by authorized dealers.
 - ii. Plastering Contractor:
 - Shall specialize in lath and plaster contracting with documented experience of at least 5 years in business. Follow published SMA recommendations or provide certificates to demonstrate knowledge in stucco.
 - Provide proof of current contractor's license and bond where required.
- b. On-Site Mock-Ups: Produced upon request.
- c. Mock-up shall represent construction using the same quality/techniques to be utilized on the project.
- d. Retain approved mock-up at job site throughout the application process.
- e. Where acceptable to the Engineer, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion. Contractor shall provide a letter at completion, that they have installed lath (if applicable) and plaster per SMA recommendations.

1.7 DELIVERY, STORAGE, AND HANDLING

- a. Delivery: Deliver all materials to the construction site in their original, unopened packaging with labels intact.
- b. Inspection: Inspect the materials upon delivery to assure that specified products have been received. Report defects or discrepancies to the responsible party according to the construction documents; do not use reported material for application.

- c. Storage: Store all products per manufacturer's recommendations. Generally, store materials in a cool, dry location; away from direct contact with the ground and/or concrete; out of direct sunlight; and protect from weather and other damage.

1.8 PROJECT CONDITIONS

- a. Environmental Requirements: Follow product manufacturer's recommendations for environmental conditions and surface preparation.
- b. Temperatures: Before, during and following the application of the Portland cement plaster, the ambient and surface temperatures must remain above 40 degrees F (4 degrees C) for a minimum period of 24 hours. Protect stucco from uneven and excessive evaporation, especially during hot, dry and/or windy weather. Protect the Portland cement plaster from freezing for a period of not less than 24-hours after set has occurred.
- c. Substrates: Prior to installation, inspect the wall for surface contamination, bond breakers, or other defects that may adversely affect the performance of the materials, and shall be free of foreign matter. Do not apply the Portland cement plaster to substrates with temperatures less than 40 degrees F (4 degrees C) or that contain frost or ice.
- d. Inclement Weather: Protect applied material from deleterious effects until cured or dry.
- e. Existing Conditions: Contractor shall walk the project prior to starting work and notify the engineer or owner's representative of any deficiencies that will negatively impact the plaster or parge coating. Do NOT proceed until remedied and contractor can provide warranty.
- f. Contractor shall advise architect of any horizontal surfaces with inadequate slope.
- g. Jobsite Resources: Notify engineer if General Contractor fails to provide access to electrical outlets, clean, potable water, and a suitable and safe work area at the construction site throughout Sequencing and Scheduling
- h. Sequencing: Coordinate the installation of the lath and Portland cement plaster with all other construction trades. To reduce stucco cracking, ensure the concrete/masonry substrate is cured a minimum of 28 days and not saturated prior to plastering.
- i. Plastering contractor shall request and attend a pre-installation meeting with general contractor and engineer to advise engineer of any control/expansion joint layout concerns. There shall be no cost to the owner for moving one-piece control joints prior and up to this meeting date, additional lineal footage of control joints from plans shall warrant a change order.
- j. Staffing: Provide sufficient manpower and proper supervision to ensure continuous operation, free of cold joints, scaffolding lines, curing, variations in texture, etc.

1.9 WARRANTY

- a. Warranty: Submit documentation on all products. At completion of work, contractor shall provide a written warranty documentation for the assembly and products used.
- b. Warranty Length: Shall start at the time of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. SMA Manufacturers: Must be from the current list on SMA website under appropriate category.
 - a. BMI
 - b. Dryvit
 - c. Parex
 - d. La Habra
 - e. California Stucco
 - f. Shamrock Stucco
 - g. Quikrete/Specmix
 - h. Merlex
 - i. El Rey Stucco
 - j. Omega Products
 - k. CalPortland/Riverside Cement
 - l. Mission Stucco
 - m. Sacramento Stucco
 - n. Cemex
 - o. BMI/SIKA
 - p. Amermix/Old Castle
- B. Lath and Trim Accessories
 - a. Stockton Products
 - b. Structa Wire
 - c. Tree Island/K-Lath
 - d. Fry Reglet

2.2 SCRATCH (IF LATH IS APPLIED) AND BROWN COAT (BASECOAT)

- A. Cement: A Portland cement complying with ASTM C150
- B. Sand:
 - 1. Field mixes shall comply with ASTM C-926 and must have sand that is clean and free from deleterious amounts of loam, clay, silt, soluble salts, and organic matter. Sampling and testing shall comply with ASTM C144 or C897.
 - 2. An “engineered performance mix” by an SMA manufacturer is acceptable with appropriate approvals (ICC ES, IAPMO or Intertek report).
- C. Water: Clean and potable without foreign matter.

2.3 LATH

Expanded Lath: Nominal 2.5 lb./yd² weight, galvanized steel complying with ASTM C847.

2.4 ACCESSORIES

- A. Sealants: Acrylic latex complying with ASTM C834
- B. Fasteners: Nails, staples, or screws used to rigidly secure lath and associated accessories shall be corrosion-resistant and meet the minimum requirements of ASTM C1063.
- C. Zinc and Zinc-Coated (Galvanized) Accessories: The following accessories shall be fabricated from zinc-coated (galvanized) steel
 - 1. Corner Aid: Minimum 26-gauge thick; expanded flanges shaped to permit complete embedding in plaster; minimum 2 in. wide; Square-edge style; use unless otherwise indicated.
 - 2. Strip Mesh: Metal Lath, 3.4 lb./yd² expanded metal; 6 in. wide x 18 in. long. To be used as “butterflies” to minimize re-entrant cracking
 - 3. Casing Bead: Minimum 26-gauge thick; thickness governed by plaster thickness; maximum possible lengths; expanded metal flanges, with square edges.
 - 4. Drip Screed: Minimum 26-gauge thick, depth governed by plaster thickness, minimum 3-1/2 in. high flange, maximum possible lengths.
 - 5. Control and Expansion Joints (If Required for Full Replacement): Depth to conform to plaster thickness; use maximum practical lengths.
 - 6. Control Joints (If Required for Full Replacement): One-piece-type, folded pair of unperforated screeds in “M”-shaped or double “V” configuration; removable protective tape on plaster face of control joint.
 - 7. Expansion Joints (If Required for Full Replacement): Two-piece-type formed to produce a slip-joint.

2.5 FINISHES

- A. Portland cement-based blended stucco finish
- B. Color and Texture: Manufacturer, color and finish texture shall be as approved by the Owner.

2.6 MIXES

- A. Portland Cement Plaster Basecoats:
 - 1. Prescriptive Method: Ratios and Mix Design shall be per ASTM C926. Contractor shall select one of the following mixes (sand is per **combined volume** of cements), lime is cement:
 - a.

Portland Cement	1 part
Masonry Cement	1 part
Sand	3 ½ to 4 ½ parts per Cement
Fibers	Maximum 3 oz per batch
 - b.

Portland Cement	1 part
Lime (type S)	¼ to ½ part
Sand	3 to 4 parts per cement & Lime

Fibers

Maximum 3 oz per batch

- c. Plastic Cement 1 part
- Sand 3 ½ to 4 ½ parts per cement
- Fibers Maximum 3 oz per bag plastic cement

2. Engineered Method: Pre-mix blends or silos per SMA manufacturer.

- B. Finish Coats: Mixing and tinting instructions are contained in the appropriate product data sheets by the SMA Manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Prior to the application of the Portland cement plaster basecoat the plastering contractor shall ensure that:
- B. Surface and site conditions are ready to receive work.
- C. Grounds and Blocking: Verify that the items within the walls for other sections of work have been installed.
- D. Notify engineer/owner of any defects that may impact the finished assembly. Proceed as directed.
- E. Substrates:
 - 1. Acceptable substrates must be sound, secure, and suitable for lath (if applicable) and plaster.
 - 2. Substrates and adjacent materials must be dry and clean. Substrate surface must be flat, free of protrusions or planar irregularities greater than ¼-inch in 10-feet (6mm in 3m).
- F. Flashings/Sealant joints: All flashing or sealant joints around windows, at deck attachments, utility penetrations, roof lines, etc. and all kick-out flashing must be properly installed prior to application of Portland cement plaster. Notify owner if flashings are missing, proceed as directed.
- G. Casing bead shall be applied around all penetrations with a minimum ¼ inch to maximum ¾ inch gap to receive a backer rod and sealant. Gap width will depend on conditions.
- H. Unsatisfactory conditions or concerns shall be reported to the general contractor and/or builder and/or engineer and/or owner. Do not proceed until directed in writing by engineer or general contractor.

3.2 PREPARATION

- A. Substrate: inspect all work prior to starting lath and plastering. Notify architect of any issues impacting performance, proceed as directed.
- B. Surrounding Areas: Protect surfaces near the work of this section from damage, disfiguration, and overspray. Mask off all dissimilar materials.

3.3 INSTALLATION, GENERAL

- A. General Installation: Refer to New York State Building Code latest edition, ASTM C926, ASTM C1063, and/or the appropriate manufacturer's product data sheet for additional installation requirements and recommendations of the SMA.

3.4 INSTALLING WEATHER PROTECTION

- A. Water-Resistive Barrier: Generally, not required. Coating of concrete/masonry substrate may be called out.
- B. Windowsill /head Flashing (Existing): Contractor shall inspect and verify the flashing is appropriate for the condition. Notify engineer/owner of any concerns.
- C. Install flashing and trims properly to ensure moisture does not pass through plaster and concrete/masonry substrate. All penetrations shall be properly flashed and/or sealed using approved methods.

3.5 INSTALLING LATH/TRIMS

- A. General: Installed per ASTM C1063 or per Engineer's direction. Trims shall be full length and installed plumb/level to within 1/8 inch in eight (8) feet.
- B. Trims shall be attached per the trim manufacturer's instructions; Do not exceed 24 inches on center spacing.
- C. Apply lath per manufacturer's recommendations. Laps shall occur at horizontal and vertical joints. Fasteners shall engage lath and have minimum 50 pound pull out value. Attach lath along grout joints for un-grouted masonry. Spacing should be approximately 1 fastener per square foot.
- D. Lath shall lap solid flange of accessories by more than 75%.
- E. Control Joints: Installed per Engineer's direction.
- F. Expansion Joints: Install per Engineer's direction. Two-piece joints (expansion) must have lath terminate each side.
- G. Contractor shall honor control or expansion joints in substrates.
- H. Do not mix lath products on same wall.
- I. Avoid excessive laps with expanded metal lath
- J. Do not use rib lath on walls
- K. Use wire nose corner for cement finish.
- L. All trims shall be securely fastened to prevent movement or shifting during plastering.

3.6 INSTALLING PORTLAND CEMENT PLASTER

- A. Per ASTM C926, apply Portland cement plaster by hand-troweling or machine-spraying to a nominal thickness of 3/8-inch (9.5mm) for scratch coat (if lath is used). Apply a second coat to a nominal thickness of 3/8-inch (9.5 mm) brown coat. Total basecoat shall be a nominal 3/4 inch thickness for lath and 1/2 inch for direct application to masonry substrates. Concrete should be skim only unless lath is used.
- B. Scratch coat shall substantially cover the lath. Score in a horizontal pattern.

- C. Apply brown coat to fill and complete basecoat. Rod to a flat plane. Do not apply to frozen or soft scratch coat. When excess moisture leaves brown coat, hard float to provide densification per ATSM.
- D. Moist Curing: Provide sufficient moisture by fog or moist curing to permit proper hydration of the cementitious materials. The length of time and most effective procedure for curing will depend on climatic and job conditions. Refer to SMA curing guidelines.

3.7 INSTALLING FINISH COAT

- A. General: Mix and apply per manufacturer's product data sheet.
- B. Do not apply to soft, contaminated, or frozen basecoat.
- C. Avoid applying to excessively hot walls.
- D. Verification: Verify the desired color, material, and texture to match the approved sample and/or mock-up prior to installation.
- E. Avoid scaffold lines and cold joints
- F. Fog coat (cement finish only) as needed to blend color variations
- G. Finish coat shall be free of eye-catching imperfections.

3.8 CLEANING/PATCHING/TOLERANCE

- A. Cleaning: Remove all materials used, overspray from adjacent surfaces, and all protective masking.
- B. Patch and repair as needed, including but not limited to fog coating, imperfections, and blisters.
- C. Cracks shall be repaired per the most current SMA Crack Policy (Technical Bulletin 4)
- D. The basecoat of plaster shall be in tolerance:
 - 1. Commercial: Not to exceed ¼ inch in ten (10) feet
- E. Eye catching variations in color or texture pattern will not be accepted.

3.9 PROTECTION

Protection: Protect applied material from inclement weather until dry and prevent it from freezing for a minimum of 24-hours after set and/or until dry. Refer to manufacturer's product data sheet for additional requirements.

Yonkers Police Third Precinct
Lobby Upgrades



Yonkers Police Third Precinct
Lobby Upgrades







END OF SECTION

SECTION 05220
BRASS HANDRAIL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Handrails.

1.2 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry: Wood supports and blocking.

1.3 SYSTEM DESCRIPTION

- A. Refer to drawings.
- B. Performance Requirements:
 - 1. Handrail and guardrail assemblies and attachments shall withstand a minimum concentrated load of 90719 g (200 pounds) applied horizontally or vertically down at any point on the top rail.
 - 2. Handrail assemblies and guards shall be designed to resist a load of 0.73 kN/m (50 pds/sf) applied in any direction at the top and to transfer this load through the supports to the structure.

1.4 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
- C. Shop Drawings: Submit Shop Drawings for fabrication and installation. Include the following:
 - 1. Plans, elevations, and detail sections.
 - 2. Indicate materials, methods, finishes, and types of joinery, fasteners, anchorages, and accessory items. Specify finishes.
 - 3. Provide setting diagrams and templates for anchorages, sleeves, and bolts installed by others.
 - 4. Where materials or fabrications are indicated to comply with certain design loadings, include structural computations, material properties, and other information needed for structural analysis.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Not less than 10 years experience in the actual production of specified products.
 - 1. Components shall be factory fabricated and engineered by single entity.
- B. Installer Qualifications: Firm with 3 years experience in installation of systems similar in complexity to those required for this Project.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: R/J Florig Industrial Co., Inc. ; 910 Brook Road, Conshohocken, PA 19428 P: 610.825.6655 F: 610.825.7424
<http://www.rjflorig.com>
- B. Alternative Manufacturers:
 - 1. Stainless Architectural Metalworks Inc.
 - 2. Johnson Bros. Metal Forming Co
 - 3. Schiff Architectural Detail
- C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 MATERIALS

- A. Metal Material: Brass/bronze to size and shape indicated. Alloy as scheduled.
- B. Handrail: 38 mm (2-1/2 inches) O.D. tube in alloy and finish as scheduled.
- C. Frame Tube: Hard drawn tube in size, alloy and finish as scheduled.
- D. Handrail Fittings:
 - 1. Handrail Bracket: Finish as scheduled.

- E. Bolts, Screws and Nuts: Stainless steel with finish as scheduled for base material.

2.3 FABRICATION

- A. Tolerances: Verify dimensions on Site prior to shop fabrication.
 - 1. Fabricate items with joints neatly fitted and properly secured.
 - 2. Mill joints to a tight, hairline fit.
 - 3. Cope or miter corner joints.
- B. Design components to allow for expansion and contraction without causing buckling, excessive opening of joints, or overstressing of welds and fasteners.
- C. Form metal to the required shapes and sizes, with true curves, lines, and angles.
- D. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling of materials.
- E. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- F. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassembly units only as necessary, for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- G. Supply components required for proper anchorage of ornamental metals. Fabricate anchorage and related components of same material and finish as metal fabrication, unless otherwise specified herein.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.
 - 1. Fully inspect the existing structure to verify a structurally sound base for anchoring railing system.
- B. Do not begin installation until substrates have been properly prepared.

3.2 PREPARATION

- A. Surface Preparation: Coordinate and furnish anchorages and setting drawings, diagrams, templates, instructions, and directions for the installation of items having integral anchors which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to the Project Site.
- B. Clean surfaces thoroughly prior to installation.

- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Comply with manufacturer's recommendations.
- B. Provide anchorage devices and fasteners including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- C. Perform cutting, drilling, and fitting required for installation. Set accurately in location, alignment and elevation, plumb, level, and true, measured from established lines and levels.
- D. Form tight joints with exposed connections accurately fitted with uniform reveals and spaces for sealants and joint fillers.
- E. Do not cut or abrade finishes which cannot be completely restored in the field. At contractor's option do either of the following:
 - 1. Return items with such finishes to shop for required alterations, followed by complete refinishing.
 - 2. Provide new units.
 - 3. Field touch-up of finishes are not acceptable.
- F. Mounting brackets shall be securely mounted to building structure in a positive manner including sufficient reinforcements and anchors as required.
- G. Install brackets as indicated on drawings.
- H. Installation shall be rigid and secure, installed by mechanics experienced in erection of architectural metal. All screws and fittings shall be drawn up tightly. Rails shall be set plumb and aligned.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 06100

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preservative treatment of wood.
- B. Miscellaneous framing, shims, battens, blocking and sheathing.

1.02 RELATED SECTIONS

- A. Section 06410 – Custom Millwork

1.03 REFERENCES

- A. AFPA WCD 1 T11 - Manual for Wood Frame Construction; American Forest and Paper Association; 1988.
- B. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association; 1997.
- C. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 1994.
- D. SPIB (GR) - Standard Grading Rules for Southern Pine Lumber; Southern Pine Inspection Bureau, Inc.; 1994.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials, and application instructions.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.
- B. Exposed-to-View Rough Carpentry: Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.01 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).
- B. Sizes: Nominal sizes as indicated on drawings.
- C. Moisture Content: Kiln-dry or MC15.
- D. Specie and Grade: No. 2 Select Structural or Dense Select Structural, Southern Yellow Pine; preservative treated.
- E. Miscellaneous Blocking, Furring, and Nailers; preservative treated.
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.02 EXPOSED DIMENSION LUMBER

- A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).
- B. Sizes: Nominal sizes as indicated on drawings.
- C. Moisture Content: Kiln-dry or MC15.
- D. Specie and Grade: For all other exposed applications No. 2 Select Structural or Dense Select Structural, Southern Yellow Pine; preservative treated.

2.03 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Fasteners: Hot-dipped galvanized steel for high humidity and treated wood locations, unfinished steel elsewhere.
- B. Joist Hangers and other metal anchors or connection devices: Hot dipped galvanized steel, sized to suit framing conditions. Provide recommended devices manufactured by Simpson or equal.

2.04 FACTORY WOOD TREATMENT

- A. Pressure Treatment of Lumber Above Grade: AWP Treatment C2 using waterborne preservative to 0.25 lb/cu ft retention.
 - 1. Kiln dry after treatment to maximum moisture content of 15 percent.
 - 2. Treat all wood to be used in an exterior environment.
 - 3. Treat wood in contact with masonry or concrete.
 - 4. Treat wood less than 18 inches above grade.
 - 5. Treat wood in contact with grade.
- B. Pressure Treatment of Lumber in Contact with Soil: AWP Treatment C2 using waterborne preservative designated in AWP C2 as suitable for ground contact use to 0.4 lb/cu ft retention.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Set wood members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance or application.
- B. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA WCD 1 T11.
- C. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

3.02 SITE APPLIED WOOD TREATMENT

- A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.
- B. Allow preservative to dry prior to erecting members.

3.03 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors or Walkways): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

END OF SECTION 06100

SECTION 06410

CUSTOM MILLWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Countertops; plastic laminate

1.02 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry: blocking for cabinetry work
- B. Section 09260 - Gypsum Board Assemblies: Installation of blocking; location of framing as required to support cabinetry.

1.03 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strip for installing woodwork items, unless concealed within other construction before woodwork installation.

1.04 REFERENCES

- A. AWI P-200 - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute; 1997, Seventh Edition, Version 1.0.
- B. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 1994 (ANSI/BHMA A156.9).
- C. FS MMM-A-130 - Adhesive, Contact; Federal Specifications and Standards; Revision B, 1974, and Amendment 3, 1976.
- D. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 1995.
- E. NHLA G-101 - Rules for the Measurement & Inspection of Hardwood & Cypress; National Hardwood Lumber Association; 1994.
- F. AA DAF-45 - Designation System for Aluminum Finishes; The Aluminum Association, Inc.; 1997, Eighth Edition.
- G. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; American Architectural Manufacturers Association; 1998.
- H. AAMA 607.1 - Voluntary Guide Specification and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum; American Architectural Manufacturers Association; 1977.
- I. ASTM B 209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 1995.

1.05 SUBMITTALS

- A. See Section 01340 – Submittal Procedures, for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, coordination with items and appliances furnished under other sections or by others and schedule of finishes.
 - 1. Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 2. Show details full size.
 - 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- C. Product Data: For plywood, high pressure decorative laminate, adhesive for bonding plastic laminate, thermoset decorative overlay, solid-surfacing material, cabinet hardware and accessories, handrail brackets, and finishing materials and processes.
 - 1. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.
- D. Samples:
 - 1. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of material indicated. Shop-applied transparent finishes. Shop-applied opaque finishes. Plastic laminates.
 - 2. Number of Samples required: three
 - 3. Samples: Submit three 12 x 12 inch in size, illustrating cabinet finish and counter top finish.
 - 4. Samples for Verification:
 - a. Plastic-laminate-clad panel products, 12 by 12 inches, for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.
 - b. Any other samples as the Architect may request.

1.06 QUALITY ASSURANCE

- A. Perform work in accordance with AWI P-200, Premium quality except where noted otherwise.
- B. Perform cabinet construction in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Premium quality.
- C. Fabricator/Installer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.
 - 1. Qualification Data: Fabricator/Installer shall demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.08 PRE-INSTALLATION MEETING

- A. Convene one week before starting work of this section.

1.09 DELIVERY, STORAGE, AND PROTECTION

- A. Deliver units when environmental systems in the building are operational and environmental conditions approximate that which will exist when the building is occupied.
- B. Protect units from moisture damage and extremes in temperature and humidity..
- C. Store and protect away from other construction activities and in a secure location to avoid theft or vandalism.

1.10 ENVIRONMENTAL REQUIREMENTS

- A. Do not deliver or install cabinetry and other work of this section until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period Environmental Limitations:

1.11 COORDINATION

- A. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Coordinate fabrication schedule with construction progress to avoid delaying the Work. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before construction is enclosed or not accessible and indicate measurements on Shop Drawings.
- C. Shop Drawings to be submitted to Architect for approval/comment. Contractor to withhold ordering of materials until approved Shop Drawings are returned from Architect.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Millwork manufacturer complying with the requirements and can demonstrate its ability to produce the Work as indicated on the documents.
 - 1. Installer may be an entity other than the Fabricator, but shall be hired and controlled by the Fabricator and responsible to the Fabricator.

2.02 PANEL MATERIALS

- A. Cabinets and Applications with Transparent Finish:
 - 1. Hardwood Plywood: ½" APA A-A, Group 1, Exposure 1:
 - a. Species: Oak hardwood of Group 1 classification, Grade: Premium , Cut: Rift.
 - b. Separate breakout for use of Cherry in lieu of Oak.
- B. Backing For Plastic Laminate Applications and Cabinet Liners; concealed or exposed:
 - 1. Hardwood Plywood: ½" APA C-D, Group 2, Exposure 1:
 - a. Species: Any closed-grained hardwood of Group 2 classification, Grade: Suitable for

- painting without visible grain telegraphing through paint; Cut: Rotary
- b. Treatment: Fire retardant treatment when used in conjunction with treated panel material.

2.03 ACCESSORIES

- A. Adhesive: FS MMM-A-130 contact adhesive.
- B. Fasteners: Size and type to suit application.
- C. Concealed Joint Fasteners: Threaded steel.
- D. Grommets: Plastic material for cut-outs.
- 3. Hinge carrier plate: Type recommended by manufacturer for specified door height.
- 4. Finish: Clear zinc.
- 5. Supply mounting hardware specified in manufacturer's instructions for cabinet hardware.

2.05 FABRICATION

- A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.
- B. Cap exposed laminate finish edges with material of same finish and pattern.
- C. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
- D. Apply laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.
- E. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

2.10 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where indicated, use materials impregnated with fire-retardant chemical formulations indicated by a pressure process or other means acceptable to authorities having jurisdiction to produce products with fire-test-response characteristics specified.
 - 1. Do not use treated material that does not comply with requirements of referenced woodworking standard or that is warped, discolored, or otherwise defective.
 - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
 - 3. Fabricator may use the non-pressure process where permitted by code, otherwise use the pressure process.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with AWPAC20 (lumber) and AWPAC27 (plywood), for woodwork items indicated as fire retardant treated. Use the following treatment type:
 - 1. Interior Type A: Low-hygroscopic formulation.
 - 2. Where wood specie and treatment process permit, mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discoloration from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork. Otherwise, mill lumber after

treatment.

3. Kiln-dry material before and after treatment to levels required for untreated material.
- C. Fire-Retardant-Treated Lumber and Plywood by Non-pressure Process: Apply non-toxic, water-soluble, fire-retardant treatment by dip, spray, roller, curtain coating, vacuum chamber, or soaking to achieve flame-spread rating of 25 or less and smoke-developed rating of 450 or less per ASTM E 84.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify dimensional clearances to assure proper fit. Correct any deviations prior to installation.
- C. Verify location and sizes of utility rough-in associated with work of this section.

3.02 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming

3.03 INSTALLATION

- A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
- C. Install millwork with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
- D. Set and secure casework in place; rigid, plumb, and level.
- E. Use fixture attachments in concealed locations for wall mounted components.
 1. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches o.c. with No. 10 wafer-head screws sized for 1-inch penetration into wood framing, blocking, or hanging strips.
 2. Use No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish. Use toggle bolts through metal backing or metal framing behind wall finish.
- F. Use concealed joint fasteners to align and secure adjoining cabinet units.
- G. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- H. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
 2. Caulk space between countertop and wall with sealant specified in Division 7 Section "Joint Sealants."
- J. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork.
1. Fill nail holes with matching filler where exposed.
 2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats were applied in shop
- K. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.04 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.05 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.
- B. Remove excess adhesives, alignment markings used for installation, labels, protective covers and wraps, etc.
- C. Exercise care and use only manufacturer recommended products and procedures when cleaning the work of this Section.

END OF SECTION

SECTION 07840

FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping materials.
- B. Firestopping of all penetrations and interruptions to fire rated assemblies, whether indicated on drawings or not, and other openings indicated.
 - 1. Firestopping shall be applied where required by code and/or where required by authorized code officials.
 - 2. Firestopping shall be applied to all penetrations through fire rated assemblies including, but not limited to, pipes, conduits, structural members, ducts, cables, and similar items.
 - 3. The application of firestopping is understood and typical for penetrations through fire rated assemblies, floors, walls, chases and otherwise, and is, generally, not specifically identified on the Drawings.
 - 4. Firestopping shall be applied to all such penetrations whether or not it is indicated on the Drawings.

1.02 RELATED SECTIONS

- A. Section 01450 - Cutting and Patching
- B. Section 01700 - Execution Requirements

1.03 REFERENCES

- A. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 1997.
- B. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- C. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- D. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, firestopping test or design number, and type of firestopping which is appropriate for each type of penetration. Provide in all locations where required by code and whether or not "firestopping" is indicated on the Drawings.
- C. Product Data: Provide data on product characteristics.
- D. Manufacturer's Installation Instructions: Indicates preparation and installation instructions.
- E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

- F. Certificate from authority having jurisdiction indicating approval of materials used.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs which provide the scheduled fire ratings when tested in accordance with methods indicated and ASTM E 119.
 - 1. Listing in the current classification or certification books of UL, FM, or ITS (Warnock Hersey) will be considered as constituting an acceptable test report.
 - 2. Current evaluation reports published by CABO, ICBO, or BOCA will be considered as constituting an acceptable test report.
 - 3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years experience.

1.06 MOCK-UP

- A. Install one firestopping assembly representative of each fire rating design required on project.
 - 1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
- B. Obtain approval of authority having jurisdiction before proceeding.
- C. If accepted, mock-up will represent minimum standard for the Work.
- D. If accepted, mock-up may remain as part of the Work. Remove and replace mock-ups not accepted.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation. Maintain minimum temperature before, during, and for 3 days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 FIRESTOPPING ASSEMBLIES

- A. Firestopping: Any material meeting the requirements and which will be inconspicuous when used in conjunction with scheduled finishes and architectural details.
 - 1. Coordinate selection of materials with scheduled finishes to be applied to the surface.
 - 2. Do not use firestopping materials or methods which will conflict with finish systems.
 - 3. Fire Ratings: See Drawings for required systems and ratings.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

- B. Verify if firestopping will be used in conjunction with an architectural detail and/or finish. Select firestopping method which will be inconspicuous.
- C. Verify method of firestopping to be used for each penetration. Drawings do not indicate type of firestopping.
- D. Verify what finishes, if any, are scheduled for each area and coordinate firestopping work so as not to conflict with the scheduled finishes.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other matter which may affect bond of firestopping material.
- B. Remove incompatible materials which may affect bond.
- C. Install backing materials to arrest liquid material leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by authority having jurisdiction.
- C. Coordinate installation to permit the installation of finishes and other subsequent work
- D. Install labeling required by code.

3.04 CLEANING AND PROTECTION

- A. Clean adjacent surfaces of firestopping materials.
- B. Protect adjacent surfaces from damage by material installation.
- C. Remove excess materials which may conflict with subsequent work and which are not necessary to provide required fire rating

END OF SECTION 07840

SECTION 07900

JOINT SEALERS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Sealants and joint backing.
- B. Precompressed foam sealers.

1.02 RELATED SECTIONS

- A. Section 08410 - Aluminum Framed Storefronts.
- B. Section 09260 - Gypsum Board Assemblies

1.03 REFERENCES

- A. ASTM C 834 - Standard Specification for Latex Sealants; 1995.
- B. ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications; 1984 (Reapproved 1992).
- C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 1995.
- D. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 1991 (Reapproved 1995).
- E. ASTM D 1667 - Standard Specification for Flexible Cellular Materials--Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam); 1976 (Reapproved 1990).

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data indicating sealant chemical characteristics.
- C. Samples: Submit three samples, 3/8 x 6 inches in size, illustrating sealant colors for selection.
- D. Manufacturer's Installation Instructions: Indicate special procedures.
- E. Schedule: Installer/applicator shall submit a detailed schedule of all conditions requiring sealant and the proposed sealant assembly to be used for each condition.

1.05 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years experience.

1.06 MOCK-UP

- A. Provide mock-up of sealant joints in conjunction with windows, storefront and door frames under provisions of Section 01400.
- B. Construct mock-up with specified sealant types and with other components noted.
 - 1. Provide mock -up for interior assemblies where sealant will be visible.
- C. Locate where directed by Architect.
- D. Mock-up may remain as part of the Work wherever the particular mock up may remain part of the Work.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.08 COORDINATION

- A. Coordinate the work with all sections referencing this section.

1.09 WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five-year period after Date of Substantial Completion.
 - 1. Where the manufacturer, as a standard feature, provides a warranty which exceeds five years that warranty shall become the warranty which shall apply to this Project.
- C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, watertight seal, and acoustical seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Silicone Sealants:
 - 1. Bostik.
 - 2. Dow Corning Corp.
 - 3. GE Silicones.
 - 4. Pecora Corp.
 - 5. Sonneborn Building Products.
 - 6. Tremco, Inc.
 - 7. Substitutions: See Section 01600 - Product Requirements.
- B. Polyurethane Sealants:
 - 1. Bostik.
 - 2. ChemRex (Master Builders).
 - 3. Pecora Corp.
 - 4. Sonneborn Building Products.
 - 5. Tremco, Inc.
 - 6. Substitutions: See Section 01600 - Product Requirements.

- C. Polysulfide Sealants:
 - 1. Morton International, Inc.
 - 2. Pecora Corp.
 - 3. Sonneborn Building Products.
 - 4. Substitutions: See Section 01600 - Product Requirements.
- D. Acrylic Emulsion Latex Sealants:
 - 1. Bostik.
 - 2. Pecora Corp.
 - 3. Sonneborn Building Products.
 - 4. Tremco, Inc.
 - 5. Substitutions: See Section 01600 - Product Requirements.
- E. Preformed Compressible Foam Sealers:
 - 1. Emseal Joint Systems, Ltd.
 - 2. Sandell Manufacturing Co., Inc.
 - 3. Polytite Manufacturing Corp.
 - 4. Substitutions: See Section 01600 - Product Requirements.

2.02 SEALANTS

- A. Type I-1 - General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, single component, paintable.
 - 1. Color: Standard colors matching finished surfaces, except where sealant is to be painted.
 - a. Color where sealant is to be painted: off-white color.
 - 2. Applications: Use for:
 - a. Interior wall and ceiling control joints.
 - b. Joints between door and window frames and wall surfaces.
 - c. Joints between countertops, without sinks, and wall surfaces.
 - d. Other interior joints for which no other type of sealant is indicated.
- B. Type S-1 - Silicone Sealant: ASTM C 920, Grade NS, Class 25, Uses NT, A, G, M, O; single component, solvent curing, non-sagging, non-staining, fungus resistant, non-bleeding.
 - 1. Color: Standard colors matching finished surfaces.
 - 2. Movement Capability: Plus and minus 25 percent.
 - 3. Service Temperature Range: -65 to 180 degrees F.
 - 4. Shore A Hardness Range: 15 to 35.
 - 5. Applications: Use for:
 - a. Glazing applications, except where otherwise recommended by manufacturer of glazing or glazing framing system.
- C. Unspecified Sealants: Provide sealants for each application which is not indicated in the Section but which is encountered during the Work
 - 1. Where a sealant is not specified for a condition, provide a product which is compatible with the materials to be sealed and which is recommended by the sealant manufacturer for the specific application
 - a. Provide color sealants for applications which will be exposed to view. Furnish products from manufacturer's standard colors; Architect to select colors.

2.03 ACCESSORIES

- A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

- C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1667, closed cell PVC; oversized 30 to 50 percent larger than joint width.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Identify each assembly to be sealed and assign the proper sealant to the assembly.
 - 1. Verify if finished assembly will be painted, concealed or exposed and assign appropriate products
- B. Verify that substrate surfaces are ready to receive work.
- C. Verify that environmental conditions are suitable for sealant installation.
- D. Verify that joint backing and release tapes are compatible with sealant.

3.02 PREPARATION

- A. Remove loose materials and foreign matter which might impair adhesion of sealant.
- B. Clean and prime joints in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.
- D. Protect elements surrounding the work of this section from damage or disfigurement.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C 1193.
- C. Perform acoustical sealant application work in accordance with ASTM C 919.
- D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.
- E. Install bond breaker where joint backing is not used.
- F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.
- G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- H. Tool joints concave.
- I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and

intersections; install with face 1/8 to 1/4 inch below adjoining surface.

3.04 CLEANING

- A. Clean adjacent soiled surfaces.

3.05 PROTECTION OF FINISHED WORK

- A. Protect sealants until fully cured and, where applicable, painted.

3.06 SCHEDULE

- A. Applications of sealant shall be according to the general guidelines as indicated by the descriptions in Part 2 of this Section.
- B. Installer/applicator shall furnish a schedule as identified in Part 1 of this Section, under "Submittals".

END OF SECTION 07900

SECTION 08110

CUSTOM STEEL FRAMES AND DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Steel doors and frames.
 - 1. Provide hollow metal steel doors and frames as indicated on the Door and Frame Schedule and on the drawings.

1.02 RELATED SECTIONS

- A. Section 08710 - Door Hardware.
- B. Section 08110 – Flush Wood Doors

1.03 REFERENCES

- A. ANSI A250.6 - Hardware on Standard Steel Doors (Reinforcement--Application); 1997.
- B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 1998.
- C. ASTM A 366/A 366M - Standard Specification for Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality; 1996.
- D. ASTM A 569/A 569M - Standard Specification for Commercial Steel, Sheet and Strip, Carbon (0.15 Maximum Percent), Hot-Rolled; 1997.
- E. ASTM A 591/A 591M - Standard Specification for Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications; 1996.
- F. ASTM A 620/A 620M - Standard Specification for Drawing Steel (AS), Sheet, Carbon, Cold-Rolled; 1997.
- G. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1997.
- H. DHI A115.1G - Installation Guide for Doors and Hardware; Door and Hardware Institute; 1994.
- I. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.
- J. NFPA 80 - Standard for Fire Doors and Windows; National Fire Protection Association; 1995.
- K. SDI 105 - Recommended Erection Instructions for Steel frames; Steel Door Institute; 1992.
- L. SDI 113 - Test Procedure and Acceptance Criteria for Apparent Thermal Performance of Steel Door and Frame Assemblies; Steel Door Institute; 1979.
- M. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard details and catalog data demonstrating

compliance with referenced standards; installation instructions.

- B. Certificates:
 - 1. Provide manufacturer's certification that products comply with referenced standards.
 - 2. Provide evidence of manufacturer's membership in the Steel Door Institute.
- C. Shop Drawings: Submit for approval of the following:
 - 1. Shop drawings showing all openings in the door schedule and/ or drawings; provide details of door design, door construction and methods of assembling sections, hardware locations, anchorage and fastening methods, door frame types, and finish requirements.
- D. Door, frame, and hardware schedule in accordance with SDI 111.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide all products from a single manufacturer who is a member of the Steel Door Institute.
- B. Fire-rated Assemblies: Manufactured in accordance with Underwriter's Laboratories Inc. and bearing their label.
- C. Manufacture products only after receipt of approved hardware schedule and templates.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Upon delivery, inspect all materials for damage; notify shipper and supplier if damage is found.
- B. Protect products from moisture, construction traffic, and damage.
- C. Store vertically under cover. Do not use non-vented plastic or canvas shelters. Should wrappers become wet, remove immediately.
- D. Place units on 4 inch high wood sills or in a manner that will prevent rust or damage. Provide 1/4 inch space between doors to promote air circulation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Any manufacturer who meets the criteria of this Section

2.02 MATERIALS

- A. Steel Sheet for Doors and Frames:
 - 1. Cold rolled steel: ASTM A 366/A 366M or ASTM A 620/A 620M.
 - 2. Hot rolled steel: Pickled and oiled, ASTM A 569/A 569M, Type B.
 - 3. Galvanized steel: ASTM A 653/A 653M; hot-dipped zinc-coated steel; hot-dipped zinc-iron alloy-coated steel of A40/ZF120 coating, minimum.
- B. Steel Sheet for Anchors and Accessories: Electrolytically deposited zinc coated steel; ASTM A 591/A 591M, coating Class B, minimum.

2.03 DOORS AND FRAMES

- A. Comply with SDI 100. Include two copies of applicable requirements of SDI-100 with submittals

required for this section.

1. All welded connections shall be filled and ground smooth
 2. Except for applied glazing stops, all connectors and fasteners shall be concealed or countersunk, filled and ground smooth.
- B. Fire-Rated Openings: Comply with NFPA 80; UL or ITS (Warnock Hersey) listed.
1. Affix permanent labels attesting to fire resistance.
 2. Provide manufacturer's certificate that oversized openings have been constructed in accordance with all other applicable requirements for labeled door construction.
- C. Exterior Doors:
1. Provide insulated construction with U-value of at least 0.48 when tested in accordance with SDI 113.
 2. Steel stiffened grid core and stile and rail units are exempt from thermal rating requirements.
- D. Full Flush and Seamless Doors: Use only steel stiffener cores. Except where the referenced standards dictate more stringent requirements, space continuous steel stiffeners a maximum of 6" O.C. and fabricate from a 20 gauge steel, minimum.
1. Exception: Fire-rated doors; cores in accordance with listed construction.
 2. Exception: Exterior doors; polystyrene cores; R value: min. 7.0 excluding stiffeners.
- E. Interior Doors: Grade II, Model 2, 16 gage doors (minimum) (heavy-duty, seamless design, 16 gage frames)
- F. Interior vision panel frames: Provide mitered and welded 12 gage galvanized.
- G. Exterior Doors: Grade III, Model 2A, 14 gage doors (minimum), (extra heavy-duty, seamless design), with 12 gage frames.
- H. Frames: Provide mitered and welded unit type frames at all new framed openings. Galvanize after welding and reinforcing.
- I. Door Reinforcement: Except where referenced standards indicate more stringent requirements provide the following reinforcing.
1. Closers, Holders: 10 gauge
 2. Butts: 7 gauge
 3. All other hardware: 12 gauge
- J. Frame Reinforcement: Except where referenced standards indicate more stringent requirements provide the following reinforcing
1. Butts: 1/4" thick steel plate welded at each end
 2. Strikes: 14 gauge
 3. Closers, Holders: 10 gauge
 4. All other reinforcements: 12 gauge
 5. Lights and Transoms: Provide tubular mullions and transom bars with heads and jambs.
- K. Galvanizing: Provide units of galvanized steel at exterior openings and at other locations where indicated. Galvanize frames after fabrication; use hot dip galvanizing process.
- L. Glazed Lights: Provide metal, screwed, glazing stops and beads.

2.04 ACCESSORIES

- A. Silencers: Resilient rubber fitted into drilled hole.

- B. Bituminous Coating: Fibered asphalt emulsion. Apply to inside of all frames
- C. Primer: Zinc chromate type; except where this primer may conflict with galvanizing or with finishes indicated in Section 09900.
- D. Weatherstripping: Specified in Section 08710.
- E. Finishing: Provide factory- primed units; coordinate primer with finish paint requirements in Section 09900.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are suitable before beginning installation of frames. Identify which partitions must be constructed with door frames in place; coordinate work accordingly.
 - 1. For wrap-around frames, verify that completed openings are of correct size and thickness.
 - 2. For butt type frames, verify that completed openings are of correct size.
- B. For frames to be installed in existing walls; verify that opening is correctly sized and is plumb and true.
- C. Correct unsatisfactory conditions before proceeding with installation.

3.02 INSTALLATION

- A. Install frames plumb, level, rigid, and in true alignment as recommended in SDI 105 and A115.1G.
- B. Install doors plumb and in true alignment and fasten to achieve the maximum operational effectiveness and appearance of the unit. Maintain clearances specified in ANSI A250.8 and NFPA 80 whichever is more restrictive.
- C. Fill welded wrap-around frames in masonry construction with grout, as masonry is laid-up. Brace or fasten frame in such a way to prevent pressure of the grout from deforming frame.
 - 1. Mix grout to provide 4-inch maximum consistency and hand trowel into place.
 - 2. Do not use grout mixed to thin "pumpable" consistency.
- D. Set welded frames in place at stud partitions as partitions is being constructed; fill void between frame and studs with acoustic glass fiber insulation.
 - 1. Except where indicated otherwise, provide double wall studs at all jambs and double studs at heads for door openings exceeding 4'-0".
- E. For frames installed in new partitions and walls provide a minimum of three anchors per jamb for frames up to 7'-0" high; four anchors for frames over 7'-0" high but not exceeding 9'-0" high.
- F. When installing a new welded frame in an existing wall, provide a minimum of five anchors per jamb for frames up to 7'-0" high; six anchors for frames over 7'-0" high but not exceeding 9'-0" high.
- G. Coordinate electrical requirements for the installation of doors and frames requiring electric strikes, hold open devices, security devices or similar electric and electronic devices.
- H. Where new doors and frames are being installed into existing walls, coordinate with cutting and patching requirements

- I. Anchors shall be concealed except exposed anchors may be used where necessary to secure a new frame to an existing wall.
 - 1. Where exposed wall anchors are necessary, install through the face of the frame, countersink fasteners and fill flush with metal filler and sand smooth.
- J. Fill welded wrap-around frames in plaster construction with plaster as work progresses.
- K. If additives are used in masonry or plaster work during cold weather, field coat the inside of steel frames with a bituminous compound to prevent corrosion.
- L. Install doors plumb and in true alignment and fasten to achieve the maximum operational effectiveness and appearance of the unit. Maintain clearances specified. Shim as indicated in DHI A115.1G and SDI 122.
- M. Install hardware in accordance with hardware manufacturer's recommendations and templates. Consult DHI A115.1G and ANSI A250.6 as necessary.

3.03 ADJUST AND CLEAN

- A. Adjust doors for proper operation, free from binding or other defects.
- B. Clean and restore soiled surfaces. Remove scraps and debris, and leave site in a clean condition.

END OF SECTION 08110

SECTION 08211

FLUSH WOOD DOORS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush wood doors; door types and locations and vision panel configurations as per door schedule, door types, and floor plans of the Drawings.

1.02 RELATED SECTIONS

- A. Section 08110 - Custom Steel Frames and Doors
- B. Section 08710 - Door Hardware
- C. Section 08800 - Glazing

1.03 REFERENCES

- A. ASTM E 336 - Standard Test Method for Measurement of Airborne Sound Insulation in Buildings; 1997.
- B. ASTM E 413 - Classification for Rating Sound Insulation; 1987 (Reapproved 1994).
- C. ASTM E 1408 - Standard Test Method for Laboratory Measurement of the Sound Transmission Loss of Door Panels and Door Systems; 1991 (Reapproved 1995).
- D. AWI P-200 - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute; 1997, Seventh Edition, Version 1.0.
- E. NFPA 80 - Standard for Fire Doors and Windows; National Fire Protection Association; 1995.
- F. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing and hardware.
- D. Samples: Submit two samples of pre-finished door construction, 8 x 8 inch in size cut from top corner of door.
- E. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.05 QUALITY ASSURANCE

- A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1300, Custom Grade.
- B. Finish doors in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Section 1500, grades identified in schedule.
- C. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

1.06 REGULATORY REQUIREMENTS

- A. Fire Door and Panel Construction: Conform to NFPA 252.
 - 1. Listed and classified by UL as suitable for the purpose specified and indicated.
- B. Installed Fire Rated Door and Transom Panel Assembly: Conform to NFPA 80 for fire rated class as indicated.

1.07 DELIVERY, STORAGE, AND PROTECTION

- A. Package, deliver and store doors in accordance with AWI P-200, Section 1300.
- B. Accept doors on site in manufacturer's packaging. Inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

1.08 PROJECT CONDITIONS

- A. Coordinate the work with door opening construction, door frame and door hardware installation.

1.09 WARRANTY

- A. See Section 01780 - Closeout Submittals for additional warranty requirements.
- B. Provide warranty for the following term:
 - 1. Interior Doors: Life of installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Veneer Doors:
 - 1. Mohawk
 - 2. Eggers Industries.
 - 3. Southwood Door Company.
 - 4. Weyerhaeuser Co.
 - 5. Substitutions: See Section 01600 - Product Requirements.

2.02 DOOR TYPES

- A. Flush Interior Doors: 1-3/4 inches thick; solid core construction, fire-rated as indicated on Door Schedule of the Drawings.

2.03 DOOR CORES

- A. Positive pressure, Category “A”, 20 Minute Rated Doors: AWI Architectural Woodwork Quality Standards Illustrated, Section 1300, Type PC – Particleboard, LD-2.
- B. Positive pressure, Category “A”, Fire Rated Doors: AWI Architectural Woodwork Quality Standards Illustrated, Section 1300, Type FD, hourly ratings as indicated.

2.04 DOOR FACINGS

- A. Interior Doors - Veneer: Custom grade wood veneer, Red Oak species, plain sliced, with book matched grain, for transparent finish.

2.05 ACCESSORIES

- A. Glazing Stops for Fire Rated Doors: Wood with metal clips, mitered corners; prepared for countersink style None - N/A screws.

2.06 FABRICATION

- A. Fabricate doors in accordance with AWI Quality Standards requirements.
- B. Fabricate fire rated doors in accordance with UL requirements. Attach fire rating label to door.
- C. Provide solid blocks at lock edge and top of door for closer for hardware reinforcement.
 - 1. Provide solid blocking for other through-bolted hardware.
- D. Vertical Exposed Edge of Stiles - Veneer Faces: Of same species as veneer facing.
- E. Fit door edge trim to edge of stiles after applying veneer facing.
- F. Bond edge banding to cores.
- G. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- H. Factory fit doors for frame opening dimensions identified on shop drawings.
- I. Cut and configure exterior door edge to receive recessed devices.
- J. Provide edge clearances in accordance with AWI 1600.

2.07 FINISH

- A. Factory finish doors in accordance with AWI P-200, Section 1500 to the following finish designations:
 - 1. Transparent Finish: TR-6, transparent catalyzed polyurethane, Premium quality, satin gloss sheen.
 - 2. Submit 2 samples for each stain color. Finish color to match adjacent doors in area of

work.

- B. Seal door top edge with color sealer to match door facing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

- A. Install doors in accordance with manufacturer's instructions and AWI P-200 requirements.
 - 1. Install fire-rated doors in accordance with NFPA 80 requirements.
- B. Trim non-rated door width by cutting equally on both jamb edges.
- C. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19 mm).
 - 1. Trim fire door height at bottom edge only, in accordance with fire rating requirements.
- D. Machine cut for hardware.
- E. Coordinate installation of doors with installation of frames and hardware.
- F. Install door louvers plumb and level.

3.03 INSTALLATION TOLERANCES

- A. Conform to AWI P-200, Section 1300 for maximum diagonal distortion.
- B. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 x 84 inches surface area.
- C. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 x 84 inches surface area.

3.04 ADJUSTING

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

3.05 SCHEDULE

- A. Refer to Door Schedule on Drawings for door types and locations.

END OF SECTION 08211

SECTION 08710

DOOR HARDWARE

PART 1 GENERAL

1.01 SECTION INCLUDES

- A.. Hardware for Steel Doors and Wood Doors.
- B.. Lock cylinders
- C.. Thresholds.
- D.. Weatherstripping, seals and door gaskets.
- E. Hardware Schedule

1.02 RELATED SECTIONS

- A. Section 08110- Steel Doors and Frames.
- B. Section 08211- Flush Wood Doors

1.03 REFERENCES

- A. ANSI/CABO A117.1 - American National Standard for Buildings and Facilities - Providing Accessible and Usable Buildings and Facilities; Council of American Building Officials; 1992.
- B. BHMA A156.1 - American National Standard for Butts and Hinges; Builders Hardware Manufacturers Association; 1997 (ANSI/BHMA A156.1).
- C. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames; Door and Hardware Institute; 1990.
- D. NFPA 80 - Standard for Fire Doors and Windows; National Fire Protection Association; 1995.
- E. NFPA 101 - Code for Safety to Life from Fire in Buildings and Structures; National Fire Protection Association; 1997.
- F. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 1995.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, and any special conditions.
 - 2. Submit manufacturer's parts lists and templates.
- C. Samples:
 - 1. Submit 1 sample of hinge, latchset, lockset, closer, and kick plates illustrating style, color,

- and finish.
- 2. Samples will be returned to supplier.
- D. Manufacturer's Installation Instructions: Indicate special procedures, perimeter conditions requiring special attention, and coordination requirements affecting the assembly of doors and frames.
- E. Project Record Documents: Record actual locations of installed cylinders and their master key code.
- F. Maintenance Data: Include data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- G. Keys: Deliver with identifying tags to Owner by security shipment direct from hardware supplier.
- H. Warranty: Submit manufacturer's warranty and ensure that forms have been completed in Owner 's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Hardware Supplier Qualifications: Company specializing in supplying commercial door hardware with 5 years of experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Package hardware items individually; label and identify each package with door opening code to match hardware schedule.

1.07 COORDINATION

- A. Coordinate the work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware.
- B. Furnish templates for door and frame preparation.
- C. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
- D. Coordinate Owner's keying requirements during the course of the Work.

WARRANTY

- A. See Section 01780 - Closeout Submittals, for additional warranty requirements.
- B. Provide five-year warranty for door closers.
- C. Provide seven-year warranty for locksets
- D. Provide five-year warranty for other hardware items.

1.09 MAINTENANCE PRODUCTS

- A. Provide special wrenches and tools applicable to each different or special hardware component.

- B. Provide maintenance tools and accessories supplied by hardware component manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hinges: Stanley or equal.
1. Plated 626 finish or solid stainless steel
- B. Locks and latches: Schlage Lock Co. or equal.
1. Heavy duty commercial; ANSI A 156.2, Series 4000; Grade 1; UL listed; Schlage series "D" or "L" (mortise) as indicated.
2. Lock cylinders: cylindrical; master keyed as per Owner's requirements.
3. Lever handle: "Sparta" design; finish 626; include stainless steel strike plate and back box.
- C. Closers: Norton or equal.
1. Adjustable, surface mounted with enclosure finished to match other door hardware.
- D. Weatherstripping and Thresholds: National Guard Products.
- E. Stops: H.B. Ives or equal
1. Finish: equivalent to 626
2. Expansion bolt floor mounted stops; provide blocking for wall mounted stops at stud walls.
- F. Protection Plates: H.B. Ives or equal.
1. Satin stainless steel; 0.050 with beveled edges and oval head stainless steel screws
2. 8" high x width of door on both sides except where noted otherwise.
- G. Substitutions: See Section 01600 - Product Requirements.

2.02 GENERAL REQUIREMENTS FOR DOOR HARDWARE PRODUCTS

- A. Provide products that comply with the following:
1. Applicable provisions of Federal, State, and local codes.
2. ANSI/ICC A117.1, American National Standard for Accessible and Usable Buildings and Facilities.
3. Fire-Rated Doors: NFPA 80.
4. All Hardware on Fire-Rated Doors: Listed and classified by UL as suitable for the purpose specified and indicated.
5. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.

2.03 KEYING

- A. Planning of Keying System
1. A Keying System shall be developed encompassing the hardware to be installed for this Project and shall include interfacing new keying with existing keying. The Contractor's hardware supplier shall provide a AHC certified Hardware Consultant to perform the services indicated in this Section.
2. The Contractor's Hardware Consultant shall:
a. Develop a Keying System to suit the express needs of the Owner to coordinate new hardware with existing hardware.
b. Review the Hardware Schedule and project requirements and make

recommendations for modifications where appropriate to achieve the intent of the hardware identified in the schedule. Present the proposed modifications to the Architect for review.

- c. Reflect in the Contractor's Hardware Schedule submittal the decisions made by the Owner's Representative regarding keying requirements and by the Architect for modifications to the Hardware Schedule.
- B. Door Locks: Master keyed.
 - 1. Include construction keying.
- C.. Supply keys in the following quantities:
 - 1. 4 master keys.
 - 2. 4 construction keys.
 - 3. 4_ change keys for each lock.

2.04 KEY CABINET

- A. Cabinet Construction: Sheet steel construction, piano hinged door with cylinder type lock master keyed to building system.
- B. Horizontal metal strips for key hook labeling with clear plastic strip cover over labels.
- C. Finish: Baked enamel, color as selected.

2.05 FINISHES

- A. Finishes: Finishes for all components are identified in schedule at end of section.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that doors and frames are ready to receive work and dimensions are as indicated on shop drawings.

3.02 INSTALLATION

- A. Install hardware in accordance with manufacturer's instructions.
- B. Use templates provided by hardware item manufacturer.
- C. Mounting heights for hardware from finished floor to center line of hardware item: Comply with referenced standards for location except where ANSI/CABO A 117.1, barrier free Requirements supercede the referenced standards or are indicated on the Drawings:
 - 1. For steel doors and frames: Comply with DHI "Recommended Locations for Architectural Hardware for Steel Doors and Frames."
 - 2. For steel frames: See Section 08110.
 - 3. For wood doors: Comply with DHI "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 - 4.. Wood doors: See Section 08211.

3.03 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Section 01400.

3.04 ADJUSTING

- A. Adjust work under provisions of Section 01700.
- B. Adjust hardware for smooth operation.

3.05 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Section 01700.
- B. Do not permit adjacent work to damage hardware or finish.

3.06 SCHEDULE

- A. SET #1: INTERIOR DOOR
 - 1. Butts: FBB 168
 - 2. Lockset: Schlage ND –Series, ANSI A 156.2 4000 Grade 1 meeting A117.1 Accessibility Code. Lever handle “Sparta” with 619 satin nickel finish on all exposed parts. Function to be Electrically Unlocked ND50PDEU Office Function, ANSI F82.
 - 3. Closer: Parallel Arm; Series 7700 with heavy-duty forearm; hold open with delayed action closing.
 - 4. Floor stop: Wall mounted; concave rubber with satin stainless steel trim; 400 Series
 - 5. Threshold: 1/2" x 5" aluminum, #425; set in sealant; stainless steel screws in expansion bolts.
- C. SET #2: INTERIOR DOORS
 - 1. Butts: FBB 199
 - 2. Lockset: Schlage ND –Series, ANSI A 156.2 4000 Grade 1 meeting A117.1 Accessibility Code. Lever handle “Sparta” with 619 satin nickel finish on all exposed parts. Function to be Electrically Unlocked ND50PDEU Office Function, ANSI F82.
 - 3. Closer: Parallel Arm; Series 7700 with standard forearm; without hold open with delayed action closing.
 - 4. Stop: Floor stop: #441, Cast Aluminum
 - 5. Threshold: 1/2" x 5" aluminum, #425; set in sealant; stainless steel screws in expansion bolts.
- D. SET #3: INTERIOR DOORS
 - 1. Butts: FBB 199
 - 2. Lockset: Schlage ND –Series, ANSI A 156.2 4000 Grade 1 meeting A117.1 Accessibility Code. Lever handle “Sparta” with 619 satin nickel finish on all exposed parts. Function to be Electrically Unlocked ND50PDEU Office Function, ANSI F82.
 - 3. Closer: Parallel Arm; Series 7700 with standard forearm; without hold open with delayed action closing.
 - 4. Stop: Floor stop: #441, Cast Aluminum
- F. Provide fire rated door hardware at rated doors.

END OF SECTION 08710

SECTION 08800

GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Interior Door Vision Panels.
- B. Glazing compounds and accessories.

1.02 RELATED SECTIONS

- A. Section 07900 - Joint Sealers: Sealant and back-up material.
- B. Section 08110 – Custom Steel Frames and Doors.

1.03 REFERENCES

- A. ASTM C 864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 1993.
- B. ASTM C 1036 - Standard Specification for Flat Glass; 1991 (Reapproved 1997).
- C. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 1997.
- D. GANA (SM) - FGMA Sealant Manual; Glass Association of North America; 1990.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, and special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.
- D. Certificates: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Do not install glazing when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
1. Warranty Period: **10** years from date of Substantial Completion.
- B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
1. Warranty Period: **10** years from date of Substantial Completion.
- C. Weathertight warranty: written warranty, made out to owner and signed by installer and contractor agreeing to furnish replacements for those glazing units that deteriorate, from the nearest shipping point to project site, within specified warranty period indicated below.
1. Warranty period: 10 years from date of substantial completion.
- D. See Section 01780 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 GLASS PRODUCTS, GENERAL

- A. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass **as needed to comply with "Performance Requirements" Article**. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass **as needed to comply with "Performance Requirements" Article**. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- B. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites **of thickness indicated**.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as **Btu/sq. ft. x h x deg F**.
 5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.02 INSULATING GLASS

- A. Not Applicable for this project.

2.03 FLAT GLASS MATERIALS

- A. Manufacturers:
1. Guardian Industries, Falconer Glass Industries.
 2. Libbey-Owens-Ford Co.
 3. Visteon, Ford Motor Co., Glass Div.
 4. Substitutions: Refer to Section 01600 - Product Requirements.
- B. Clear Float Glass: Clear, annealed. 1/4" thick, nominal.
1. Comply with ASTM C 1036, Type 1 transparent flat, Class 1 clear, Quality q3 glazing select.
- B. Patterned Wired Glass: ASTM C 1036, Type II, Class 1 (clear), Form 2, Quality-Q6, Mesh M1 (diamond). Thickness: 6.0 mm.

2.04 TEMPERED GLASS AND FIRE-RATED / SAFETY-RATED GLAZING SCHEDULE

- A. Tempered Glass: Where glass of this designation is indicated, provide glass units complying with the following:
1. Overall Unit Thickness and Thickness of Each Lite: 1/4 INCH
 - a. **1/4 INCH - Kind FT (fully tempered).**
 - b. Class 1 (clear).

2.05 INSULATING-GLASS TYPES

- A. Not Applicable for this project.

2.08 GLAZING ACCESSORIES

- A. Applied Glass Stops:
1. Special-Lite, Inc., PO Box 6, Decatur, Michigan 49045. Toll Free (800) 821-6531. Phone (269) 423-7068. Fax (800) 423-7610. Web Site www.special-lite.com. E-Mail info@special-lite.com.
 2. Alternative Manufacturers:
 - A. Norton Performance Plastics Corp.
 - B. Pecora Corp.
 - C. Tremco, Inc.
 - D. Substitutions: Refer to Section 01600 - Product Requirements.
- B. Glazing Gaskets: Gaskets installed in captive assembly of glazing stops.
1. EPDM: ASTM D 2000.
 2. Closed-Cell Foam: ASTM D 1667.
- C. Setting Blocks: Neoprene, 80 to 90 Shore A durometer hardness, ASTM C 864 Option I. Length of 0.1 inch for each square foot of glazing or minimum 4 inch x width of glazing rabbet space minus 1/16 inch x height to suit glazing method and pane weight and area.

- D. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness, ASTM C 864 Option I. Minimum 3 inch long x one half the height of the glazing stop x thickness to suit application, self adhesive on one face.
- E. Glazing Tape: Closed cell polyvinyl chloride foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent, designed for compression of 25 percent to effect an air barrier and vapor retarder seal; 1/2 inch size or as recommended by the installer.
- F. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for glazing are correctly sized and within tolerance.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

3.03 INSTALLATION - INTERIOR DRY METHOD (TAPE AND TAPE)

- A. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (1.6 mm) above sight line.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.
- C. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane or unit.
- D. Place glazing tape on free perimeter of glazing in same manner described above.
- E. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.
- F. Knife trim protruding tape.

3.04 CLEANING

- A. Remove glazing materials from finish surfaces.
- B. Remove labels after Work is complete.
- C. Clean glass and adjacent surfaces.

3.05 PROTECTION OF FINISHED WORK

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste.

END OF SECTION 08800

SECTION 09110

NON-LOAD BEARING STEEL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Interior wall framing systems.
- B. Interior ceiling suspension systems.
- C. Area separation and shaft wall framing.

1.2 RELATED SECTIONS

- A. Section 06100 - Rough Carpentry.
- B. Section 07910 - Joint Sealers.
- C. Section 09260 - Gypsum Board Assemblies.

1.3 REFERENCES

- A. ASTM A641 - Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
- B. ASTM C645 - Specification for Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board.
- C. ASTM C754 - Specification for Installation of Framing Members to Receive Screw Attached Gypsum Wallboard, Backing Board, or Water Resistant Backing Board.
- D. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.
- E. ASTM D226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
- G. ASTM E90 - Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions.
- H. ASTM E413 - Classification for Rating Sound Insulation.
- I. ASTM E119 - Specification for Fire Tests of Building Construction and Materials.
- J. GA-600 - Fire Resistance Design Manual.
- K. AISI - American Iron and Steel Institute Standard for Cold Formed Steel Framing, Code of Standard Practice (AISI COSP).

1.4 DESIGN REQUIREMENTS

- A. Provide non-load bearing steel stud partitions with deflections conforming to L/360 at 15 PSF for veneer plaster walls and L/240 at 5 PSF typical for gypsum board walls.
- B. Fire-Resistive Rating: Where indicated on Drawings, provide materials and construction that

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are identical to those assemblies whose fire resistance rating has been determined per ASTM E119 by a testing and inspecting organization acceptable to authorities having jurisdiction.

1. Meet or exceed fire resistance requirements outlined under provisions of the GA-600 Fire Resistance Design Manual for wall and ceiling assemblies.
 2. Meet or exceed flame/fuel/smoke requirements of ASTM E84 surface burning characteristics for finish materials.
- C. Sound Transmission Characteristics: For gypsum board assemblies with STC ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.

1.5 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Shop Drawings: Indicate details associated with fireproofing and acoustical seals, opening locations and details, and opening termination details.
- C. Product Data: Provide manufacturer's data on metal framing.
- D. Provide manufacturers written installation instructions.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum 5 years documented experience.
- B. Installer Qualifications: Installer experienced in performing work of this Section who has specialized in installation of work similar to that required for the Project.
- C. Pre-installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, and manufacturer's installation instructions.
- D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
 1. Construct areas designated by Architect.
 2. Do not proceed with remaining work until material, details and workmanship are approved by Architect.
 3. Refinish mock-up area as required to produce acceptable work.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store materials protected from exposure to rain, snow or other harmful weather conditions, at temperature and humidity conditions per AISI COSP Section F3.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Approved Manufacturer: MarinoWARE; 400 Metuchen Road, South Plainfield, NJ 07080. Toll Free Tel: (800) 627-4661. Tel: (908) 757-9000. Fax: (908) 412-1442. Email: sales@marinoware.com. Web: www.marinoware.com.
- B. Substitutions: Equal products from other manufacturers not indicated in this Section shall be submitted according to the requirements for substitutions

2.2 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. Framing Members - General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: manufacturer's standard corrosion-resistant zinc coating, unless otherwise indicated.

2.3 SUSPENSION SYSTEM COMPONENTS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.0625 inch (1.59 mm) diameter wire, or double strand of 0.0475 inch (1.21 mm) diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.162 inch (4.12 mm) diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch (25.4 by 4.76 mm) by length indicated.
- E. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2 inch (12.7 mm) wide flanges.
 - 1. Depth: As indicated on Drawings.
- F. **Furring Channels:**
 - 1. Steel Studs: ASTM C645.
 - a. Minimum Base-Metal Thickness: As indicated on Drawings.
 - 2. Furring Channels: 1-1/2 inches (38 mm) deep.
 - a. Minimum Base Metal Thickness: As indicated on Drawings.
- G. Grid Suspension System for Ceilings: ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

2.4 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. Steel Studs and Runners: ASTM C645.
 - 1. Minimum Base-Metal Thickness: As indicated on Drawings.
 - 2. Flanges: Equal lengths 1-1/4 inches (32 mm).
- B. Slip-Type Head Joints: Where indicated, provide the following:
 - 1. Single Long-Leg Runner System: ASTM C645 top runner with 2 inch (50.8 mm) deep flanges in thickness not less than indicated for studs, installed with studs friction fit

into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.

a. Products: MarinoWARE Deflex 6T1000 Series head-of-wall clips.

- C. Firestop Track: As specified in Division 7 Section "Fire-Resistive Joint Systems."
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: As indicated on Drawings.
- E. Cold-Rolled Furring Channels: 0.0538 inch (1.37 mm) bare-steel thickness, with minimum 1/2 inch (12.7 mm) wide flanges.
 - 1. Depth: As indicated on Drawings.
- F. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 3/4 inch (19 mm), minimum bare-metal thickness of 0.0179 inch (0.4547 mm), and depth required to fit insulation thickness indicated.
- G. CT Studs: Cold-formed galvanized steel C-studs, ASTM C 645. 40 KSI steel.
 - 1. Fasteners: 25-gauge framing - Type S screws. For 20-gauge framing - Type S-12 screws.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Type, material, size, corrosion resistance, holding power required to fasten steel members to substrates.
- B. Isolation Strip at Exterior Walls: Provide the following:
 - 1. Asphalt-Saturated Organic Felt: ASTM D226, Type I (No. 15 asphalt felt), nonperforated.
 - 2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions under which Work of this Section will be performed. Correct conditions detrimental to timely and proper completion of Work. Do not proceed until unsatisfactory conditions are corrected.
- B. Examine substrates to which metal framed construction attaches or abuts. Verify pre-set hollow metal frames, cast-in anchors, and structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of wall framing.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 FASTENING

- A. Ceiling Anchorage: Coordinate installation of ceiling suspension with installation of overhead structural systems to ensure that insert anchorage provisions have been installed to receive ceiling anchors in a manner that will develop their full strength and at spacing required to support ceiling.

1. Provide concrete inserts and steel deck devices to other trades for installation well in advance of time needed for coordination with other construction.

3.3 ERECTION

- A. Metal Framing - General:
 1. Install steel framing to comply with ASTM C754 and with ASTM C840 requirements applicable to framing installation.
 - a. Conventional Drywall Framing: Materials as specified in Part 2 of this Section.
 - b. MarinoWare ViperStud Framing: Materials as specified in Part 2 of this Section.
 2. Install supplementary framing, blocking, bracing at termination in Work, and support of fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, and similar construction to comply with details indicated on Drawings and with "Gypsum Construction Handbook" published by United States Gypsum Company.
 3. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement, at locations indicated below to comply with details indicated on Drawings:
 - a. Where edges of suspended ceilings abut building structure horizontally at ceiling perimeters or penetrations of structural elements.
 - b. Where partitions and wall framing abuts overhead structure.
 - c. Provide slip type joint as detailed to attain lateral support and avoid axial loading.
 4. Do not bridge building expansion and control joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members.
- B. Metal Framing - Walls and Partitions:
 1. Install runners (track) at floors, ceilings, and structural walls and columns where gypsum board stud system abuts other construction.
 - a. Where studs are installed directly against exterior walls, install asphalt felt strips between studs and wall.
 2. Metal Stud Spacing: Maximum 16 inches (406 mm) on center, unless noted otherwise. For applications that exceed the laterally unsupported height limitations, provide engineered studs per Section 05400 - Cold Formed Metal Framing. Use gage and depth of stud required to meet maximum deflection requirements.
 3. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch (3 mm) from plane of faces of adjacent framing.
 4. 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.
 5. Install steel studs in sizes and spacing indicated on Drawings, but not less than that required by referenced steel framing installation standards.
 6. Install steel studs so that flanges point in the same direction and gypsum boards can be installed in the direction opposite to that of the flanges.
 7. Frame door openings to comply with details indicated on Drawings, with GA-219, and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames. Install runner track section (for cripple studs) at head and secure to jamb studs.
 8. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.
 9. Frame openings other than door openings to comply with details indicated on Drawings, or if none is indicated, in same manner as required for door openings; and install framing below sills of openings to match framing required above door heads.

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10. Blocking: Bolt or screw steel channels to metal studs. Install concealed wood blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and other related items that require backing for support under provisions of Section 06100.
11. Install vapor retarder on interior of framing members of exterior walls and soffits or interior face of masonry wall construction as shown on Drawings, and to comply with the following requirements:
 - a. Extend vapor retarder to extremities of exterior insulated walls, and to cover miscellaneous voids in insulated substrates, including those that have been stuffed with loose thermal insulation.
 - b. Seal vertical joints in vapor retarders over framing by lapping vapor retarders not less than 2 wall studs. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints.
 - c. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with cloth or aluminized tape which bonds permanently to vapor retarder.
 - d. Repair tears and punctures in vapor retarder immediately before concealment by application of gypsum board or other construction.
 - e. Use fire-resistive type vapor retarder in locations where vapor retarder is not covered with gypsum board. Attach as per manufacturer's written instructions.
 - f. Use non-resistive type vapor retarder where vapor retarder is covered with gypsum board.

3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 09260

GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal stud wall framing.
- B. Gypsum wallboard.
- C. Joint treatment and accessories.

1.02 RELATED SECTIONS

- A. Section 06100 – Rough Carpentry:

1.03 REFERENCES

- A. ASTM C 36 - Standard Specification for Gypsum Wallboard; 1997.
- B. ASTM C 475 - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 1994.
- C. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 1997.
- D. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 1996.
- E. ASTM C 1002 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases; 1996a.
- F. GA-201 - Using Gypsum Board for Walls & Ceilings; Gypsum Association; 1990.
- G. GA-216 - Application and Finishing of Gypsum Board; Gypsum Association; 1996.
- H. GA-600 - Fire Resistance Design Manual; Gypsum Association; 1997.
- I. E84 Test Method for Surface Burning Characteristics
- J. E90 Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements
- K. E96 Test Method for Water Vapor Transmission of Materials
- L. E136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 degrees F. (unfaced)
- M. C423 Test Method for Sound Absorption and the Sound Absorption Coefficient by the Reverberation Room Method

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data:
 - 1. Provide manufacturer's data on metal framing members including sizes and gages to be used including any accessories.
 - 2. Provide manufacturer's data on gypsum panel product types, thicknesses, and locations and accessories.
 - 3. Provide manufacturer's data on acoustical batt insulation product types, thicknesses, acoustic and thermal performance, locations and accessories.

1.05 QUALITY ASSURANCE

- A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
 - 1. Maintain one copy of standards at project site.
- B. Applicator Qualifications: Company specializing in performing the work of this section with minimum 3 years of experience.

1.06 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire rated assemblies as indicated on drawings if applicable.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Gypsum Board:
 - 1. G-P Gypsum Corp.
 - 2. National Gypsum Co.
 - 3. United States Gypsum Co.
 - 4. Substitutions: See Section 01600 - Product requirements.
- B. Metal Framing:
 - 1. Marino-Ware Industries.
 - 2. Dietrich Metal Framing.
 - 3. Unimast, Inc.
 - 4. Substitutions: See Section 01600 - Product requirements.
- C. Acoustic Batt Insulation:
 - 1. Owens-Corning.
 - 2. Thermafiber Inc.
 - 3. Johns-Manville Inc.
 - 4. Substitutions: See Section 01600 - Product requirements.

2.02 METAL FRAMING MATERIALS

- A. Framing materials, studs, soffits and furring.
Non-Loadbearing Framing System Components:
 - 1. Studs and Track: ASTM C 955; studs formed to channel shape with knurled faces with punched web; U-shaped track in matching nominal width and compatible height.
 - a. Gauge and depth: As indicated on the drawings; 18 gauge (0.0329") minimum; 4" deep at 16" O.C. unless otherwise indicated.

- b. Galvanized finish in accordance with ASTM A 653/A 653M: G90/Z275.
- c. Provide with aligned openings for routing wiring and for bracing.
- d. Provide components fabricated from ASTM A 611 steel.

2.03 GYPSUM BOARD MATERIALS

- A. Standard Gypsum Wallboard: ASTM C 36; sizes to minimize joints in place; ends square cut.
 - 1. Thickness: As indicated on drawings.
 - 2. Edges: Tapered.

2.04 ACOUSTIC BATT INSULATION

- A. Type I: Unfaced glass fiber insulation complying with ASTM C 665 and ASTM E 136.
- B. Surface burning characteristics:
 - 1. Unfaced Insulation
 - Maximum flame spread: 10
 - Maximum smoke developed: 10
- C. Combustion Characteristics: Unfaced insulation passes ASTM E 136 test.

2.05 ACCESSORIES

- A. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board.
- B. Corner Beads: Galvanized steel.
- C. Trim: ASTM C 840; Bead type as detailed.
- D. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
 - 1. Ready-mixed vinyl-based joint compound.
- E. Screws: ASTM C 1002; self-drilling type; cadmium-plated for exterior locations.
- F. Anchorage to Substrate: Tie wire, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 FRAMING INSTALLATION

- A. Metal Framing: Comply with ASTM C 754 and manufacturer's instructions.
- B. Studs: Space studs as indicated. Use 20 gauge: size as indicated.
 - 1. Extend stud framing through ceiling to structure above only where indicated. Maintain clearance under structural building members to avoid deflection transfer to studs. Provide extended leg ceiling runners.
- C. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

- D. Blocking: Install blocking for support of plumbing fixtures, wall cabinets, toilet accessories, and hardware. Bolt or screw steel channels to studs.

3.03 GYPSUM BOARD INSTALLATION

- A. Comply with ASTM C 840. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Installation on Metal Framing: Use screws for attachment of all gypsum board.
- D. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board and exterior gypsum soffit board with sealant.

3.04 ACOUSTIC BATT INSULATION

- A. Comply with manufacturer's instruction for particular conditions of installation in each case with ASTM C 840.
- B. This insulation is for interior wall use only. The Kraft paper for this product is NOT a vapor retarder. NOT recommended for exterior walls over firm bearing.
- C. Protect insulation from damage and from becoming wet before, during and after installation.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

3.06 JOINT TREATMENT

- A. Finish gypsum board in scheduled areas in accordance with levels defined in ASTM C 840 and as scheduled below.

3.07 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

3.08 FINISH LEVEL SCHEDULE

- A. Level 1: Above finished ceilings concealed from view; including, but not limited to plenums and attics.
- B. Level 2: Areas behind cabinetry or other built in items which conceal the wall.
- C. Level 3: Walls in service or utility rooms, electrical closets, telephone equipment rooms, janitor closets and other non-habitable spaces.

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- D. Level 4: Walls and Ceilings in all finished spaces which are not scheduled for another finish level by the descriptions contained herein. Including, but not limited to walls and ceilings to be painted with flat or eggshell finishes or which are scheduled for wall coverings.
- E. Level 5: Walls and Ceilings scheduled to receive semi-gloss or gloss paint finishes and surfaces to be used for cove lighting applications or where lighting is focused directly onto gypsum surface:
- F. Soffits: Finish as indicated for Ceilings.

END OF SECTION

SECTION 09511

SUSPENDED ACOUSTICAL CEILINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 RELATED SECTIONS

- A. Section 07900 - Joint Sealers: Acoustical sealant.
- B. Section 09260 - Gypsum Board Assemblies.
- C. Division 15 - Mechanical: air outlets, diffusers, grilles
- D. Division 16 - Electrical: lighting fixtures, electrical devices, smoke/fire detectors

1.03 REFERENCES

- A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2000.
- B. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 1996.
- C. ASTM E 580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint; 2000.
- D. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 1998.
- E. UL (FRD) - Fire Resistance Directory; Underwriters Laboratories Inc.; current edition.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate grid layout and related dimensioning.
- C. Product Data: Provide data on suspension system components.
- D. Samples: Submit three samples 6 x 6 inch in size illustrating material and finish of acoustical units.
- E. Manufacturer's Installation Instructions: Indicate special procedures.

1.05 QUALITY ASSURANCE

- A. Fire-Resistive Assemblies: Complete assembly listed and classified by UL for the fire resistance indicated.

- B. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 ENVIRONMENTAL REQUIREMENTS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

1.07 PROJECT CONDITIONS

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust-generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Install acoustical units after interior wet work is dry.

1.08 EXTRA MATERIALS

- A. See Section 01600 - Product Requirements, for additional provisions.
- B. Provide 2 percent of total acoustical unit area of each type of acoustical unit for Owner's use in maintenance of project.

PART 2 PRODUCTS

2.01 ACOUSTICAL UNITS

- A. Manufacturers:
 - 1. Equal products from other manufacturers may be submitted for consideration
 - 2. Substitutions: See Section 01600 - Product Requirements.
- B. Acoustical Panels Type lay in: ASTM E 1264 Type IV, Plastic faced mineral fiber, conforming to the following:
 - 3. Size: 24 x 24 inches.
 - 4. Thickness: 5/8 inches.
 - 5. Composition: mineral fiber, wet-formed.
 - 6. Weight: 1.40 lb/sq.ft.
 - 7. NRC: 0.10
 - 8. CSTC Minimum: 35.
 - 9. UL Labeled; Class A; Flame Spread 25 or under according to ASTM 1264 requirements.
 - 10. Smoke Development Rating: 50 or less according to ASTM E84 & ASTM 1264.
 - 11. Edge: Square.
 - 12. Surface Color: White. High light reflectance rating of 0.88
 - 13. Surface Pattern: Non-directional fissured Texture: medium.
 - 14. Product: "Fine-Fissured" Ceramaguard, by Armstrong.
 - 15. Suspension System: Exposed grid Type exposed tee.
- C. Acoustical Panels Type ACT-1:
 - 16. Surface Texture: Medium
 - 17. Composition: Mineral Fiber
 - 18. Color: White

19. Size: 12 x 12 inches
20. Thickness: 5/8 inches.
21. Edge Profile: Beveled K4C4.
22. Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton, 0.55.
23. Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton, 35
24. Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton N/A.
25. Flame Spread: ASTM E 1264; Class A (UL)
26. Light Reflectance (LR): ASTM E 1477; White Panel: Light Reflectance: 0.85.
27. Dimensional Stability: HumiGuard Plus - temperatures up to 120 degrees F and high humidity excluding only exterior use, use over standing water, and direct contact with moisture .
28. Mold/Mildew Inhibitor: The front and back of the product have been treated with BioBlock, a paint that contains a special biocide that inhibits or retards the growth of mold or mildew, ASTM D 3273.
29. Acceptable Product: Fine Fissured, 746 as manufactured by Armstrong World Industries.

2.02 SUSPENSION SYSTEM(S)

- A. Manufacturers:
 1. Same as for acoustical units.
 2. Substitutions: See Section 01600 - Product Requirements.
- B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.
- C. Exposed Steel Suspension System Type Exposed Tee: Formed steel, commercial quality cold rolled; heavy-duty.
 1. Profile: Tee; 15/16-inch wide face.
 2. Construction: Double web.
 3. Finish: White painted.

2.03 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Same material and finish as grid.
 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
- C. Adhesive: Henry 237 AcoustiGum Acoustical Ceiling Tile Adhesive
- D. Acoustical Insulation: Specified in Section 07212.
 1. Thickness: 2 inch.
 2. Size: To fit acoustical suspension system.
- E. Acoustical Sealant For Perimeter Moldings: Specified in Section 07900.
- F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Coordinate location of hangers and grid pattern with Mechanical or Electrical work.
- C. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Locate system on room axis according to reflected plan.
- D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- E. Support suspension system only from structural floor slab, beams, girders or joists. Do not support suspension system from ducts, mechanical equipment, electrical equipment, piping, finish materials or framework supporting other finishes
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- J. Do not eccentrically load system or induce rotation of runners.
- K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
 - 1. Install in bed of acoustical sealant at acoustic partitions.
 - 2. Use longest practical lengths.
 - 3. Overlap and rivet corners.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Follow grid pattern indicated on the drawings; coordinate with details at windows and other perimeter conditions.

- D. Fit border trim neatly against abutting surfaces.
- E. Install units after above-ceiling work is complete.
- F. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- G. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- H. Where round obstructions occur, provide preformed closures to match perimeter molding.
- I. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions except where otherwise indicated.
- J. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.
- K. Install hold-down clips on panels within 20 ft of an exterior door.

3.04 ERECTION TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION

SECTION 09650

RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring (Vinyl Composition Tile - VCT)
- B. Resilient base.
- C. Resilient stair accessories.
- D. Installation accessories.

1.02 RELATED SECTIONS

1.03 REFERENCES

- A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 1997a.
- B. ASTM E 648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2000.
- C. ASTM F 710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2000.
- D. ASTM E 662 - Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials; 1995.
- E. ASTM F 1066 - Standard Specification for Vinyl Composition Floor Tile; 1999.
- F. ASTM F 1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing; 1999.
- G. FS SS-T-312 - Tile, Floor: Asphalt, Rubber, Vinyl, and Vinyl Composition; Federal Specifications and Standards; Revision B, 1974, and Amendment 1, 1979.

1.04 PERFORMANCE REQUIREMENTS

- A. Conform to applicable code for fire performance ratings as follows:
 - 1. Classification: Class 1 as per ASTM E-648
 - 2. Critical radiant flux (CRF): Minimum 0.45 watt per square centimeter, per ASTM E 648.
 - 3. Flame spread: Maximum 75, per ASTM E 84.
 - 4. Smoke developed: Maximum 450, per ASTM E 84.
 - 5. Smoke density: Maximum 450, per ASTM E 662.

1.05 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance

characteristics; including sizes, patterns and colors available; and installation instructions.

- C. Shop Drawings: Indicate seaming plan for resilient sheet flooring.
- D. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- E. Verification Samples: Submit three samples, 6 x 6 inch in size illustrating color and pattern for each resilient flooring product specified.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.06 DELIVERY, STORAGE, AND PROTECTION

- A. Protect roll materials from damage by storing on end.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.08 EXTRA MATERIALS

- A. See Section 01600 - Product Requirements, for additional provisions.
- B. Provide 400 sq ft of flooring, 100 lineal feet of base, and 5 percent of installed stair materials of each type and color specified.

PART 2 PRODUCTS

2.01 MATERIALS - TILE FLOORING (VCT)

- A. Vinyl Composition Tile: Homogeneous, with color extending throughout thickness, and:
 - 1. Size: 12 x 12 inch.
 - 2. Thickness: 0.125 inch.
 - 3. Patterns: Marbleized and Faux Wood
 - 4. Manufacturers:
 - a. Armstrong World Industries, Inc: www.armstrong.com/commflooringna
 - b. Azrock Industries, Inc.
 - c. Tarkett, Inc: www.tarkett.com.
 - d. Kentile Floors Inc.
 - e. Congoleum Corporation

2.02 MATERIALS - BASE

- A. Resilient Base: Complies with ASTM F-1861 Type TS (Thermoset Vulcanized Rubber), Group 1 (Solid, Straight, and as follows:
 - 1. Height: 4 inch.
 - 2. Thickness: 0.080 inch thick.
 - 3. Finish: Satin.
 - 4. Length: Roll (minimum 80 feet long)

5. Color: Color as selected from manufacturer's standards.
6. Manufacturers:
 - a. Same manufacturers as for Tile Flooring or one of the following.
 - b. BurkeMercer Flooring Products, Inc: www.burkemercer.com.
 - c. Johnsonite, Inc: www.johnsonite.com.
 - d. Roppe Corp: www.roppe.com.
 - e. Substitutions: See Section 01600 - Product Requirements.

2.03- MATERIALS- RUBBER STAIR TREADS AND RISERS

- A. Roppe, Style # 31 Diamond Design Round Nose, color as selected by Architect from Manufacturer's full range of standard colors.
 1. Complies with ASTM F 2169, Type TS, Class 2 (Patterned)
 2. Length: as required to cover full stair tread.
 3. Depth: 12" (304.8mm) nominal from inside of nose.
 4. Thickness: 1/4" tapering to 3/16" (6.35mm to 4.76mm) nominal
 5. Nose Length: 1-3/8" (34.93mm) nominal
 6. Nose Thickness: 7/64" (2.78mm) nominal
 7. Tapered Nose: No
 8. Relief Cut: No
 9. Limited Wear warranty: Manufacturer's limited wear warranty of three years for normal commercial traffic
- B. Roppe Rubber Risers: Standard Rubber Risers, color as selected by Architect from Manufacturer's full range of standard colors.
 1. Height: 7" coordinate in the field.
 2. Thickness: .100" (2.54mm) nominal
 3. Toe Length: 9/16" (14.24mm) nominal
 4. Length as required to cover full stair riser.
- C. Approved Equal.

2.04 ACCESSORIES

- A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Moldings and Edge Strips: Metal.
- D. Filler for Coved Base: Plastic.
- E. Sealer and Wax: Types recommended by flooring manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified in Section 03300 and are ready to receive resilient flooring.
- B. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.
- C. Verify that concrete sub-floor surfaces are ready for resilient flooring installation by testing for

moisture emission rate and alkalinity; obtain instructions if test results are not within the following limits:

1. Moisture emission rate: Not greater than 3 lb per 1000 sq ft per 24 hours when tested using calcium chloride moisture test kit for 72 hours.
 2. Alkalinity: pH range of 5-9.
- D. Verify and/or test for the presence of curing compounds or similar products which may have applied to the concrete substrate and determine if such substances will affect installation and bond.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Provide thermoplastic rubber subfloor leverer.
- B. Prohibit traffic until filler is cured.
- C. Clean substrate.

3.04 INSTALLATION - TILE FLOORING (VCT)

- A. Install in accordance with manufacturer's instructions.
- B. Mix tile from container to ensure shade variations are consistent when tile is placed.
- C. Spread only enough adhesive to permit installation of materials before initial set.
- D. Set flooring in place and press with heavy roller to attain full adhesion.
- E. Lay flooring with joints and seams parallel to building lines to produce symmetrical tile pattern.
- F. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.
- G. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated. Secure metal strips before installation of flooring with stainless steel screws.
- H. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- I. Install flooring in recessed floor access covers. Maintain floor pattern.
- J. Install feature strips where indicated. Fit joints tightly.

3.05 INSTALLATION - BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners,'V' cut back of base strip to 2/3 of its thickness and fold. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to doorframes and other interruptions.

3.06 INSTALLATION - STAIR COVERINGS

- A. Install landing tiles, stair nosing, stair treads, and stair risers in one piece for full width and depth of tread.
- B. Layout stair landing tiles to minimize joints; install in a symmetrical pattern.
- C. Adhere over entire surface. Fit accurately and securely.

3.07 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean, seal and wax resilient flooring products in accordance with manufacturer's instructions.

3.08 PROTECTION OF FINISHED WORK

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 09650

SECTION 09900

PAINTS AND COATINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Use products specified in this section to finish all surfaces exposed to view, unless otherwise indicated, including but not limited to the following:
 - 1. Interior wall surfaces.
 - 2. Interior wood trim and woodwork.
 - 6. All shop-primed items.
- B. Do not paint the following:
 - 1. Items specified or provided with factory finish.
 - 2. Items indicated to receive other finish.
 - 3. Items indicated to remain naturally finished.
 - 4. Concrete masonry in utility, mechanical, and electrical spaces.
 - 5. Stainless steel, anodized aluminum, bronze, terne, or lead.
 - 6. Equipment nameplates, fire rating labels, and operating parts of equipment.
 - 7. Acoustical materials.
 - 8. Concealed piping, ductwork, and conduit.
- C. Materials and products having factory-applied primer are not considered factory finished.
- D. For paint systems, see Schedules at end of Section.

1.02 REFERENCES

- A. ASTM D 16 - Standard Terminology Relating to Paint, Varnish, Lacquer, and Related Products; 1996a.

1.03 DEFINITIONS

- A. Conform to definitions of terms in ASTM D 16 in interpreting requirements of this specification section.

1.04 SUBMITTALS

- A. See Section 01300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's descriptive literature for coating materials and coating application accessories.
- C. Selection Samples: For each finish coating specified, two sets of color chips representing manufacturer's full range of available colors and finishes.
- D. Manufacturer's printed application instructions for each product, including product storage requirements and surface preparation requirements.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacture of coatings of quality specified with minimum of 10 years experience.
- B. Installer Qualifications: Company specializing in commercial painting and finishing with three years documented experience and approved by the coating manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products of this section in manufacturer's unopened packaging until installation.
- B. Establish and maintain storage area conditions for products of this section in accordance with manufacturer's instructions until installation.
- C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction over project.

1.07 PROJECT CONDITIONS

- A. Do not apply coatings to exterior surfaces except under environmental conditions recommended by coating manufacturer.
- B. Establish and maintain environmental conditions recommended by coating manufacturer before, during, and after application of coatings to interior surfaces.
- C. During application of coating materials, post "WET PAINT" signs.
- D. During application of solvent-based materials, post "NO SMOKING" signs.

1.08 SEQUENCING

- A. Do not allow application of finish coats in an area until moisture-producing construction activities, dust-producing construction activities, and other construction activities which could impair performance or appearance of finish coatings, have been completed in that area.

1.09 EXTRA MATERIALS

- A. See Section 01600 - Product Requirements, for additional provisions.
- B. Extra Materials: Supply for each finish coating material, color, and finish specified two gallons of coating material, in sealed 1 gallon containers, marked with color and finish identification.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Duron, Inc., 10406 Tucker Street, Beltsville, MD 20705. ASD. Tel: (800) 723-8766, ext. 3400. Fax: (301) 595-0429. www.duron.com
- B. Substitutions: See Section 01600 - Product Requirements.
- C. Unless otherwise specified for an individual product or material, supply all products specified in this section from the same manufacturer.

2.02 MATERIALS

- A. Paints and Coatings - General:
 - 1. Acceptable products: Indicated in Schedules at the end of this section.
 - 2. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not dilute or thin coatings, except as instructed.
 - 3. Do not add additives, except as instructed or recommended by coating manufacturer.
 - 4. Supply each coating material in quantity required for this section from a single production run.
 - 5. Colors: To be selected from manufacturer's full range of available colors.
- B. Coating Application Accessories: Specified in this section or in coating manufacturer's application instructions, including but not limited to thinners, sealers, primers, cleaning agents, etching agents, cleaning cloths, sanding materials, and clean-up materials.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Immediately prior to coating application, ensure that surfaces to receive coatings are dry.
- B. Ensure that moisture-retaining substrates to receive coatings have moisture content within tolerances allowed by coating manufacturer, using moisture measurement techniques recommended by coating manufacturer.
- C. Immediately prior to coating application, examine surfaces to receive coatings for surface imperfections and for contaminants which could impair performance or appearance of coatings, including but not limited to, loose primer, rust, scale, oil, grease, mildew, algae, or fungus, stains or marks, cracks, indentations, or abrasions.
- D. Correct the above conditions and other conditions which could impair performance or appearance of coatings in accordance with specified surface preparation procedures before proceeding with coating application.

3.02 PREPARATION

- A. Do not start work until surfaces to be finished are in proper condition to produce finished surfaces of uniform, satisfactory appearance.
- B. Stains and Marks: Remove completely, if possible, using materials and methods recommended by coating manufacturer; cover stains and marks which cannot be completely removed with isolating primer or sealer recommended by coating manufacturer to prevent bleed-through.
- C. Mildew, Algae, and Fungus: Remove using materials and methods recommended by coating manufacturer.
- D. Remove dust and loose particulate matter from surfaces to receive coatings immediately prior to coating application.
- E. Remove or protect hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items not indicated to receive coatings which are adjacent to

surfaces to receive coatings.

- F. Disconnect equipment adjacent to surfaces indicated to receive coatings.
- G. Move equipment and fixtures adjacent to surfaces indicated to receive coatings to allow application of coatings.
- H. Protect surfaces not indicated to receive coatings which are adjacent to surfaces indicated to receive coatings.
- I. Do not allow coatings on surfaces not indicated to receive them.
- J. Prepare surfaces in accordance with manufacturer's instructions for specified coatings and indicated materials, using only methods and materials recommended by coating manufacturer, and as follows:
- K. Concrete Floors: Remove contaminants which could impair coating performance or appearance, acid-etch, flush with clean water; verify alkaline-acid balance recommended by coating manufacturer; mechanically abrade surface, if required, to achieve medium-sandpaper texture.
- L. Ferrous Metals, Unprimed: Remove rust or scale, if present, by wire brush cleaning, power tool cleaning, or sandblast cleaning; remove grease, oil, and other contaminants which could impair coating performance or appearance by solvent cleaning, with phosphoric-acid solution cleaning of welds, bolts and nuts; spot-prime repaired welds with specified primer.
- M. Ferrous Metals, Shop-Primed: Remove loose primer and rust, if present, by scraping and sanding, feathering edges of cleaned areas to produce uniform flat surface; solvent-clean surfaces and spot-prime bare metal with specified primer, feathering edges to produce uniform flat surface.
- N. Galvanized Steel: Wipe down surfaces using clean, lint-free cloths saturated with mineral spirits or lacquer thinner; wipe dry using clean, lint-free cloths.
- O. Wood:
 - 1. Seal knots, pitch streaks, and sap areas with sealer recommended by coating manufacturer; fill nail recesses and cracks with filler recommended by coating manufacturer; sand surfaces smooth.
 - 2. Apply primer coat to back of wood trim and paneling.
- P. Gypsum Board: Repair cracks, holes, indentations, and other surface defects using joint compound to produce surface flush with adjacent undamaged surface; sand to produce uniform flat surface when dry.

3.03 APPLICATION

- A. Apply each coat to uniform coating thickness in accordance with manufacturer's instructions, not exceeding manufacturer's specified maximum spread rate for indicated surface; thins, brush marks, roller marks, orange-peel, or other application imperfections are not permitted.
- B. Allow manufacturer's specified drying time, and ensure correct coating adhesion, for each coat before applying next coat.
- C. Inspect each coat before applying next coat; touch-up surface imperfections with coating material, feathering, and sanding if required; touch-up areas to achieve flat, uniform surface

without surface defects visible from 5 feet.

- D. Remove dust and other foreign materials from substrate immediately prior to applying each coat.
- E. Where coating application abuts other materials or other coating color, terminate coating, making clean sharp termination line without coating overlap.
- F. Where color changes occur between adjoining spaces, through framed openings which are of same color as adjoining surfaces, change color at outside stop corner nearest to face of closed door.
- G. Re-prepare and re-coat unsatisfactory finishes; refinish entire area to corners or other natural terminations.

3.04 MECHANICAL AND ELECTRICAL EQUIPMENT

- A. Wood Equipment Panels: Apply primer coat to panel back before mounting; finish in accordance with requirements for interior wood, flat finish, including edges, before mounting equipment.
- B. HVAC Ductwork: Finish interior surfaces visible through grilles and louvers with one coat alkyd flat wall paint, color black.
- C. Piping, Ductwork, and Conduit Exposed to View in Finished Spaces: Finish in accordance with requirements for unprimed ferrous metal items, color matching adjacent surfaces unless otherwise indicated.
- D. Access Panels, Electrical Panels, and Cover Plates: Finish in accordance with requirements for shop-primed ferrous metal items, including doors, door backs and sight-exposed cabinet surfaces, color matching adjacent surfaces unless otherwise indicated; do not allow coatings on identification plates, tags, or markings.

3.05 RE-INSTALLATION

- A. Re-install hardware, electrical equipment plates, mechanical grilles and louvers, lighting fixture trim, and other items which have been removed to protect from contact with coatings.
- B. Reconnect equipment adjacent to surfaces indicated to receive coatings.
- C. Relocate to original position equipment and fixtures which have been moved to allow application of coatings.
- D. Remove protective materials.

3.06 CLEANING

- A. Clean excess coating materials, and coating materials deposited on surfaces indicated to receive coatings, as construction activities of this section progress; do not allow to dry.

3.07 PROTECTION

- A. Protect completed coating applications from damage by subsequent construction activities.
- B. Repair to Architect's acceptance coating applications which are damaged by subsequent

construction activities in accordance with specified application procedures; re-apply finish coating to nearest adjacent change of surface plane, in both horizontal and vertical directions, where repairs cannot be made to Architect's acceptance.

3.08 SCHEDULE - PAINT SYSTEMS

- A. Masonry Walls: Latex Finish
 - 1. One coat Duron Interior Acrylic Enamel Undercoater
 - 2. Two coats Duron Plastic Kote interior Acrylic Latex Flat, DU0017 Series
- B. Concrete Floors - Urethane Finish:
 - 1. One coat Duron Dura Clad Interior Clear Epoxy Floor Sealer/Finish 33-056.
 - 2. Two coats Duron Dura Clad Moisture Cure Urethane, amber/clear, 93-009.
- C. Ferrous Metals:
 - 1. Unprimed:
 - a. One coat Duron Dura Clad Alkyd White Metal Primer 33-010, or one coat Duron Dura Clad Damp Proof Red Oxide Metal Primer 33-015, as recommended by finish coating manufacturer for colors of finish coats.
 - b. Two coats Duron Dura Clad Alkyd Gloss Enamel, Urethane Modified, 12 Series.
 - c. Two coats Duron Wall Kote Interior Alkyd Semi-Gloss Enamel, 48 Series.
 - 2. Shop-primed:
 - a. Touch-up: Duron Dura Clad Alkyd White Metal Primer 33-010, or Duron Dura Clad Damp Proof Red Oxide Metal Primer 33-015, as recommended by finish coating manufacturer for colors of finish coats.
 - b. Two coats Duron Dura Clad Alkyd Gloss Enamel, Urethane Modified, 12 Series.
 - c. Two coats Duron Wall Kote Interior Alkyd Semi-Gloss Enamel, 48 Series.
 - 3. Galvanized:
 - a. One coat Duron Dura Clad Acrylic Galvanized Metal Primer, White, 33-100.
 - b. Two coats Duron Dura Clad Alkyd Gloss Enamel, Urethane Modified, 12 Series.
- D. Wood - Paint (Opaque) Finish:
 - 1. Semi-gloss finish:
 - a. One coat Duron Wall Kote Interior Alkyd Enamel Undercoater 04-024.
 - b. Two coats Duron Ultra Deluxe Interior Vinyl Acrylic Semi-Gloss Enamel, 35 Series.
- E. Gypsum Board:
 - 1. Semi-gloss finish:
 - a. One coat Duron Ultra Deluxe Interior Drywall Vinyl Primer Sealer 04-126.
 - b. Two coats Duron Ultra Deluxe Interior Vinyl Acrylic Semi-Gloss Enamel, 35 Series.

END OF SECTION 09900

SECTION 13070

BULLET RESISTANT GLAZING BARRIERS

PART 1 GENERAL

1.1 REFERENCE

- A. Underwriters Laboratory UL 752-Standard for Bullet Resisting Equipment & ASTM E119-98-Standard Test Methods for Fire Tests of Building Construction and Materials, NIJ Standard 0108.01-(National Institute of Justice) Standard for Ballistic Resistant Protective Materials
- B. ASTM B 209/B 209M- Standard Specification for Aluminum and Aluminum Alloy Sheet and Plate
- C. ASTM A 666-Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar..

1.2 SUBMITTALS

- A. The following shall be submitted by the manufacturer in accordance with Sections 13070 and: Submit for approval prior to fabrication: samples, product data (including preparation, storage and installation methods), cuts & anchor spacing, reinforcement & location , product specifications, shop drawings, test reports (current UL Listing Verification & UL 752 Test Results as provided by Underwriters Laboratories), and printed data in sufficient detail to indicate compliance with the contract documents.
- B. Manufacturer's Instructions for installation and cleaning of Window Assemblies. All required submittals shall be approved prior to installation.

1.3 DESIGN PERFORMANCE

- A. Through the design, manufacturing techniques and material application the Bullet Resistant Glazing Barrier shall be of the "non-ricochet" type. This design is intended to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration. This assembly shall provide two (2) transaction positions. Each transaction position shall have a stainless steel dip tray as shown on the drawings. Components must be manufactured in strict accordance with the specifications, design and details. All vision panels shall be cut to size with all exposed edges polished. Necessary holes shall be pre drilled and tapped where required. Stainless Steel assembly screws and acrylic spacers shall be provided. Clear anodized angles, channels and anchoring screws shall be provided.
- B. No field alterations to the construction of the assembly fabricated under the acceptable standards shall be allowed unless approved by the manufacturer and the architect. Standard manufacturing tolerances shall be +/- 1/16".
- C. Materials shall meet or exceed UL 752 requirements.

1.4 QUALITY ASSURANCE

- A. Manufacturer shall be a Company that specializes in manufacturing products of the specified type with a minimum of five years experience. Installer shall be a Company that specializes in product type specified and Certified for the installation by the manufacturer. Manufacturer shall provide a sampling, if required, for evaluation of surface preparation and application workmanship and color/finish to the Architect for approval prior to start of work.

1.5 DELIVERY, STORAGE & HANDLING

- A. Delivery of the materials to the project with the manufacturer's UL Listed Labels intact and legible. Handle the materials with care to prevent damage. Store materials inside and under cover, stack flat and off floor. Project conditions (temperature, humidity, and ventilation) shall be within the maximum limit recommendations set by manufacturer. Do not install products that are under conditions outside these limits.

1.6 WARRANTY

- A. All materials shall be warranted against defects for a period of 1 year for the date of receipt at the project site. . Certificates of manufacturer's standard limited warranty shall be provided at project completion.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Products shall be manufactured by: Total Security Solutions, Inc, 170 National Park Drive, Fowlerville, MI 48836, 866-930-7807. Web: www.tssbulletproof.com .
- B. Equal products from one of the following manufacturers may be submitted for review. All products of this section shall be from a single manufacturer.

1. Action Bullet Resistant, 263 Union Boulevard, West Islip, New York 11795. Web: <http://www.actionbullet.com>

2. Substitutions: See Section 01600 - Product Requirements.

2.2 BULLET RESISTANT GLAZING BARRIERS

- A. Product shall consists of custom prefabricated bullet resistant wall section panels with secure air passage through the window transaction point as required for voice transmission. Aluminum channel, acrylic mounting clips, acrylic buttresses and accessories for installation are included. Available finishes include clear anodized or powder coated.
- B. Glazing interior and exterior application shall be **Bullet Resistant Level 3** as shown on the drawings. All acrylic pieces shall meet or exceed UL 752 testing for ballistic integrity. All edges of acrylic shall be filed, sanded after cutting to remove rough edges and then polished until "water clear" transparent. All through holes for fasteners shall be 3/8" in diameter and be drilled clean. Chipped edges at through-hole exit points are not acceptable. All acrylic

pieces shall be supported in the proper glazing channel designed for this purpose (see aluminum, Section D).

*Bullet-Resisting Glazing Material: **Bullet Resistant Level 3 - 1 1/4" LP 1250 Laminated***

- C. Deal Trays: Standard deal trays are constructed on 18 gauge stainless steel in a brushed #4 finish. All joints are welded and ground smooth and all edges are finished smooth. Deal trays shall be securely fastened to the counter millwork with the fasteners hidden and inaccessible. Trays are 8" from front to rear. Surface mounted trays are 2" in height and are standard for retrofit applications. Deal tray width is determined by the deal area width. If the counter has no designated deal area the trays shall be at least 14" in width.
- D. Aluminum sections to be manufactured in accordance with ASTM B209, Extruded aluminum alloy 6063 T5 Anodized or powder coated finish to match the existing décor and be free of sharp edges or burrs when in place. Glazing Channel: U-Channel specifically designed for securing transparencies tightly in place. Angles and stops are only acceptable for top attachment. All exposed aluminum edges shall be clean cut and have no burrs. Exposed corners shall be rounded and sanded.
- E. Mounting plates and or connecting clips shall be fabricated from 1/8" thick clear polycarbonate.
- F. Ballistic fiberglass protection in counters and walls. UL Tested and rated ballistic fiberglass fabricated to fit into teller knee space areas, risers and adjacent walls.
 - a. Fiberglass sheeting in the counter shall have a painted finish. Fiberglass installed on walls will be finished in plastic laminate to match the existing counter and/or door.
 - b. Fiberglass shall have all necessary cutouts provided for electrical receptacles, alarm and computer equipment.
 - c. For New Construction applications ballistic fiberglass material shall be installed by the millwork contractor within the new countertops, as well as in all half wall and full wall structures adjacent to the teller counter. Fiberglass full sheets or factory cut panels will be shipped directly to the contractor.

PART 3 EXECUTION

3.1 PREPARATION

A. Prior to installing the bullet resistive material, the contractor shall verify that all supports have been installed as required by the contract documents and architectural drawings, and approved shop/CAD drawings, if required. Installer shall notify architect of any unsatisfactory preparation that is responsibility of another installer.

B. Clean and prepare all surfaces per manufacturers recommendations for achieving the best results for the substrate under the project conditions.

3.2 INSTALLATION

A. Do not begin installation until openings have been verified and surfaces properly prepared in accordance with Drawings. Install in accordance with manufacturer's instructions and UL 752.

Set all equipment plumb. All products shall be installed per installation instructions provided by Total Security Solutions, if warranty is to be issued.

B. Bullet resistant glazing barriers shall arrive on site completely pre-fabricated to supplied field dimensions. Unit shall be installed in provided opening and secured to structure.

3.3 POST APPLICATION

A. Bullet resistant glazing barriers shall be installed in accordance with manufacturer's printed recommendations, including adhering to anchoring and finishing details.

B. Inspection and Cleaning: Verify installation is complete and complies with manufacturer's requirements. Clean product and accessories, removing excess sealant, labels and protective covers.

C. Touch-up, repair or replace damaged products before Substantial Completion.

D. Product Warranty: Applicable warranty shall be issued to owner upon final release of completed project.

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. Piping Insulation: Section 210700.

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.
- C. Quality Control Submittals:
 - 1. Company Field Advisor Data:
 - a. Name, business address and telephone number of Company Field Advisor secured for the required services.
 - b. Certified statement from the Company listing the qualifications of the Company Field Advisor.
 - c. Services and each product for which authorization is given by the Company, listed specifically for this project.

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. The contractor shall provide pre-engineered or stamped and signed details (by a NYS Licensed Professional Engineer) of seismic restraint

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systems to meet total design lateral force requirements for support and restraint of mechanical and electrical systems.

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
3 to 6	4	14	6	10
8 to 14	10	12	12	16
16 and up	10	10	12	16

- 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
3 to 8	10	16
10 to 14	12	12
16 and up	18	10

- 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.

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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

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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.

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

2. For Grooved End Steel Pipe:

PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)
1-1/2 and under	7
2 through 4	10
5 and over	12

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PIPE SIZE (Inches)	MAXIMUM SPACING (Feet)

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
4 and 5	5/8	1/2	1/2	3/8
6	3/4	1/2	5/8	1/2
8, 10 and 12	7/8	5/8	3/4	5/8

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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 Concrete Filled Steel Decks:

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1. New Construction: Install metal deck ceiling bolts.
 2. Existing Construction: Install welding studs (except at roof decks). Do not support a load in excess of 250 lbs from any single welded stud.
 3. Do not attach hangers to decks less than 2-1/2 inches thick.
- D. Attachment to Cast-In-Place Concrete: Secure to overhead construction by means of cast-in-place concrete inserts.
- E. 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.
- F. Attachment to Cored Precast Concrete Decks (Flexicore, Dox Plank, Spancrete, etc.): 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 Hollow Tile Filled Concrete Decks:
1. New Construction: Omit block or tile and pour solid concrete with cast-in-place inserts.
 2. Existing Construction: Break out block or tile to access, and install machine bolt anchors at highest practical point on side of web.
- H. Attachment to Waffle Type Concrete Decks:
1. New Construction: Install cast-in-place inserts.
 2. Existing Construction: Install machine bolt expansion anchors at highest practical point on side of web.
- I. Attachment to Precast Concrete Tee Construction:
1. New Construction: Tee hanger inserts between adjacent flanges, except at roof deck without concrete fill.
 2. Existing Construction: Dual unit expansion shields in webs of tees. Install shields as high as possible in the webs.
 - a. Exercise extreme care in the field drilling of holes to avoid damage to reinforcing.
 - b. Do not use powder driven fasteners.
- J. Attachment to Wood Construction: Secure hangers to the sides (only) of wood members, by means of malleable iron side beam connectors, or malleable iron or steel side beam brackets. Do not secure hanger attachments to nailing strips resting on top of steel beams.
1. Secure side beam connectors to wood members with two No. 18 x 1-1/2 inch long wood screws, or two No. 16 x 1-1/2 inch long drive screws. Do not support piping over 1-1/2 inches in size from side beam connectors. Do not hammer in wood screws.
 2. Secure side beam brackets to wood members with steel bolts or lag screws. Do not use lag screws in wooden members having a nominal

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thickness (beam face) less than 2 inches in size. Install bolts or lag screws, in the sides of a timber or a joist, at the mid-point or above, not less than 2-1/2 inches from the lower edge when supporting branch lines and not less than 3 inches from the lower edge when supporting mains. Install heavy gage steel washers under all nuts.

3. Secure side beam brackets to wooden beams or joists, with lag screws or bolts of size as follows:

PIPE SIZE (Inches)	LAG SCREW SIZE (Inches)	BOLT DIAMETER (Inches)
2 and under	3/8 diameter x 1-3/4	3/8
2-1/2 and 3	1/2 diameter x 2	1/2
4 and 5	Use Bolt	5/8

- a. Do not support piping larger than 3 inches with lag screws. Pre-drill holes for lag screws 1/8 inch in diameter less than the root diameter of the lag screw thread.
- b. The minimum width of the lower face of wood beams or joints in which lag screws of size as specified may be used is as follows:

LAG SCREW DIAMETER (Inches)	NOMINAL WIDTH OF BEAM FACE (Inches)
3/8	2
1/2	3

4. Do not secure hanger attachment to the diagonals or vertical members of the trusses.

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

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- 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 AND STANDPIPE PIPING

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Through Penetration Firestops: Section 078400.

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.

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. NOT PERMITTED: Welded pipe; Grooved Pipe.
- C. 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.

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- 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

- A. Water Pipe: Bitumin coated and cement-mortar lined; AWWA C151.
 - 1. 3 and 4 Inch Sizes: Class 51.
 - 2. 6 inch Size and Over: Class 50.
- B. Fittings: Bitumin coated and cement-mortar lined; AWWA C110.

2.03 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

- A. NOT USED

2.04 BOLTED MECHANICAL BRANCH CONNECTION

- A. Victaulic Co.'s 920 Mechanical T.

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. Gaskets For Use With Ductile Iron Water Pipe: Synthetic rubber rings (molded or tubular): Clow Corp.'s Belltite, Tyler Pipe Industries Inc.'s Ty-Seal, or U.S. Pipe and Foundry Co.'s Tyton.
- D. Flange Gasket Material:
 - 1. For Use With Cold Water: 1/16 inch thick rubber.
- E. Gaskets For Use With Grooved End Pipe and Fittings: Type and materials as recommended and furnished by the fitting manufacturer, for the service of piping system in which installed.
- F. Anti-Seize Lubricant: Bostik Inc.'s Never Seez or Dow Corning Corp.'s Molykote 1000.

2.06 DIELECTRIC CONNECTORS

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- 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.
- C. For Penetrations of Fire Rated Separations: see Section 078400

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.

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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 AND FIRE STANDPIPE 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: NOT USED.
- E. Mechanical Joint: Make up joint in conformance with the manufacturer's printed installation instructions, with particular reference to tightening of bolts.

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- 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.

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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.

B. 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.

NOTE: Should penetration of an existing roof membrane be required, the Contractor shall employ an authorized agent of the Roofing Manufacturer to penetrate membrane and to seal the penetration. The agent shall be pre-qualified by the Manufacturer so that the Manufacturer's warranty of the existing roofing membrane to the Owner is maintained and not diminished. Contractor shall submit Roof Manufacturer's Agent's qualifications and documentation from the Manufacturer stating the Warranty will not be voided or diminished in length.

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:

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- 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. Fire Standpipe and Sprinkler: Standard weight black steel pipe, with extra heavy cast iron fittings, and threaded joints.
- B. Sprinkler and Standpipe (Below Ground): Coated ductile iron water pipe and fittings, with mechanical or push-on joints.

END OF SECTION

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SECTION 211313

SPRINKLER SYSTEMS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

- A. Painting: Section 099000.
- 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.
- B. Occupancy Classification:
 - 1. Light Hazard Occupancy.
 - 2. Ordinary Hazard Occupancy.

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. 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.

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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, water flow test data 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 Owner'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 Owner 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 Owner's Representative for storage in spare sprinkler head cabinets:

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1. Spare sprinkler heads of required temperature range as follows:

QUANTITY	TYPE
	standard upright
	standard pendent
	sidewall upright
	sidewall pendent
	sidewall horizontal
	flush ceiling
	flush wall
	institutional pendent

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.
 2. 2-1/2 inch and larger: IBBM, OS & Y indicating type; double or wedge disc with end connections as required to suit the piping system.
- B. Inspector's Test Outlet Valve: Ball type, bronze body, Type 316 stainless steel ball and stem, teflon seats and stem packing, 400 psi WOG. Valve shall have padlocking feature in both the open and closed position.
- C. 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. Alarm Check Valve:
 1. Two piece cast iron body, bolted and gasketed.
 2. Moving parts brass, bronze, or stainless steel with replaceable rubber clapper facing.
 3. Right or left hand trimming as required.
 4. Suitable for horizontal or vertical installation.
 5. Two pressure gages.
 6. Main drain tap.
 7. Alarm retarding chamber for water motor alarm device and electric alarm pressure switch.

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- a. Pressure switch: Equip with spst or spdt contacts rated 10 Amps at 110 V ac, adjustable differential, range as required; NEMA Type 12 enclosure.
- 8. Factory finish with corrosion resistant red paint.
- 9. Trim Package: Angle valve, globe valve, alarm line strainer, orifice restriction, pipe nipples and fittings.
- E. 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.
- F. Dry Pipe Valve: NOT USED
- G. Pressure Gages: Range of 2 times system working pressure at point where installed. Equip with gage cock and provisions for draining.
- H. Inspector's Test Connection: Cast brass, capped, sprinkler line tester fitting; Elkhart Brass Mfg. Co.'s No. 112, or Seco Mfg., Inc.'s No. 445 or 446.

2.02 SPRINKLER HEADS AND APPURTENANCES

- A. Sprinkler Heads: Brass or bronze, with standard 1/2 inch orifice, and deflector:
 - 1. Upright or Pendent Type: Deflector designed to distribute water downward in a uniform hemispherical spray pattern.
 - 2. Dry Pendent Type: Designed to prevent water and condensation from being trapped below the drainable system piping.
 - 3. Flush Pendent Type: All or part of sprinkler body including shank thread mounts above lower plane of finished ceiling.
 - 4. 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.
 - 5. Institutional Pendent Type: Star Sprinkler Corporation's (Grunau Co.) Model PH-2, Style A and Style B, 165 degree temperature rating.
 - a. Style A: Flat escutcheon (for rooms with recessed lighting).
 - b. Style B: Conical escutcheon (for rooms with surface mounted lighting).
 - 6. Markings: Stamp sprinkler type on deflector in addition to NFPA's color code requirements covering temperature classification.
 - 7. Finish:
- B. Escutcheons:
 - 1. Material: Steel
 - 2. Finish: Chrome Plated or match existing
- 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.

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- D. Spare Sprinkler Head Cabinet: Steel, with hinged cover, constructed of minimum 20 gage material and fitted with 16 gage steel racks designed to hold quantities and types of spare sprinkler heads and sprinkler head wrenches.
 - 1. Finish: Bright red, baked on enamel.

2.03 FIRE DEPARTMENT CONNECTION

See drawings.

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

- A. Construction: Weather-proof, steel rotary clapper, brass or aluminum gong, 8 inch minimum diameter provided with a protecting hood, removable brass inlet strainer, 3/4 inch alarm line and 1 inch drain.

2.06 ELECTRIC ALARM GONG

- A. 6 inch diameter vibrating bell; 120 V ac. Sound rating 92 db at 10 feet minimum; Viking's 03115BA or Edward's 438-6N5.
 - 1. Markings: The words FIRE ALARM in block lettering on a contrasting background.
 - 2. Mounting: Suitable for both wall and ceiling mounting.

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

- A. Pressure actuated switch designed to detect increase and decrease from normal system pressure in dry pipe systems. Potter Electric Signal's PS40-2, with BVL bleeder valve, and cover tamper switch.

2.09 AIR COMPRESSOR- NOT USED

2.10 ENCLOSURE

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- A. Size: Length and width as indicated; full ceiling height, but not to exceed 8'-0".
- B. Construction and Materials: 1-1/2 inch diamond pattern woven mesh, with No. 10 W&M (0.135 inch) steel wire forming a panel framed with minimum 1 x 1/2 x 1/8 inch steel channel.
 - 1. Panel width: 5'-0" wide panels with odd size fill-in sections as required.
 - 2. Door Panel: Include one panel containing a 3'-0" wide door set in a steel frame. Hang door on not less than 3 butt hinges; equip door with mortise cylinder lock and 2 keys.
- C. Accessories:
 - 1. Cast iron floor sockets with set screws and means of anchoring.
 - 2. 1 x 2 inch steel cap bar around top of panels.
 - 3. Wall clips, bolts for fastening sections together and bolts, shields and hardware for fastening the enclosure to floor, walls and ceiling.
 - 4. Finish: Factory applied light green enamel.

2.11 SIGNS

- A. Steel with vitreous enamel finish, lettering on contrasting background to identify and indicate the function of:
 - 1. Control valves.
 - 2. Drain, test, air supply and alarm check valves.
 - 3. Water motor alarm.
 - 4. Hydraulic Design Nameplate Data: Size approx. 9 x 12 inches, inscribed with the following:
 - a. SPRINKLER SYSTEM HYDRAULICALLY DESIGNED (in block letters).
 - b. Location and area of hydraulically designed section.
 - c. Discharge density over designed area in gallons per minute.
 - d. Residual pressure at base of riser supplying water to designed section.

PART 3 EXECUTION

3.01 WATER FLOW TESTS

- A. Contractor shall perform or cause to be performed a water flow test conducted at the Fire Hydrant closest to the point of connection to the Building. The test data shall indicate the static pressure, residual pressure at test flow rate and elevation of test location.

3.02 HYDRAULIC CALCULATIONS

- A. Hydraulic calculations shall be prepared for all new sprinklers in the Building. The calculations shall be complete and cross referenced to the appropriate drawing sheets.

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- B. The calculations shall be signed and sealed by a licensed New York State Professional Engineer,
- C. The calculations shall be prepared in accordance with the requirements of NFPA 13.
- D. The calculations shall be based upon the results of the water flow test.
- E. The calculations shall indicate a minimum 5% pressure safety margin.

3.03 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's 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.

3.04 PREPARATION

- A. Existing Sprinkler System Shutdown:
 - 1. Before shutting down the sprinkler system to perform the Work, notify the Owner's 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's Representative.
 - 3. Return the existing system to pre-shutdown operation immediately after the Work has been completed. Give written notice to the Owner's Representative that the system has been returned to pre-shutdown operation.

3.05 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. Base Plate Air Compressor: Mount on a concrete pad. Level, grout-in and secure compressor and motor.
- C. Strap-on Compressor: Mount on system piping above the level of dry valve using mounting brackets and straps. Connect air piping to sprinkler riser on system side of dry pipe valve. Provide check valve and shut-off valve in air piping.
 - 1. Test the air compressor for proper operation; verify that it can pressurize the dry pipe system in 30 minutes or less.
- D. Locking Valves:

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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 Main: A bolted mechanical branch connection may be used. Refer to Section 211300.
- G. Signs: Install signs identifying the following:
1. Valves: One for each size, type and function.
 2. Water Motor Alarm.
 3. Hydraulically Designed System.
- H. NOT USED

3.06 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 Owner's Representative when the Work of this Section is ready for testing.
 - c. Perform the tests when directed, and in the Owner's Representatives presence.

END OF SECTION

SECTION 23000
BASIC HEATING, VENTILATING AND AIR CONDITIONING REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Provide labor, materials, tools, machinery, equipment, and services necessary to complete the HVAC 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. Examine the Architectural, Structural, Plumbing and Electrical Drawings and other Divisions, and Sections of the Specifications in order to determine the extent of the Work required to be completed under this Division. Failure to examine all the Contract Documents for this Project will not relieve the Contractor of his/her responsibilities to perform the Work required for a complete fully operational and satisfactory installation.
- C. The Work includes but is not limited to the following systems, equipment and services:
 - 1. HVAC
 - a. 3rd Precinct Lobby: Reconfigure ductwork as required by the new layout and balance the entire system connected thereto. Provide hot water convectors, piping, and accessories as specified.
 - b. Perform testing, adjusting, and balancing for all systems affected by the Work.
- D. All systems, equipment and services specified herein shall be provided complete and ready for use.

1.02 SUBMITTALS

- A. General: Unless indicated otherwise in the specific technical section, if a particular product specified in the technical section is being provided, manufacturer's qualifications and samples (except as listed below), are not required to be submitted. Manufacturer's product data, installation instructions, samples requiring color or texture approval, samples showing thickness and type of material, shop drawings, and calculations are to be submitted. Schedules, startup manuals, operation and maintenance manuals, and shop drawings are always required to be submitted.
- B. The following Submittals are required for all Sections of Division 23-Heating, Ventilating, and Air Conditioning. Specific "Supplemental Submittals" or additional information to that listed below that are required to be submitted are defined in each individual technical section.
 - 1. Product Data: Submit manufacturer's product data for equipment including catalog sheets or cuts, specifications, capacity, performance charts, test data, materials,

dimensions, weights, furnished specialties and accessories; and installation instructions. Submit start-up instructions where applicable.

2. Shop Drawings: Submit manufacturer's shop drawings detailing equipment assemblies and indicating dimensions, weight, loadings, required clearances, method of field assembly, components, location and size of each field connection.
- C. Where indicated in the Supplemental Submittals of the technical sections, the following submittals are defined as follows:
1. Maintenance Data: Submit maintenance data and parts list. Include this data and the product data in the maintenance manual in accordance with the requirements of Division 1.
 2. Test Report: Submit factory certified test results prior to shipping.
- D. Piping, Ductwork, and Wiring Diagrams: Submit a complete wiring diagram, ductwork layout, and piping layout of all equipment. All parts of the installation shall be indicated exactly as installed and shall be properly identified. Valve identification numbers shall agree with valve tags of Section 230553: Identification and all piping shall be clearly shown and labeled.
- E. Coordination Drawings: Provide complete coordination Drawings showing interface of all mechanical trades with the Architecture of the Building. All copies are to be signed. The Contractor is to keep a copy of the signed coordination drawing on the site.

1.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications: If a particular product specified in the technical section is not being provided, provide manufacturer's qualifications.

Provide manufacturer's qualifications that indicate that the firms are regularly engaged in manufacture of equipment, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than five years.

- B. Codes and Standards: All equipment furnished and installed shall meet or exceed the referenced Standards and Codes in all respects – installation, performance, etc.

References and industry standards listed herein and in other HVAC Sections are applicable to the Work specified in the Section. Unless more restrictive criteria is explicitly called-out for in other HVAC Specifications or mandated by the Building Code, the requirements described in the referenced standards below shall be deemed applicable to the Work. This includes language in the documents in the form of a recommendation or suggestion, which shall be deemed as mandatory.

1. NFPA
2. 2013 NYS BUILDING CODE
3. ASHRAE (SPECIFICALLY 90.1-2010)
4. SMACNA
5. ELECTRICAL IEEE STANDARDS
6. STATE DEC REGULATIONS

7. ASME
8. ANSI
9. ABMA
10. UL
11. LOCAL LAWS
12. NCPWB
13. FCI
14. EJMA
15. MSS
16. ABMA
17. IRI
18. MEA
19. AABC
20. NEBB
21. ARI
22. AMCA
23. ADC
24. NEMA
25. NEC
26. ASTM
27. YONKERS BUILDING CODE

1.05 ACCESSIBILITY

- A. Install access for servicing and maintenance. Coordinate the final location of concealed equipment and devices requiring access with final location of access panels and doors. Allow ample space for removal of all parts that require replacement or servicing.
- B. For access doors to valves, dampers and all other HVAC type of items, accessories and equipment, concealed in walls, ceiling, furring's and hung ceilings; Door shall permit full access to the equipment.

1.06 ROUGHING-IN

- A. Verify final locations for roughing work with field measurements and with the requirements of the actual equipment being connected. Coordinate with General Construction drawings.

1.07 MECHANICAL INSTALLATIONS

- A. Coordinate HVAC equipment and materials installation with other building components.
- B. Verify all dimensions by field measurements.
- C. Arrange for chases, slots, and openings in other building components to allow for HVAC installations.
- D. Sequence, coordinate, and integrate installations of HVAC materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning and entrance prior to the close of the building.

- E. Coordinate the cutting and patching of building components to accommodate the installation of HVAC equipment and materials.
- F. Where mounting heights are not detailed or dimensioned, install HVAC services and overhead equipment to provide the maximum headroom possible.
- G. Install HVAC equipment to facilitate maintenance and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting and minimum of interference with other installations.
- H. Coordinate the installation of HVAC materials and equipment above ceilings with suspension system, light fixtures, and all other installations and accessories.
- I. Provide all rigging, disassembly and reassembly of equipment including the furnishing and installation of dunnage and all other required and necessary accessories.

1.08 COORDINATION DRAWINGS

- A. Provide coordination drawings. Coordination drawings shall be completed so as not to delay the progress of the Project.
- B. The coordination drawings shall be prepared in the following manner: HVAC Subcontractor shall prepare a set of mylars drawn to the scale of 3/8"=1'-0", indicating thereon ductwork, steam and return piping, All beam and slab penetrations shall be indicated and sizes shall be coordinated. HVAC Contractor shall provide shop drawings for all roof openings required for installation of HVAC systems. 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. Should any problems of coordination require architectural or structural change of design, this change shall be submitted to the Owner for approval.
- C. If any trade installs any Work before coordinating with the Work of other trades, that Trade shall make necessary changes to correct the condition without extra cost to the OWNER OW. This requirement for "Coordination Drawings" shall not be construed as authorization to make any unauthorized changes to the Drawings. All Design Drawings space allocations shall be maintained, such as ceiling height, chase walls, equipment room size, and all other items and accessories, unless prior written authorization is received from the OWNER OW to change them.

1.09 CUTTING AND PATCHING

- A. Do not endanger or damage installed Work through procedures and processes of cutting and patching.
- B. Arrange for repairs required to restore the work, because of damage caused as a result of HVAC installations.
- C. No additional compensation will be authorized for cutting and patching Work that is necessitated by defective or non-conforming installations.

- D. Perform cutting, fitting, and patching of HVAC equipment and materials required to:
 - 1. Remove and replace defective work.
 - 2. Remove and replace work not conforming to requirements of the Contract Documents.
 - 3. Remove samples of installed work as specified for testing.
 - 4. Install equipment and materials in existing structures.
 - 5. Cut, remove and legally dispose of selected HVAC equipment, components, and materials as indicated, including, but not limited to removal of HVAC piping, heating units and trim and other HVAC items made obsolete by the new work.
 - 6. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.

1.10 EQUIPMENT NOISE AND VIBRATION

- A. Provide equipment and systems that, as defined herein, shall be quiet and free of apparent vibration in operation.
- B. The vibration shall not be apparent in occupied areas of the building. Both the balancing of rotating machinery and the installation of vibration isolation at various locations are required.
- C. Obtain equipment that is quiet in operation as compared to other available equipment of its size, capacity, and type; install equipment so that a minimum amount of noise and/or vibration is transmitted to the building; and fabricate the duct system so that air noises generated in the system are held to an absolute minimum.
- D. Adjust all the equipment RPM, noise production and vibration in order to avoid any production of resonance in any system.

1.11 ELECTRICAL CHANGES TO MECHANICAL EQUIPMENT

- A. If any changes made in equipment submitted are approved especially as to the sizes of the motors, notify Electrical.

1.12 DELIVERY, STORAGE, AND HANDLING

- A. Handle equipment carefully to prevent damage, breaking, denting, and scoring. Do not install damaged units or components; replace with new.
- B. Store equipment in clean dry place. Protect from weather, dirt, fumes, water, construction debris, and physical damage.
- C. Comply with manufacturer's rigging and installation instructions for unloading equipment, and moving them to final location.

1.13 GUARANTEES, WARRANTIES, BONDS, AND MAINTENANCE CONTROL

- A. Refer to General Sections for procedures and submittal requirements for warranties. Refer to individual equipment specifications for warranty requirements.
 - 1. Compile and assemble the warranties specified for HVAC work into a separated set of documents, tabulated and indexed for easy reference.
 - 2. Provide complete warranty information for each item to include product or equipment including duration of warranty or bond; and names, addresses, and telephone numbers and procedures for filing a claim and obtaining warranty services.
 - 3. Unless otherwise noted in the specific sections, warranties for the equipment, workmanship and materials shall be provided for the period of one year.
 - 4. Manufacturers', not Contractors' warranties, shall be provided for all HVAC equipment and accessories.
 - 5. All warranties are to start from the date of Substantial Completion.

1.15 OPERATIONS, TRAINING, AND MANUAL

- A. Refer to General Sections for procedures and requirements for preparation and submittal of operation and maintenance manuals of each HVAC equipment. Refer to individual equipment specifications for maintenance manual additional requirements. In addition, include the following information:
 - 1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
 - 2. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shut-down, and emergency instructions; and summer and winter operating instructions.
 - 3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassemble; aligning and adjusting instructions.
 - 4. Servicing instructions and lubrication charts and schedules.
- B. Bind all the other Sections maintenance manuals in a single final Operating and Maintenance Manual.

1.16 PAINTING

- A. Painting Schedule

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1. No on-site painting is required on the following items unless specifically indicated otherwise:
 - a. Concealed metal and piping.
 - b. Piping or ductwork to be insulated.
 - c. Insulation on piping or ductwork in unfinished spaces or concealed.
2. Paint the following:
 - a. Hangers, Supports, Restraints and Accessories:
 - 1) All black steel or iron pipe hangers, rods, inserts, brackets, restraints, and accessories for supporting piping systems and duct systems: 1 coat of primer and 2 coats of latex semi-gloss enamel. Paint black steel hanger rods, threaded on the job site, with a primer immediately after installation.

F. Color Coding:

1. Apply finish paints of colors indicated opposite the various items listed below where such items are installed in Mechanical Equipment Rooms:

Piping, Exposed - Bare and Insulated on Unfinished Spaces and Rooms:

Water - Dual temperature	Yellow
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2. Piping Not Listed Above: Color code by classification as follows:

Dangerous Materials	Yellow or Orange
Safe Materials	Green
Valuable Materials	Purple
3. Ductwork: Grey.
4. Equipment - Bare and Insulated (Except Factory Painted): Grey.

1.17 ADJUSTING AND CLEANING

- B. Alignment: Check alignment, and where necessary, realign equipment within recommended tolerances by the manufacturer and in presence of manufacturer's service representative and the owner.

1.18 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 Division of Fire Prevention of the Fire Department, latest Fire Prevention (F.P.) Directive. 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 OW.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine areas and conditions under which equipment is to be installed. Do not proceed with work until conditions are suitable.

3.02 INSTALLATION

- A. Install equipment in accordance with manufacturer's installation instructions. Install units plumb and level, firmly anchored in locations indicated, and maintain manufacturer's recommended clearances.
- B. Support: Install equipment on 4" high concrete pad when installed on floor, with vibration isolators and restraints as required.
- C. Accessories: Install equipment accessories not installed at factory and shown on the Drawings.
- D. Connections: Connect all equipment and accessories as recommended by manufacturer for a complete installation.
- E. Contractor shall not leave sharp exposed metal edges (bottom of threaded rods, mechanical equipment supports, etc.) that could otherwise present safety hazards to the building's occupants/work staff.

3.03 START-UP AND DEMONSTRATION/TRAINING/SERVICE

- A. Start-Up and Demonstration/Training: The Contractor shall start-up and demonstrate, in the presence of the Owner, the proper operation of all equipment provided in this Contract.

- B. Service: Provide the services of a competent field service representative to furnish service to the facility during construction and during the warranty period. Service must be performed within 48 hours from the time of notification (24 hours for emergencies).

3.04 ADJUSTING AND CLEANING

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

3.06 TESTING

- A. The Contractor shall furnish energy, fuel, oil, water, air, light and electrical instruments as required for all testing. Reference Section 230593, Cleaning and Testing.

END OF SECTION

SECTION 230523

VALVES

PART 1 GENERAL

1.01 ABBREVIATIONS

- A. IBBM: Iron body, bronze mounted.
- B. OS&Y: Outside screw and yoke.
- C. WOG: Water, oil, gas.
- D. WSP: Working steam pressure.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's catalog sheets and specifications for each valve type.
- B. Valve Schedule: List type of valve, manufacturer's model number, and size for each service application.

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 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. Type A: 125 psig WSP, 200 psig WOG, bronze body, union bonnet, solid wedge disc, and threaded ends. Acceptable Valves: Crane 428UB, Hammond IB617, Jenkins 47CU, Milwaukee 1152, Nibco T134, and Stockham B105.

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- B. Type D: 125 psig WSP, 200 psig WOG, bronze body, threaded bonnet, solid wedge disc, and solder ends. Acceptable Valves: Crane 1330, Hammond IB635, Jenkins 991AJ, Milwaukee 149, Nibco S111, and Stockham B108.

2.03 COMBINATION BALANCING AND SHUT-OFF VALVES

- A. Heavy duty brass construction of angle or straightway pattern with 200 psig working water pressure at 250 degrees F, one union connection and one threaded or solder end, visible graduated dial indicator, memory stop, and wheel handle with full turn opening. Acceptable Manufacturers: Bell & Gossett, Armstrong, Dunham-Bush, and Spirax Sarco.

2.04 PRESS FIT VALVES

- A. Valves shall be of type, material and pressure rating, as required by the particular application, as approved.

2.05 BALL VALVES

- A. Type BV: 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.

3.02 VALVE APPLICATION SCHEDULE

- A. Schedule of valve applications for the different services is as follows:
 - 1. Hot Water (S & R) 125 psig and Less:
 - a. 3 inch and Less: A or D gates or BV balls.

END OF SECTION

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.
 - 3. Details and method of installing restraints, anchors, and supports for grooved end piping systems
- B. Product Data: Catalog sheets, specifications and installation instructions for each item specified except fasteners.

1.03 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.

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
3 to 6	4	14	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
3 to 8	10	16

- 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.
- D. Pipe Hangers: Height adjustable standard duty clevis type, with cross bolt and nut.
- 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. Rollers: Cast Iron.

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).

2.03 VIBRATION ISOLATION FOR PIPING

- A. Type: Combination rubber and spring type designed for insertion in a split hanger rod for isolating piping from the overhead construction.
 - 1. Approved isolators: Amber Booth Type BSSR, Korfund Type VX, Mason Industries, Type DNHS, Vibration Eliminator Co. Type SNRC and Vibration Mountings and Controls Type RSH.
- B. To ensure that piping weight is properly distributed and not being supported by equipment flanges, the first three rubber and spring isolators on the inlet shall be of the "position indicating" type.

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1. Approved Isolators: Amber Booth Type PBSS, Korfund Type VXLS, Mason Industries Type PDNHS, Vibration Eliminator Co. Type PR2H and Vibration Mountings and Controls Type RSHP.

2.04 FASTENERS

- A. Bolts, Nuts, Washers, 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. Electroplated copper hanger rods, hangers and accessories shall be used with copper pipe or copper tubing.

PART 3 EXECUTION

3.01 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

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

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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. 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
4 and 5	5/8	1/2	1/2	3/8

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 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.

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.
- D. Attachment to Hollow Block or Hollow Tile Filled Concrete Decks:
 - 1. Existing Construction: Break out block or tile to access, and install machine bolt anchors at highest practical point on side of web.

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.

3.05 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.

3.06 VIBRATION ISOLATION FOR PIPING

- A. Install vibration isolation in accordance with the manufacturer's printed installation instructions, unless otherwise specified.
- B. Piping: The isolator deflections shall be equal to or greater than the static deflection of the vibration isolators provided for the connected machinery as follows:
 - 1. Hot Temperature Piping: For risers from pumps and for the first 20 feet of the branch connection of the main supply and return piping at each floor.
 - 2. Water Distribution Piping Application: Resiliently support piping with combination rubber and spring isolation hangers.
 - a. Provide spring elements with 5/8-inch static deflection; install the hanger with spacing so that the first harmonic natural frequency is not less than 360 Hz. Provide double-deflection neoprene elements.
 - b. Incorporate an adjustable preloading device to transfer the load to the spring element within the hanger mounting after the piping system has been filled with water.

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SECTION 230553

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.

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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. HVAC Use: 1-1/2 inch dia round.
- 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:

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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 furred spaces or suspended ceilings, except at valve access panels where valves and piping shall be identified as specified for exposed piping systems.
 2. Piping in finished spaces such as dorms, common rooms, 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. Valves in heating systems.
- 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.

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SECTION 230594

BALANCING OF SYSTEMS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Quality Control Submittals:
 - 1. Testing, Adjustment and Balancing Reports:
 - a. Submit final testing and balancing results on applicable report forms, as approved or furnished by the environmental systems balancing council or bureau, which is certifying the independent member agency performing the Work, required by this Section. Each final systems report form shall bear the signature of the person performing the Work and recording the data and the signature of the certified supervisor for the performing agency. Submit simultaneously with the final reports, a list of the instruments used with the last date of calibration for each instrument.

1.02 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Provide the services of a certified independent agency for the testing, adjustment and balancing of all air distribution and hydronic distribution systems complete with all connected apparatus and equipment. The agency shall be certified by the Associated Air Balance Council Bureau - AABC, Los Angeles, Cal. 90026 or by National Environmental Balancing Bureau - NEBB, Arlington, Va. 22209.
 - 2. The Work shall be performed by skilled mechanical technicians under the direct supervision of certified personnel in the employ of the independent agency. The supervisor shall be personally certified by the national council or bureau, as approved by the Owner.

1.03 SEQUENCING AND SCHEDULING

- A. Scheduling:
 - 1. Perform environmental systems testing and balancing after cleaning, miscellaneous testing, adjustment and operational testing Work has been completed.
 - 2. Test and balance system during a period of time when outside temperature conditions will impose a significant load on the system; i.e., summer months for air conditioning system, winter months for heating system. Balance and adjust systems accordingly.
 - 3. Send written notification to the Owner a minimum of five days prior to the performance of testing and balancing Work. Perform testing and balancing Work in the presence of the Owner.

PART 2 PRODUCTS

2.01 TEST EQUIPMENT

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- A. General Information: Test instruments are included in this specification for information only. Balancing of hydronic systems shall be performed by qualified personnel utilizing company owned test instruments, which will remain the property of the company. Use test instruments which are in first class operating condition, with individual calibration histories to guarantee their accuracy. Test instruments shall be of type and kind as required by the type of system installed. Trade names and manufacturer's names are mentioned in this section for descriptive purposes only; instruments of equivalent range and capabilities may be utilized.
- B. Hydronic Balancing Instruments:
1. Calibrated Test Gages: Ranges 0 to 30 lbs., 0 to 60 lbs., 0 to 200 lbs.
 2. Calibrated Test Gages (Compound Type): Ranges from -30 inches to 30 lbs. and -30 inches to 60 lbs.
 3. U Tube Manometer: 36 inches.
 4. Thermometers: 12 inches mercury column type and dial type, with a range of -40 to +120 degrees F. and 0 to 220 degrees F. Total of four thermometers.
 5. Universal Hand Tachometer: Herman H. Sticht Type UH.
 6. Stop Watch.
 7. Stroboscope.
 8. Contact Pyrometer: Thermocouple type.
 9. Volt-Ohm-Ammeter Test Kit, High Current Type: Sperry "Ohmprobe".
 10. Volt-Ammeter: With leads for connecting to lugs.

PART 3 EXECUTION

3.01 PRELIMINARY WORK

- A. Circulating Water Systems: Prior to balancing the system, bleed all air vents so as to completely flood the system; check pumps for proper rotation; clean strainers and set balancing and system stop valves in the full-open position.

3.02 BALANCING OF CIRCULATING WATER SYSTEM

- A. Equipment Schedules and Report Sheets: Prepare itemized equipment schedules, listing all heating or cooling elements and equipment in the system to be balanced. List in order on equipment schedules, by pump or zone according to the design, all heating or cooling elements and all zone balancing valves or balancing devices. Break down schedules into zones to circuits, starting from the zone or circuit pump and terminating with the last item of equipment or transfer element in the respective zone or circuit. Include on schedule sheets, column titles listing the location, type of element or apparatus, design conditions and water balance readings. Prepare individual pump report sheets for each individual system or zone pump.
- B. Balancing:
1. Place system in full automatic operation, with automatic controls set in accordance with design conditions, and allow water to reach design temperature.
 2. Test pumps and balance flow. Record the following on pump report sheets:
 - a. Suction and discharge pressure.
 - b. Running amps and brake horsepower of pump motor under full flow and no flow conditions.

- c. Pressure drop across pump in feet of water and total gpm pump is handling under full flow conditions.
3. Set zone or circuit balancing valve at each pump, finned tube radiator, and elsewhere throughout the building, to handle the design GPM.
4. Check pumps for flow, after the system has been balanced.
5. Record test readings, calculations and results.

3.03 FIELD QUALITY CONTROL

- A. Inspection: Prior to the environmental testing and balancing of hydronic and air distribution systems, the certified supervisor in the employ of the testing and balancing agency shall inspect the installations and notify the Owner of any Work which must be performed or modified prior to initiating testing and balancing procedures.
- B. Performance: Test and balance environmental hydronic and air distribution systems, including all connected equipment and apparatus, so as to conform to the design conditions. Perform the Work of this section in accordance with the published standards of the balancing council or bureau, which is certifying the member firm. Record all test readings, calculations and results.

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SECTION 230719

INSULATION

PART 1 GENERAL

1.01 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.
- D. PVC: Polyvinylchloride.

1.02 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's catalog sheets, specifications and installation instructions for insulation materials and jacket materials.
 - 2. Materials Schedule: Itemize insulation materials and thicknesses for each specified application in Insulation Material Schedules in Part 3 of this Section. Where optional materials are specified, indicate option selected.
- B. Quality Control Submittals:
 - 1. Installers Qualification Data:
 - a. Name of each person who will be performing the Work, and their employer's name, business address and telephone number.
 - b. Furnish names and addresses of the required number of similar projects that each person has worked on which meet the qualifications.

1.03 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.
- B. Regulatory Requirements:
 - 1. Insulation installed inside buildings, including duct lining materials, laminated jackets, mastics, sealants and adhesives shall have a Fire Spread/Smoke Developed Rating of 25/50 or less based on ASTM E 84.

PART 2 PRODUCTS

2.01 INSULATION

- A. Fibrous Glass (Mineral Fiber) Insulation: Composed principally of fibers manufactured from rock, slag, or glass, with or without binders, and asbestos free.
1. Preformed Pipe Insulation: Minimum density 3 pcf; ASTM C 547:
 - a. Class 1 (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
 - b. Class 2 (Suitable for Temperatures 451 to 650 degrees F): K of 0.46 at 300 degrees F.
 - c. Class 3 (Suitable for Temperatures 651 to 1200 degrees F): K of 0.56 at 300 degrees F.
 2. Premolded Fitting Insulation: Minimum density 4.0 pcf, K of 0.26 at 75 degrees F; ASTM C 547, Class 1.
 3. Insulation Inserts for PVC Fitting Jackets: Minimum density 1.5 pcf, K of 0.28 at 75 degrees F; ASTM C 553, Type III.
 - a. Suitable for temperatures up to 450 degrees F.
 4. Block or Board Insulation: Minimum density 3.0 pcf and 6.0 pcf as specified; ASTM C 612:
 - a. Type IA or IB (Suitable for Temperatures Up to 450 degrees F): K of 0.26 at 75 degrees F.
 - b. Type II (Suitable for Temperatures 451 to 850 degrees F): K of 0.44 at 300 degrees F.
 - c. Type III (Suitable for Temperatures 851 to 1000 degrees F): K of 0.44 at 300 degrees F.
 - d. Type IV (Suitable for Temperatures 1001 to 1200 degrees F): K of 0.37 at 300 degrees F.
 - e. Type V (Suitable for Temperatures 1201 to 1800 degrees F): K of 0.42 at 300 degrees F.
 5. Thermal and Acoustic Board Insulation: Minimum density 3.0 pcf, K of 0.27 at 75 degrees F; ASTM C 1071, Type II.
 - a. Air Stream Side: Erosion, temperature, and fire resistant type;
 6. Blanket Insulation:
 - a. For Ductwork (Suitable for Temperatures Up to 450 Degrees F): Minimum density 1.0 pcf, K of 0.31 at 75 degrees F; ASTM C 553, Type II.
 - b. For Breeching (Suitable for Temperatures up to 1200 degrees F): Minimum density 8 pcf, K of 0.55 at 400 degrees F, metal mesh faced one side; ASTM C 553, Type VII.
- B. Flexible Elastomeric Foam Insulation:
1. FM tested and approved, meeting the following:
 - a. Maximum Water Vapor Transmission: 0.10 perm - inch based on ASTM E 96, Procedure A.
 - b. K of 0.27 at 75 degrees F based on ASTM C 518 or C 177.
 - c. Fire Spread/Smoke Developed Rating: 25/50 or less based on ASTM E 84.
 2. Pipe Insulation: ASTM C 534, Type I.

3. Sheet Insulation for Ductwork and Equipment: ASTM C 534, Type II, smooth skin one side.
 4. Polyethylene and polyolefin insulation is not acceptable.
- C. High Density Jacketed Insulation Inserts for Hangers and Supports:
1. For Use with Fibrous Glass Insulation:
 - a. Cold Service Piping:
 - 1) Polyurethane Foam: Minimum density 4 pcf, K of 0.13 at 75 degrees F, minimum compressive strength of 125 psi.
 - b. Hot Service Piping:
 - 1) Calcium Silicate: Minimum density 15 pcf, K of 0.50 at 300 degrees F; ASTM C 533.
 - 2) Perlite: Minimum density 12 pcf, K of 0.60 at 300 degrees F; ASTM C 610.
 - c. Ductwork: Fibrous glass board, minimum density 6 pcf, K of 0.26 at 75 degrees F, conforming to ASTM C 612, Type IA or IB.
 2. For Use with Flexible Elastomeric Foam Insulation:
 - a. Ductwork and Piping: Hardwood dowels and blocks, length or thickness equal to insulation thickness, other dimensions as specified or required.
- D. Cements:
1. Fibrous Glass Thermal Insulating Cement: Asbestos free; ASTM C 195.
 2. Fibrous Glass Hydraulic Setting Thermal Insulating and Finishing Cement: ASTM C 449/C 449M.

2.02 JACKETS

- A. Laminated Vapor Barrier Jackets for Piping and Ductwork: Factory applied by insulation manufacturer, conforming to ASTM C 1136, Types I and II.
1. Type I: Reinforced white kraft and aluminum foil laminate with kraft facing out.
 - a. Pipe Jackets: Furnished with integral 1-1/2 inch self sealing longitudinal lap, and separate 3 inch wide adhesive backed butt strips.
 2. Type II: Reinforced aluminum foil and kraft laminate with foil facing out.
 3. Laminated vapor barrier jackets are not required for flexible elastomeric foam insulation.
- B. Canvas Jackets: Cotton duck, fire retardant, complying with NFPA 701, 4 oz or 6 oz per sq yd as specified.
- C. Premolded PVC Fitting Jackets:
1. Constructed of high impact, UV resistant PVC.
 - a. ASTM D 1784, Class 14253-C.
 - b. Working Temperature: 0-150 degrees F.

- D. Metal Jacketing:
1. Aluminum: ASTM B 209, Alloys 1100, 30003, 3105 or 5005, Temper H14, 0.016 inch thick.
 - a. Factory Pre-formed Sectional Pipe Jacketing:
 - 1) Smooth outer finish with integral bonded laminated polyethylene film - kraft paper moisture barrier underside.
 - 2) Pittsburg or modified Pittsburg longitudinal lock seams.
 - 3) 2 inch overlapping circumferential joints with integral locking clips, or butt joints sealed with 2 inch wide mastic backed aluminum snap bands.
 - b. Roll Jacketing: Smooth outer finish with integral bonded laminated polyethylene film - kraft paper moisture barrier underside.
 - c. Sheet Jacketing: Corrugated 1-1/4 inch x 1/4 inch deep with integral bonded laminated polyethylene film - kraft paper moisture barrier underside.
 - d. Fastening Devices:
 - 1) Strapping: Type 18-8 stainless steel, 0.020 inch thick, 1/2 and 3/4 inch wide as specified.
 - 2) Wing Seals: Type 18-8 stainless steel, 0.032 inch thick.
 - 3) Sheet Metal Screws: Panhead, Type A, hardened aluminum, and stainless steel.
 2. Circumferentially Corrugated Aluminum Jacketing: Childers' Corrolon.
 - a. Construction: 3/16 inch circumferentially corrugated embossed aluminum, ASTM B 209, Types 1100, 3003, 3105, or 505, H-14 temper, 0.016 inch thick.
 - b. Moisture Barrier: Integrally bonded to jacket over entire surface in contact with insulation.
 - c. Fastening Devices:
 - 1) Strapping: 0.020 inch thick by 1/2 inch wide, Type 3003, 3105, 5005, H-14 temper.
 - 2) Wing Seals: 0.032 inch thick Type 5005, H-14 temper aluminum.

2.03 ADHESIVES, MASTICS, AND SEALERS

- A. Lagging Adhesive (Canvas Jackets): Childers' CP-50AMV1, Epolux's Cadagal 336, Foster's 30-36.
- B. Vapor Lap Seal Adhesive (Fibrous Glass Insulation): Childers' CP-82, Epolux's Cadoprene 400, Foster's 85-60 or 85-20.
- C. Vapor Barrier Mastic (Fibrous Glass Insulation): Permeance shall be .03 perms or less at 45 mils dry per ASTM E 96. Childers' CP-34, Epolux's Cadalar 670, Foster's 30-65 .

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- D. Adhesive (Flexible Elastomeric Foam): Armstrong's 520, Childers' CP-82, Epolux's Cadoprene 488, Foster's 85-75. 5 gallon cans only.
- E. Adhesive (Fiberglass duct liner): Childers' Chil Quik CP-127, Foster Vapor Fas 85-60. Must comply with ASTM C 916, Type II
- F. Weather Barrier Breather Mastic (Reinforcing Membrane): Childers' VI-CRYL CP-10/11, Foster's Weatherite 46-50.
- G. Sealant (Metal Pipe Jacket): Non hardening elastomeric sealants. Foster Elastolar 95-44, Childers Chil Byl CP-76, Pittsburgh Corning 727.
- H. Reinforcing Membrane: Childers' Chil Glas #10, Foster Mast a Fab, Pittsburgh Corning PC 79

2.04 MISCELLANEOUS MATERIALS

- A. Insulation Fasteners for Ductwork and Equipment:
 - 1. Acceptable Manufacturers: Duro-Dyne Corp.; Erico Fastening Systems, Inc.
 - 2. Type: Weld pins, complete with self-locking insulation retaining washers.
- B. Pressure Sensitive Tape for Sealing Laminated Jackets:
 - 1. Acceptable Manufacturers: Alpha Associates, Ideal Tape, Morgan Adhesive.
 - 2. Type: Same construction as jacket.
- C. 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.
- D. Metal Corner Angles: Galvanized steel, 2 x 2 inch 28 gage.
- E. Reinforcing Membrane: Glass or Polyester, 10 x 10 mesh. Alpha Associates Style 59, Childer's Chil-Glas, Foster's MAST-A-FAB.

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, ductwork, and equipment.
 - 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. Piping Insulation: Provide continuous 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.
 - 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.
- B. Install high density jacketed insulation inserts at hangers and supports for insulated ductwork, piping, and equipment.
- C. Insulation Inserts For Use with Fibrous Glass Insulation:
 - 1. Ductwork: Install 6 pcf density jacketed fibrous glass board, same thickness as adjoining insulation, sized for full bearing on supporting trapeze member, and as required to enable abutting to adjoining insulation and overlapping of jacketing.
 - 2. Piping: Where clevis hangers are used, install insulation shields and high density jacketed insulation inserts between shield and pipe.
 - a. Where insulation is subject to compression at points over 180 degrees apart, e.g. riser clamps, U-bolts, trapezes, etc.; fully encircle pipe with 2 protection shields and 2 high density jacketed fibrous glass insulation inserts within supporting members.
 - 1) Exception: Locations where pipe covering protection saddles are specified for hot service piping, 6 inch and larger.
- D. Insulation Inserts For Use with Flexible Elastomeric Foam Insulation:
 - 1. Ductwork: Install hardwood block, same thickness as adjoining insulation, sized for full bearing on supporting trapeze member and as required to abutt and seal vapor tight with adjoining insulation.
 - 2. Piping:
 - a. Where clevis hangers are used, install insulation shields with hardwood filler pieces, same thickness as adjoining insulation, inserted in undersized die cut or slotted holes in insulation at support points.
 - b. Contour hardwood blocks to match the curvature of pipe, and shield.

- c. Coat dowels and blocks with insulation adhesive, and insert while still wet.
- d. Vapor seal outer surfaces of dowels and blocks with adhesive after insertion.
- e. Install filler pieces as follows:

PIPE/TUBING SIZE	FILLER PIECES	POSITION
Thru 1-1/2"	2 dowel plugs	6 o'clock; in tandem
2" thru 4"	1 block 2 dowel plugs	6 o'clock, and 4 & 8 o'clock respectively

3.04 INSTALLATION OF FIBROUS GLASS HOT SERVICE INSULATION

- A. Install insulation materials with field or factory applied ASTM C 1136 Type I laminated vapor barrier jacket unless otherwise specified.
- B. Canvas Jackets on Piping, Fittings, Valves, Flanges, Unions, and Irregular Surfaces:
 1. For Piping 2 inch Size and Smaller: 4 oz per sq yd unless otherwise specified.
 2. For Piping Over 2 inch Size: 6 oz per sq yd unless otherwise specified.
- C. Piping:
 1. Butt insulation joints together, continuously seal minimum 1-1/2 inch wide self sealing longitudinal jacket laps and 3 inch wide adhesive backed butt strips.
 - a. Substitution: 3 inch wide pressure sensitive sealing tape, of same material as the jacket, may be used in lieu of butt strips.
 2. Fill voids in insulation at hanger with insulating cement.
 3. Exceptions:
 - a. Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Spaces and Concealed Piping: Butt insulation joints together and secure minimum 1-1/2 inch wide longitudinal jacket laps and 3 inch wide butt strips of same material as jacket, with outward clinching staples on maximum 4 inch centers. Fill voids in insulation at hangers with insulating cement.
 - b. Piping in Tunnels: Butt insulation joints together and secure minimum 1-1/2 inch wide longitudinal jacket laps and 3 inch wide butt strips, of same material as jacket, with outward clinching staples on maximum 4 inch centers and 16 gage wires a minimum of 4 loops per section. Fill voids in insulation with insulating cement.
- D. Fittings, Valves, Flanges and Irregular Surfaces:
 1. Insulate with mitre cut or premolded fitting insulation of same material and thickness as insulation.
 2. Secure in place with 16 gage wire, with ends twisted and turned down into insulation.
 3. Butt fitting, valve and flange insulation against pipe insulation, and fill voids with insulating cement.

4. Insulate valves up to and including bonnets, without interfering with packing nuts.
5. Apply leveling coat of insulating cement to smooth out insulation and cover wiring.
6. After insulating cement has dried, coat insulated surface with lagging adhesive, and apply 4 oz or 6 oz canvas jacket as required by pipe size.
 - a. Lap canvas jacket on itself and adjoining pipe insulation at least 2 inches.
 - b. Size entire canvas jacket with lagging adhesive.
7. Exceptions:
 - a. Valves, fittings and flanges may be insulated with premolded PVC fitting jackets, with fibrous glass insulation inserts.
 - 1) Additional insulation inserts are required for services with operating temperatures over 250 degrees F or where insulation thickness exceeds 1-1/2 inches. The surface temperature of PVC fitting jacket must not exceed 150 degrees F.
 - b. Insulate fittings, valves, and irregular surfaces 3 inch size and smaller with insulating cement covered with 4 oz or 6 oz canvas jacket as required by pipe size.
 - 1) Terminate pipe insulation adjacent to flanges and unions with insulating cement trowelled down to pipe on a bevel.
 - c. Fittings, Valves, Flanges, and Irregular Surfaces In Concealed Piping, Piping in Accessible Shafts, Attic Spaces, Crawl Spaces, Unfinished Rooms, Unfinished Spaces, and Tunnels: Sizing of canvas surface is not required.

3.05 INSTALLATION OF FLEXIBLE ELASTOMERIC FOAM INSULATION

- A. Where possible, slip insulation over the pipe, and seal butt joints with adhesive.
 1. Where the slip-on technique is not possible, slit the insulation and install.
 2. Re-seal with adhesive, making sure the mating surfaces are completely joined.
- B. Insulate fittings and valves with miter cut sections. Use templates provided by the manufacturer, and assemble the cut sections in accordance with the manufacturer's printed instructions.
 1. Insulate threaded fittings and valves with sleeved fitting covers. Over lap and seal the covers to the adjoining pipe insulation with adhesive.
- C. Carefully mate and seal with adhesive all contact surfaces to maintain the integrity of the vapor barrier of the system.
- D. Insulated Covers for Pumps:
 1. Do not extend pump insulation beyond or interfere with stuffing boxes, or interfere with adjustment and servicing of parts requiring regular maintenance or operating attention.

3.06 INSTALLATION OF DUCTWORK INSULATION

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- A. Fibrous Glass Board Insulation Application:
1. Secure insulation to ductwork, with duct insulation fasteners spaced 3 inch in from all corners of ducts, with intermediate fasteners on maximum 16 inch centers in all directions.
 2. Butt edges of insulation and fill voids with similar insulation.
 3. Seal minimum 1-1/2 inch wide longitudinal jacket laps continuously with vapor seal adhesive.
 4. Lap circumferential joints with 4 inch wide jacket material and seal laps continuously with vapor barrier lap adhesive, or seal continuously with minimum 3 inch wide pressure sensitive sealing tape, of same material as jacket.
 5. Install metal corner angles over the jacketed insulated corners. Seal exposed ends of insulation with vapor barrier mastic.
 6. Vapor seal breaks in vapor barrier jacketing, exposed surfaces of duct insulation fasteners and metal corner angles, with pressure sensitive sealing tape of same material as jacket or coat with vapor barrier mastic.
 7. Field apply 6 oz canvas jacket over the vapor barrier jacketed insulation where indicated on Ductwork Service Insulation Material Schedule in Part 3 of this Section.
 - a. Apply canvas jacket with lagging adhesive, with a 2 inch lap on circumferential and longitudinal seams.
 - b. Outward clinching staples may be utilized for additional securement of canvas to bottom of ducts in excess of 48 inch in width.
 - c. Apply heavy coat of lagging adhesive to entire canvas surface.
 8. Place trapeze hangers, fabricated of steel rods and structural steel channels or angles, outside of jacketed insulated ducts.
 - a. Install high density insulation inserts, of thickness equal to insulation, minimum of 4 inch in width by the bottom dimension of the duct, at points of support.
 - b. Continuously jacket insulated ducts and filler pieces through supports.
- B. Fibrous Glass Blanket Insulation Application:
1. Cut insulation to stretch-out dimensions as recommended by insulation manufacturer.
 2. Remove 2 inch wide strip of insulation material from the jacketing on the longitudinal and circumferential joint edges to form an overlapping staple/tape flap.
 3. Install insulation with jacketing outside so staple/tape flap overlaps insulation and jacketing on other end.
 4. Butt ends of insulation tightly together.
 - a. Rectangular and Square Ductwork: Do not compress insulation at duct corners.
 5. Staple longitudinal and circumferential joints with outward clinching staples minimum 6 inches on center, and seal with pressure sensitive sealing tape.
 6. Cut off pretruding ends of fasteners flush with insulation surface and seal with pressure sensitive sealing tape.
 7. Install duct insulation fasteners on bottom side of horizontal duct runs, when bottom dimension of the duct is in excess of 24 inches in width.

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8. Install duct insulation fasteners on sides of duct risers having a dimension over 24 inches in size.
9. Seal tears, punctures, and penetrations of insulation jacketing with sealing tape and coat with vapor barrier mastic.
10. Secure insulation to ductwork with fasteners spaced in accordance with the following schedule:

DUCT DIMENSION	SPACING OF FASTENERS (MINIMUM)
Up to 24 inches	None required.
24 inches to 48 inches	Horizontal Runs: 2 rows - 16 inches on center. Risers: 16 inches on center, all directions.
49 inches to 60 inches	Horizontal Runs: 3 rows - 16 inches on center. Risers: 16 inches on center, all directions.
61 inches and over	Horizontal Runs: 16 inches on center, all directions. Risers: 16 inches on center, all directions.

- C. Bench Insulated Ductwork:
 1. Insulate ducts prior to erection in place when ducts are required to be installed proximate to walls, ceilings, equipment or other ductwork, which will not permit adequate space for installation of insulation after ducts are installed.
- D. Flexible Elastomeric Foam Insulation on Ductwork Exposed to the Elements, Exterior to a Building:
 1. Apply 2 inch thick flexible elastomeric foam sheet insulation to ductwork with adhesive.
 - a. Insulate sheet metal duct seams, angle bracing, and reinforcing with same insulation thickness specified for ductwork.
 2. Apply reinforcing membrane around ductwork insulation with adhesive or mastic.
 3. Adhesive Applied System: Apply 2 coats of finish. See Section 099103.
 4. Mastic Applied System: Apply another coat of mastic over reinforcing membrane.

3.07 FIELD QUALITY CONTROL

- A. Field Samples: The Owner, may at his discretion, take field samples of installed insulation for the purpose of checking materials and application. Reinsulate sample cut areas.

3.08 PIPING AND EQUIPMENT INSULATION SCHEDULE

- A. Insulate all hot service piping, equipment, and appurtenances except where otherwise specified.
- B. Schedule of Items Not to be Insulated:
 1. Do not insulate the following hot service piping:
 - a. Plated or white metal piping.
 - b. Piping inside convactor and finned tube radiation enclosures.

- c. Short vertical and horizontal piping connections (less than 24 inches in length):
 - 1) Located exposed above floors in finished rooms or finished spaces.
 - 2) Serving one fixture, or one piece of equipment.
 - 3) Connected to horizontal mains, branch mains or riser mains.
 - 4) Conveying liquids or vapors at temperatures from 75 degrees F to 215 degrees F, unless otherwise specified.
- 2. Do not insulate the following hot service fittings, valves, flanges and irregular surfaces:
 - a. Flanges and unions.
 - b. Hydronic Specialties:
 - 1) Flow indicators.
 - 2) Zone control valves.
 - 3) Air vents.
 - 4) Air control fittings.
- 3. Do not insulate the following hot service equipment:
 - a. Actual heat transfer surfaces.
- 4. Do not insulate items installed under other Contracts.
- 5. Do not insulate mechanical equipment with a factory applied insulated steel jacket.

3.09 HOT SERVICE INSULATION MATERIAL SCHEDULE

	SERVICE AND TEMPERATURES	INSULATION MATERIAL	PIPE SIZES (INCHES)	MINIMUM (NOMINAL) INSULATION THICKNESS (INCHES)
F	Water and other fluids 141 F to 250 F.	Fibrous Glass	6 & Less	2

A. NOTES:

- 1. Insulate piping in tunnels and conduits with insulation of thickness as follows:
 - a. Types E, F, and G Service: Minimum 2 inch thick unless greater thickness is specified in Hot Service Insulation material Schedule above.
 - b. Type H Service: Minimum 4 inch thickness.
- 2. Equipment Insulation:
 - a. Insulate the following with fibrous glass block or board insulation:
 - 1) Low pressure steam and heating hot water boilers.
 - 2) Instantaneous type domestic hot water heaters.

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- 3) Combination domestic hot water heater and storage tanks.
- 4) Domestic hot water storage tanks.
- 5) Convertors.
- 6) Heat exchangers.
- 7) Condensate return tanks.
- 8) Deaerating feed water heaters.
- 9) Fuel oil heaters and similar equipment.
- b. Insulate equipment with fibrous glass board insulation with minimum density 6 pcf.
- c. Minimum thickness for flat, curved and irregular equipment surfaces:
 - 1) 1-1/2 inch for E and F service.
 - 2) 3 inch for G service.
 - 3) 5 inch for H service.

3.10 DUCTWORK SERVICE INSULATION SCHEDULE

- A. Insulate all ductwork service except where otherwise specified.
- B. Do not insulate the following ductwork service items:
 1. Exhaust ductwork, unless otherwise shown.
 2. Return fans.
 3. Exhaust fans.
 4. Interior lined ductwork.
 5. Flexible ductwork connections.
 6. Interior lined air terminal units.
 7. Sound absorbers.
 8. Ductwork located within equipment.
 9. Ductwork where design temperature difference between interior and exterior of duct or plenum does not exceed 15 degrees F.

3.11 DUCTWORK SERVICE INSULATION MATERIAL SCHEDULE

LOCATION	SERVICE	INSUL. MATERIAL	MINIMUM INSUL. THICKNESS	JACKET TYPE	MINIMUM REQUIRED R VALUE
Concealed, inside building insul. envelope in unconditioned spaces (in shafts, ceilings, walls, and floors)	Air Conditioning Supply and Returns Under 65 F, 100% Outside Air, Heating Supply Over 85 F.	Fibrous Glass Blanket	2	I or II	R-6
	Returns with Temp. Diff. With Ambient Greater than 15 degrees F	Fibrous Glass Board	1-1/2	I or II	
Exposed, inside building insul. envelope.	Air Conditioning Supply Under 65 F, 100% Outside Air, Heating Supply Over 85 F.	Fibrous Glass Board	1-1/2	I with Canvas Outer Jacket	R-6

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LOCATION	SERVICE	INSUL. MATERIAL	MINIMUM INSUL. THICKNESS	JACKET TYPE	MINIMUM REQUIRED R VALUE
Inside building but exposed to outside air temp., e.g., ventilated attic.	Air Conditioning Supply, Heating Supply, All Returns including returns mixed with outside air.	Fibrous Glass Blanket	2-1/2	I or II	R-8
		Fibrous Glass Board	2	I or II	
Exposed exterior to building.	Air Conditioning Supply, Heating Supply, All Returns including returns mixed with outside air.	Elastomeric Foam Sheet	2-1/2	None Required	R-8

A. **NOTES:**

1. Equipment: Insulate air handling equipment, not furnished with factory applied insulated jacket or internal insulation, with minimum 1-1/2 inch thick fibrous glass board with an ASTM C 1136 Type I jacket, installed and finished as specified for exposed ductwork in finished spaces.

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SECTION 232000

HVAC PIPING

PART 1 GENERAL

1.01 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. Installers Qualification Data:
 - a. Welder Qualification Data: Copies of certification; include names, home addresses.
 - b. Welding Procedures:
 - 1) Copy of QW-482 "Suggested Format for Welding Procedure Specification (WPS)" for all welders for all weld types.
 - 2) Copy of QW-483 "Suggested Format for Procedure Qualification Record (PQR)" as specified in Welding Quality Assurance below for all weld types.
 - c. Welders' Certificates:
 - 1) Copy of QW-484 "Suggested Format for Manufacturer's Record of Welder or Welding Operator Qualification Tests (WPQ)" for all welders for all weld types.
 - 2. Quality Control Submittals (for Hydraulic Press Joints, if used): Copy of hydraulic press fitting manufacturer's printed field inspection procedures for hydraulic press joints in copper tubing.
 - 3. Welding Procedure Submittals: Submit the following:
 - a. Welding Procedure Specifications: Provide for each weld type.
 - 1) Recommended to use ASME Form E00006, QW-482 "Suggested Format for Welding Procedure Specification (WPS)".
 - b. Procedure Qualification Records: Provide for each weld type.
 - 1) Recommended to use ASME Form E00007, QW-483 "Suggested Format for Procedure Qualification Record (PQR)".
 - 4. Contract Closeout Submittals:
 - a. Copy of Final Hydrostatic Testing Record Log.

1.02 QUALITY ASSURANCE

- A. Qualifications of Welding Procedures, Welders and Welding Operators: Comply with the following:
 - 1. American Welding Society Standard AWS B 2.1.
- B. Welding Procedures:
 - 1. Record in detail, and qualify the Welding Procedure Specifications for every welding procedure that is proposed to be used for the Project.

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2. Develop procedures for all metals included in the work.
3. Qualify the procedures for making transition welds between different materials, or between plates or pipes of different wall thickness.
4. Qualification for each welding procedure shall conform to the requirements of ASME B31.1, and as specified herein.
5. Describe the method for each system including the number of beads, the volts, the amperes, and the welding rod for various pipe thicknesses and materials.
6. The welding procedures shall specify end preparation for butt welds including cleaning, alignment, and root openings.
7. Preheat, interpass temperature control, and postheat treatment of welds shall be as required by approved welding procedures, unless otherwise indicated or specified.
8. Approval of any procedure does not relieve the Contractor of the sole responsibility for producing acceptable welds.
9. Welding procedures shall be identified individually and shall be clearly referenced to the type of welding required for this project.
10. These procedures shall be the same as those used for all pipe welder qualification tests, all shop welds, and all field welds.
11. Provide procedure qualification records for all proposed Welding Procedure Specifications (WPS).

C. Welder Qualification:

1. WPQs:
 - a. Provide welder qualifications for each welder for each weld type.
 - b. Recommended to use ASME Form E00008, QW-484 "Suggested Format for Manufacturer's Record of Welder or Welding Procedure Qualification Tests (WPQ)."
2. Perform WPQs under the witness of an independent agency.
 - a. The witness shall be a representative of an independent testing agency, Authorized Inspector, or consultant, any of which must be approved by the National Certified Pipe Welding Bureau.
 - b. The qualifying test segment must be a 2 inch nominal pipe size with wall thickness within range of the WPS.
 - c. Tests position shall be "6G" per ASME Section IX.
3. Evidence of Continuity: Welder qualifications must be current.
 - a. If the qualification test is more than 6 months old, provide record of welding continuity for each welder.
 - b. Record of welding continuity shall show that the welder in question has performed welding to the procedure in question without a 6 month continuous span of inactivity since the date that the welder qualification test was passed for the submitted welding procedure.
 - c. Record of welding continuity shall include, at a minimum, the welder's employer name and address, the date the welder qualification test was passed, and the dates indicating welding continuity including welding procedure for each date.

D. Weld Records:

1. For all welding within the scope of ASME B31.1, submit for approval an administrative procedure for recording, locating, monitoring, and maintaining the quality of all welds to be performed on the project.
 - a. The weld record shall include but not be limited to drawings and schedules identifying location of each weld by individual number, identification of welder who performed each weld by individual welder's name, stamp number, date and WPS used.

2. After achieving qualification, but before being assigned work, each qualified person shall be assigned an identifying number by the Contractor to be used to identify all of his welds.
 - a. A list of qualified persons with their respective numbers shall be submitted and maintained accurately with deletions and additions reported promptly.
3. Upon completing a joint, the welder shall mark the pipe not more than 6 inches from the weld with the identifying number and the last two digits of the year in which the work was performed.
 - a. Make identification marks with a rubber stamp or felt-tipped marker with permanent, weatherproof ink or other methods approved by the Owner that do not deform the metal.
 - b. Place identification marks for seam welds adjacent to the welds at 3-foot intervals.
 - c. Identification by die stamps or electric etchers is not acceptable.
 - d. Provide required markers. Substitution of a map of welds with welders' names is not acceptable.
4. Maintain a constantly updated log available to the Owner at all times.

1.03 DELIVERY, STORAGE, AND HANDLING

- A. Pipe Storage:
 1. Upon the receipt of each shipment of pipe on the job, maintain the pipe marking, and store pipe in accordance with ASTM material specifications, and method of manufacture (seamless, etc.) of each length of pipe.
 2. Pipe markings shall be clearly readable at the time of pipe installation.
 3. If at the time of its installation, any length of pipe not readily identifiable will be subject to rejection, or arbitrary downgrading by the Owner to the lowest grade which has been received on the job to that date.
 4. Provide factory-applied plastic end-caps on each length of pipe and tube, except for concrete, corrugated metal, bell and-spigot, and clay pipe.
 - a. Maintain end-caps through shipping, storage and handling to prevent pipe-end damage and prevent entrance of dirt, debris, and moisture.

PART 2 PRODUCTS

2.01 STEEL PIPE AND FITTINGS

- A. Standard Weight Schedule 40, Black Steel: ASTM A 53, Grade B, Type E or S, or ASTM A 135.
- B. Bending, Coiling, Flanging and Other Special Services: ASTM A 53, Grade A, Type E or S, or ASTM A 135.
- C. Grooved End Type: Schedule 40, ASTM A 53, Grade B, Type F for sizes 3/4 inch to 1-1/2 inch, and Type E or S for sizes 2 inch to 24 inch; or ASTM A 135.
- D. Flanges, Welding Neck Type, Same Pressure Rating as Adjoining Pipe: ASME B16.5.
- E. Weld Fittings, Carbon Steel:
 1. Butt Welding Type: ASME B16.9.
 - a. Allied Piping Products Co., Inc.'s Branchlets, Type 1 or 2.

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- b. Bonney Forge Corp.'s Weldolets.
 - 2. Socket Welding Type: ASME B16.11.
 - a. Allied Piping Products Co., Inc.'s Branchlets, Type 1 or 2.
 - b. Bonney Forge Corp.'s Thredolets or Sockolets.
- F. Cast Iron Fittings:
 - 1. Steam Pattern, Threaded: ASME B16.4.
 - a. Standard Weight: Class 125.
 - 2. Flanged Fittings and Threaded Flanges: ASME B16.1.
 - a. Standard Weight: Class 125.
- G. Unions: Malleable iron, 250 lb class, brass to iron or brass to brass seats.
- H. 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.
- I. 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, Type L: ASTM B 88.
- B. Wrot Copper Tube Fittings, Solder Joint: ASME B16.22.
- C. Cast Copper Alloy Tube Fittings, Solder Joint: ASME B16.18.
- D. Flanges: Conform to the Standards for fittings used in systems.
- E. Unions: Cast bronze, 150 lb Class, bronze to bronze seats, threaded or solder joint.

2.03 HYDRAULIC PRESS FITTINGS FOR COPPER TUBING

- A. Acceptable Fittings:
 - 1. ProPress by Viega, 301 N. Main, Wichita, KS 67202, (877) 843-4262, www.viega.com.
- B. Operating Conditions:
 - 1. Maximum Operating Pressure: 200 psi.
 - 2. Operating Temperature Range: 0-250 degrees F.
 - 3. Maximum Test Pressure: 600 psi.
 - 4. Maximum Vacuum: 29.2 inches hg @ 68 degrees F.
- C. Features:
 - 1. Fittings: Copper and copper alloy conforming to material requirements of ASME B16.18 or ASME B16.22.
 - a. Stainless Steel Grip Ring: Adds strength to the joint without collapsing the interior passageway.
 - 2. No flame for soldering required for installation of fittings and valves.
 - 3. Unpressed connections identified during pressure testing when water flows past sealing element.
 - 4. Sealing Elements: Factory installed, EPDM.

5. Fittings that have been pressed can be rotated. If rotated more than 5 degrees, the fitting must be repressed to restore its resistance to rotational movement.
6. Extended fitting end lead allows for twice the retention grip surface, and assists with proper tube alignment.
7. Soldered adapter fittings are not allowed.

2.04 COUPLINGS AND FITTINGS FOR GROOVED END PIPE

- A. Couplings: Grinnell Corp.'s Rigidlok Fig. 7401, or Victaulic Co.'s Zero-Flex Style 07, having minimum pressure rating of:
 1. 750 psi from 1-1/2 inch to 4 inch.
 2. 700 psi for 6 inch.
 3. 600 psi for 8 inch.
- B. Fittings: By same manufacturer as couplings, having pressure ratings equal to or greater than couplings. Comply with the following standards:
 1. Steel: ASTM A 53 or A106, Grade B.
 2. Malleable Iron: ASTM A 47.
 3. Ductile Iron: ASTM A 536.

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. 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 Silvacore 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.
- D. Electrodes and Welding Rods:
 1. Electrodes for Use in Arc Welding: Heavily coated, not larger than 3/16 inch diameter exclusive of coating, unless otherwise approved.
 2. Welding Rods: Free flowing when fused, so as to avoid excessive puddling.
 3. Electrodes for Welding Stainless Steels: Coated and used with reverse polarity.
 4. Filler material shall conform to the appropriate AWS-ASTM specification.
- E. Flange Gasket Material:
 1. For Use With Hot Water: Waterproofed non-asbestos mineral or ceramic fiber, or a combination of metal and waterproofed non-asbestos mineral or ceramic fiber, designed for the temperature and pressures of the piping systems in which installed.
- F. Flange Bolts, Washers and Nuts
 1. Bolts: High strength, ASTM A 193 B7.
 2. Washers: ASTM F436 Structural Type 1 hardened steel flat hot dipped galvanized.

3. Nuts: ASTM A194 2H.

G. Gaskets For Use With Grooved End Pipe and Fittings: Type and materials as recommended and furnished by the fitting manufacturer, for the service of piping system in which installed.

H. Anti-Seize Lubricant: Bostik Inc.'s Never Seez or Dow Corning Corp.'s Molykote 1000.

2.06 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.

2.07 DIELECTRIC CONNECTORS

A. Dielectric Union: Female iron pipe thread to solder connection with zinc plated steel or malleable iron nut and adaptor, lead-free brass tailpiece, polysulfone insulator, and Buna-N gasket suitable for use up to 180°F and 250 psig.

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. Water Applications:

a. Heating Hot Water: Rated 150 psi at 250 degrees F: ANSI Class 300, full faced durlon gasket with bolt holes, double durlon washers, and durable sleeves; Model 300 by APS, Lafayette, LA 70596, (337) 233-6116.

2.08 PIPE SLEEVES

A. Type A: Schedule 40 steel pipe.

B. Type B: No. 16 gage galvanized sheet steel.

2.09 FLOOR, WALL AND CEILING PLATES

A. Cast Brass: Solid type with polished chrome plated finish, and set screw.

B. Stamped Steel: Split type, polished chrome plated finish, with set screw.

C. Cast Iron or Malleable Iron : Solid type, galvanized finish, with set screw:

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

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 vertical piping plumb.
- F. Use fittings for offsets and direction changes.
- G. Cut pipe and tubing ends square; ream before joining.
- H. Threading: Use American Standard Taper Pipe Thread Dies.
 - 1. Thread brass pipe with special threading dies.
- I. Make final connections to equipment with unions, flanges, or mechanical type joint couplings.

3.02 WATER PIPING SYSTEMS

- A. Pitch:
 - 1. Pitch horizontal piping 1/8 inch per 10 feet in direction indicated on drawings. When direction of flow is not indicated, pitch supply piping up in direction of flow and return piping downward in direction of flow.
 - 2. Pitch single pipe systems up in direction of flow 1/8 inch per 10 feet.
- B. Air Vents: Install air vents at locations indicated on the drawings, and at each high point in system. Use manually operated air vents, unless otherwise indicated.
- C. Drains:
 - 1. Install piping to be completely drainable. Provide drains at low points, consisting of a 1/2 inch valve with a hose bibb connection, and at the following locations and equipment:
 - a. In each section of piping separated by valves.
 - b. For each riser.
 - c. In low point of piping to each down fed convector or radiator.
- D. Runouts: Connect runouts to upfeed risers to top of mains, and runouts to downfeed risers to bottom of mains.

3.03 PIPE JOINT MAKE-UP

- A. Threaded Joint: Make up joint with a pipe thread compound applied in accordance with the manufacturer's printed application instructions for the intended service.
- B. Soldered Joint: Thoroughly clean tube end and inside of fitting with emery cloth, sand cloth, 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.
- C. 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.
 - a. Hot Water Pipe Gasket: Coat with a thin film of oil before making up joint.
 - 3. Flange Bolt Installation:
 - a. Clean and coat nuts, bolt threads and washers with anti-seize lubricant before making up joint.

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- b. With each bolt; one hardened steel washer is required under the nut.
 - c. With each stud; one hardened steel washer is required under the nut at each end.
 - d. Torque Requirements: Stress bolts to 30,000 psi.
 - e. Check torque with a calibrated breaking action torque wrench on the final torque round.
 - f. Bolts shall be cold and hot torqued.
 - g. Torque Pattern: Cross or star pattern with at least four passes. Limit each pass to 30 percent of full torque increases.
 - h. Hot torque: Re-torque the flange bolts with the system at normal operating pressure, and operating temperature for minimum of 12 to 15 hours.
 - 4. Coat bolt threads and nuts with anti-seize lubricant before making up joint.
- 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. Welded Pipe Joint:
 - 1. General:
 - a. Weld pipe joints only when ambient temperature is above 0 degree F where possible.
 - b. Bevel pipe ends at a 37.5 degree angle where possible, smooth rough cuts, and clean to remove slag, metal particles, and dirt.
 - c. Use pipe clamps or tack-weld joints with 1 inch long welds; 4 welds for pipe sizes to 10 inches, 8 welds for pipe sizes 12 inches to 20 inches.
 - d. Build up welds with stringer-bead pass, followed by hot pass, followed by cover or filler pass.
 - e. Eliminate valleys at center and edges of each weld.
 - f. Weld by procedures which will ensure elimination of unsound or unfused metal, cracks, oxidation, blow-holes, and non-metallic inclusions.
 - g. Do not weld-out piping system imperfections by tack-welding procedures. Refabricate as required to comply with requirements.
 - h. If piping component ends are bored, such boring shall not result in the finished wall thickness after welding less than the minimum design thickness.
 - i. Align the inside diameters of piping components to be butt-welded as accurately as is practicable within existing commercial tolerances on diameters, wall thickness and out of roundness.
 - j. Preserve alignment during welding. The internal misalignment of the ends to be joined shall not exceed 0.05 inch.
 - 2. Welding Processes:
 - a. All welding on metal piping systems shall be performed using qualified welding procedures and qualified welders and welding operators in accordance with Section IX of the ASME Boiler and Pressure Vessel Code.
 - b. All welding shall be performed by a process that is compatible with the work being welded and the working conditions. Shielded metal-arc welding (SMAW) shall not be used on work less than 3/16 inch thick.

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- c. Welding shall be performed by using only one of the following processes:
 - 1) Shielded Metal Arc Welding (SMAW), also known as "Stick" Welding.
 - 2) Gas Tungsten Arc Welding (GTAW), also known as TIG and Heliarc Welding.
 - 3) Submerged Arc Welding (SAW).
 - d. Where a specific welding process is called for in the piping group, it shall govern.
 - e. All stainless steel work less than 3/16 inch thick shall be welded by the gas tungsten-arc (GTAW) process with the back side purged with argon. Work thicker than 3/16 inch shall have a root pass by the GTAW Process with the back purged with argon and the balance of the weld may be completed by SMAW Process or any other suitable process.
3. Welding Grooves:
- a. Bevel the ends of steel pipe and fittings to be erected with butt welded joints to form welding grooves in accordance with ANSI B16.25, except where otherwise noted herein, or on the Contract Drawings.
 - b. Bevel welding grooves for butt welded joints in pipe of unequal wall thickness in accordance with ASME Code for Pressure Piping B31.1 - latest edition, latest revision and section that is applicable.
4. Backing Rings: Backing rings or consumable inserts are not acceptable.
5. Cleaning of Welding: Completely remove all slag or flux remaining on the bead of welding before laying down the next successive bead and at the completion of the weld.
- a. Wire brush all completed welds a minimum of 2 inches on both sides and coated with one coat of high temperature (minimum rated 500 deg. F) primer prior to being insulated.
6. Preheating of Welded Joints: Pipe adjacent to joints before and during welding shall be preheated by any suitable method in accordance with the qualified welding procedure, and in all cases shall be in accordance with ASME B31.1, Paragraph 131.
7. Weld Quality:
- a. All welds shall have full penetration and complete fusion with a minimum of weld metal protruding on the inside of the pipe.
 - b. The finished weld contour shall be uniform, with the toe or edge of the weld merging smoothly into the base material.
 - c. Butt welds shall have a slight reinforcement build-up gradually from the toe or edge toward the center of the weld.
 - d. The limitation on butt weld reinforcement shall be in accordance with ASME B31.1, Table 127.4.2 and shall apply separately to both inside and outside surfaces of the joint.
 - e. Fillet welds may be slightly concave on the furnished surface.
8. Identification of Welders:
- a. Upon completing a joint, the welder shall mark the pipe not more than 6 inches from the weld with the identifying number and the last two digits of the year in which the work was performed.
 - b. Make Identification marks with a rubber stamp or felt-tipped marker with permanent, weatherproof ink or other methods approved by the Owner that do not deform the metal.
 - c. Place identification marks for seam welds adjacent to the welds at 3-foot intervals.
 - d. Identification by die stamps or electric etchers is not acceptable.

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- e. Provide required markers. Substitution of a map of welds with welders' names is not acceptable.
- 9. Postheat Treatment of Welded Joints In Carbon and Ferritic Alloy Steel Pipe:
 - a. Postheat treatment of welded joints in carbon and ferritic alloy steel piping shall be in accordance with ASME B31.1, as specified in the piping group, or on the Contract Drawings, except the cooling rate for stress relieving shall not exceed 200 degrees F per hour down to 600 degrees F.
 - 1) In each case, the temperature given is a minimum and where a higher temperature is called for in the welding procedure, the welding procedure shall govern.
 - b. Perform stress relieving by one of the following methods:
 - 1) Electrical resistance or induction coil heating is the preferred method for field use.
 - a) Record the temperature by pyrometer from the start of the heating operation until 600 degrees F. is reached during cooling.
 - 2) The gas, natural or liquid petroleum, torch stress relieving procedure may be used only where approved by Owner.
 - a) Maintain temperature record from the start of the heating operation until 600 degrees F. is reached during cooling.
 - b) Place two measuring thermocouples 180 degrees apart at the centerline of the weld and two measuring thermocouples each placed 90 degrees away from the centerline thermocouples at a distance from the centerline of the weld equal to three times the wall thickness.
 - 3) Furnace postheat treatment may be employed when desirable to treat several welded or formed assemblies simultaneously.
 - a) Temperature range, heating conditions, holding time, and cooling conditions shall be as outlined above but shall satisfy the requirements for the thickest section, etc. of the load.
 - b) When this method is used, adequately support pipe and pipe assemblies to minimize distortion.
- 10. Socket Welding Joints:
 - a. Where socket welding valves or fittings are used, space pipe with a minimum of 1/16 inch clearance between the end of the pipe and the socket so that no stresses will be imparted to the weld due to "bottoming" of the pipe in the socket.
 - b. The fit between the socket and the pipe shall conform to applicable standards for socket weld fittings and in no case shall the inside diameter of the socket exceed the outside diameter of the pipe by more than 0.075 inches.
- F. Mechanical Joint: Make up joint in conformance with the manufacturer's printed installation instructions, with particular reference to tightening of bolts.
- G. Hydraulic Pressed Joint: Follow manufacturer's printed installation instructions.

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- H. Dissimilar Pipe Joint:
1. Joining Steel Pipe and Copper Tubing: Make up joint with a dielectric union or dielectric flange.

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, floor, or roof construction:

<u>CONSTRUCTION</u>	<u>SLEEVE TYPE</u>
1. Frame construction.	None Required
2. Non-waterproof interior walls.	B
3. Non-waterproof interior floors not on metal decks.	B
4. Floors not on grade having a floor drain.	A

- 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.
- 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.
- D. Packing of Sleeves and Core Drilled Holes:
1. Unless otherwise specified, pack sleeves or cored drilled holes in accordance with the Firestopping Section.

3.05 FLOOR, WALL AND CEILING PLATES

- A. Install plates for exposed uninsulated piping passing thru floors, walls, ceilings, and 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: Solid, unplated cast iron.
 3. Fasten plates with set screws.
 4. Plates are not required in pipe shafts or furred spaces.

3.06 PIPE AND FITTING SCHEDULE

- A. Abbreviations: The following abbreviations are applicable to the Pipe and Fitting Schedule:

BS	Black steel.
CI	Cast iron.
GE	Grooved end.
MI	Malleable iron.

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SE	Screwed end.
ST	Steel.
SW	Standard weight.
WE	Weld end.

- B. Where options are given, choose only one option for each piping service. No deviations from selected option will be allowed.
- C. Schedule of Pipe and Fittings for the different piping services is as follows:
 - 1. Hot Water Supply and Return (S & R) 125 psig and less:
 - a. 3 inch and less: SW BS pipe with SE SW CI fittings, or Type L hard drawn copper tubing with wrought copper or cast copper alloy solder fittings and Type 3 solder, or hydraulic press joints.
 - b. 4 inch Size: SW BS pipe, with SE SW CI fittings, or WE SW ST fittings, or GE fittings.

END OF SECTION

SECTION 232006

HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Product Data: Catalog sheets, specifications, and installation instructions for each item specified.
- B. Contract Closeout Submittals:
 - 1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products, to the Owner.

PART 2 PRODUCTS

2.01 AIR VENTS

- A. Type A: Manual Coin Operated Vent; ITT Bell and Gossett Model 4V.
 - 1. Construction: Brass.
 - 2. Maximum Working Pressure: 150 psig.
 - 3. Maximum Operating Temperature: 212 degrees F.
- B. Type B: Automatic Float Operated Vent; ITT Hoffman Model 78.
 - 1. Construction: Brass body with stainless steel ball check, and 1/8 inch safety drain connection.
 - 2. Maximum Working Pressure: 150 psig.
 - 3. Maximum Operating Temperature: 250 degrees F.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions.
- B. Provide a 12"x12" minimum access door for each vent where installed in a concealed location.
- C. Pipe air vent safety drains to drain or a conspicuous location as approved by the Owner.

3.02 AIR VENT INSTALLATION SCHEDULE

- A. Provide vents where shown on the drawings and as follows:
 - 1. Supply side of each radiator: Type A.
 - 2. Top of each riser: Type B.

END OF SECTION

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SECTION 233113

METAL DUCTWORK

PART 1 GENERAL

1.01 REFERENCES

- A. American Conference of Governmental Industrial Hygienists (ACGIH).
- B. National Fire Protection Association (NFPA).
- C. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

1.02 SUBMITTALS

- A. Shop Drawings:
 - 1. Layouts for areas in which it may be necessary to deviate substantially from layout shown on the Drawings. Show major relocation of ductwork and major changes in size of ducts. Minor transitions in ductwork, if required due to job conditions, need not be submitted as long as the duct area is maintained.
 - 2. Layout and fabrication details for cooking equipment exhaust ductwork.
 - 3. Layouts of mechanical equipment rooms and penthouses.
 - 4. Details of intermediate structural steel members required to span main structural steel for the support of ductwork.
 - 5. Method of attachment of duct hangers to building construction.
 - 6. Coordinate shop drawings with related contracts prior to submission.
- B. Product Data: Material, gage, type of joints, sealing materials, and reinforcing for each duct size range, including sketches or SMACNA plate numbers for joints, method of fabrication and reinforcing. Include ACGIH figure numbers for hoods if applicable.

1.03 QUALITY ASSURANCE

- A. SMACNA: Gages of materials, fabrication, reinforcement, sealing requirements, installation, and method of supporting ductwork shall be in accordance with the following SMACNA manuals, unless otherwise shown or specified:
 - 1. HVAC Duct Construction Standards.
- C. Conform to the applicable requirements of NFPA 90A, 90B, 91, 96, and 101.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Sheet Metal:

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1. Galvanized Steel: ASTM A653, Class LFQ (lock forming quality), coating designation G-90.
- B. Duct Hangers:
 1. Strap Hangers: Same material as ducts, except that hangers for stainless steel ducts in unfinished spaces may be galvanized steel.
 2. Rod Type Hangers: Mild low carbon steel, unless otherwise specified; fully threaded or threaded each end, with 2 removable nuts each end for positioning and locking rod in place. Unless stainless steel, galvanized or cadmium plated; shop coat with metal primer.
- C. Miscellaneous Fasteners and Upper Hanger Attachments:
 1. Sheet Metal Screws, Machine Bolts and Nuts: Same material as duct, unless otherwise specified.
 2. C Clamps: Fee & Mason Co.'s 255L with locking nut, and 255S with retaining strap.
 3. Metal Deck Ceiling Bolts: B-Line Systems, Inc.'s Fig. B3019.
 4. Welding Studs: Erico Fastening Systems, capacitor discharge, low carbon steel, copper flashed.
 5. Structural (carbon) Steel Shapes and Steel Plates: ASTM A36, shop primed.
 6. Stainless Steel Shapes and Plates: ASTM A276 and ASTM A666.
 7. Machine Bolt Expansion Anchors:
 - a. Non-caulking single unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 1.
 - b. Non-caulking double unit type: FS FF-S-325, Group II, Type 2, Class 2, Style 2.
 - c. Self-drilling type: FS FF-S-325, Group III, Types 1 and 2.

2.02 FABRICATION - GENERAL

- A. Fabricate ductwork from galvanized sheet metal.
- B. Dissimilar Metals: Separate dissimilar metals used for ductwork with 12 oz vinyl coated woven fiberglass duct connector fabric, such as Duro Dyne's Glasseal. No separation is required between screws or rivets and the materials in which they are inserted.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Install ductwork to allow maximum headroom. Properly seam, brace, stiffen, support and render ducts mechanically airtight. Adjust ducts to suit job conditions. Dimensions may be changed as approved, if cross sectional area is maintained.
- B. Pitch horizontal ducts connected to hoods downward toward hood not less than 1 inch in 10 feet.

- C. Provide necessary transformation pieces, and flexible fabric connections for ductwork connected to air handling equipment or air inlet and outlet devices.

3.02 SEALING SEAMS, JOINTS, AND PENETRATIONS

- A. Seal ductwork in accordance with the SMACNA Manual except for the following:
 - 1. Ductwork Specified to be Insulated: Conform with Seal Class A for all pressure classes.
- B. Duct Sealants: Water based, non-fibrated: Foster 32-19, Childers CP-146, Duro Dyne SAS.

3.03 HANGERS FOR DUCTS, UNDER 2 INCHES W.G.

- A. Install hangers for ducts as specified in the SMACNA Manual, with the following exceptions:
 - 1. Rectangular ducts up to 42 inches wide, not having welded or soldered seams, and supported from overhead construction; extend strap hangers down over each side of the duct and turn under bottom of duct a minimum of 2 inches. Secure hanger to duct with 3 full thread sheet metal screws, one in the bottom and 2 in the side of the duct.
 - 2. Rectangular ducts 43 inches wide and over, and all sizes of duct with welded or soldered seams, and supported from overhead construction; use trapeze hangers.
 - 3. Prime coat plain steel rods threaded at the site immediately after installation with metal primer.

3.04 UPPER HANGER ATTACHMENTS

- A. General:
 - 1. Secure upper hanger attachments to structural steel or steel bar joists wherever possible.
 - 2. Do not use drive-on beam clamps, flat bars or bent rods, as upper hanger attachments.
 - 3. Do not attach hangers to steel decks which are not to receive concrete fill.
 - 4. Do not attach hangers to precast concrete planks less than 2-3/4 inches thick.
 - 5. Avoid damage to reinforcing members in concrete construction.
 - 6. Metallic fasteners installed with electrically operated or powder driven tools may be used as upper hanger attachments, in accordance with the SMACNA Manual, with the following exceptions:
 - a. Do not use powder driven drive pins or expansion nails.
 - b. Do not attach powder driven or welded studs to structural steel less than 3/16 inch thick.
 - c. Do not support a load, in excess of 250 lbs from any single welded or powder driven stud.
 - d. Do not use powder driven fasteners in precast concrete.

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- B. Attachment to Steel Frame Construction: Provide intermediate structural steel members where required by ductwork support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of 5.
 - 1. Secure upper hanger attachments to steel bar joists at panel points of joists.
 - 2. Do not drill holes in main structural steel members.
- C. Attachment to Concrete Filled Steel Decks:
 - 1. Existing Construction: Install welding studs (except at roof decks).
 - 2. Do not attach hangers to decks less than 2-1/2 inches thick.
- D. Attachment to Existing Cast-In Place Concrete:
 - 1. Secure hangers to overhead construction with self drilling type expansion anchors and machine bolts.
 - 2. Secure hanger attachments required to be supported from wall or floor construction with single unit expansion anchors or self drilling type expansion anchors and machine bolts.

END OF SECTION

SECTION 238233

CONVECTORS

PART 1 GENERAL

1.01 SUBMITTALS

- A. Schedule: Submit a schedule itemizing height, length and depth of enclosure; style of enclosure (sloping top, pedestal) and other accessories and options.
- B. Product Data: Submit manufacturer's catalog sheets, brochures, performance charts, specifications and installation instructions for Convector Radiators.

1.02 QUALITY ASSURANCE

- A. Regulatory Requirements: Ratings of radiation shall be IBR approved.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Sheet Metal (For fabricating radiation enclosures and accessories).
 - 1. Galvanized Sheet Steel: ASTM A 653, coating designation G90.
- B. Sheet Metal (For Fabricating Radiator Baffling):
 - 1. Same material as used for enclosures, minimum of No. 20 USS gage.

2.02 CONVECTOR RADIATORS

- A. General Design: Furnish each radiator complete with a rigidly supported heating element, an enclosure and a damper assembly.
- B. Heating Element: Fabricate elements from seamless copper tubes, with aluminum plate type fins with flanged collars, accurately spaced and securely affixed to the tubes by mechanical expansion of the tubes; complete with steel side plates, intermediate and end supports arranged to reinforce and strengthen the element. Design elements for a working pressure of 75 psig and factory test at 150 psig. Support element by means of metal brackets and threaded bolt arrangements, so as to permit ease of adjustment to obtain desired pitch.
- C. Enclosures:
 - 1. Fabricate from minimum No. 14 USS gage galvanized steel. Provide splice joints, end caps, pedestals, and corners as needed. Provide access doors at all valves and air vents. Grille shall be anodized aluminum.
- D. Factory Finish:
 - 1. Furnish all surfaces of enclosures with a factory applied minimum two coat baked enamel finish, unless otherwise indicated. Colors shall be as

selected by the Owner, from the manufacturer's optional decorator color chart.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Secure convector radiator enclosures to floor or wall construction with expansion shields and-or bolts, of size in number and on centers as directed by the manufacturer, unless otherwise indicated.
- B. Convector Enclosures:
 - 1. When enclosures are furnished by others, install sheet metal baffles arranged so as to prevent air from by-passing the heating elements. In addition, when the air space between the heating element and the front or rear of the enclosure is greater than 1/2", install sheet metal baffles at these locations.
 - 2. Install sheet metal baffles to prevent air by-pass, at element ends and sides as required, when enclosures provided under this contract are longer or deeper than the enclosed element.
 - 3. When enclosures are fully recessed into building construction, install a removable front panel having an overlap flange on all four sides.
 - 4. Install convector baffling with a factory or shop applied prime paint finish.

END OF SECTION

SECTION 260010

GENERAL PROVISIONS FOR ELECTRICAL WORK

PART 1 - GENERAL

1.1 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.

1.2 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.

1.3 RELATED DOCUMENTS

- A. Drawings and General Provisions of the Contract.
- B. Division 1 - General and Supplementary Requirements.

1.4 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.

1.5 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.

1.6 COORDINATION DRAWINGS

- A. Provide coordination drawings. Coordination drawings shall be completed so as not to delay the progress of the Project.

1.7 OPERATIONS, TRAINING, AND MAINTENANCE MANUALS

A. General

1. Provide SYSTEMS OPERATION AND MAINTENANCE MANUAL for procedures and requirements for preparation and submittal of operation and maintenance manuals of each equipment. Refer to individual equipment specifications for maintenance manual additional requirements. In addition, include the following information:
2. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and commercial numbers of all replaceable parts.
3. Manufacturer's printed operating procedures to include start-up, break-in, routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

4. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassemble; aligning and adjusting instructions.
 5. Servicing instructions and lubrication charts and schedules.
- B. Bind all the other Sections maintenance manuals in a single final Operating and Maintenance Manual.
 - C. Provide FACILITY START-UP, DEMONSTRATION AND TRAINING procedures and requirements for training on each equipment. Refer to individual equipment specifications for the additional training requirements.
 - D. Contractor shall videotape all the training sessions for various equipment and systems as specified in individual sections of these Specifications. If a manufacturer's particular equipment item is furnished with a training video, the manufacturer's video shall be provided in addition to the requirements of this Section, not in lieu thereof and at no additional cost to the Owner. Contractor shall be responsible for providing informative videotapes covering all the materials and content outlined in each individual section of these Specifications.

1.8 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.
- B. 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.

END OF SECTION

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SECTION 260519

WIRING, GENERAL - 600 VOLTS AND UNDER

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings:
 - 1. For Electrical Circuit Protective Systems: Show proposed routes and installation details (include UL classification data, listing, and system number).
- B. Product Data: Catalog sheets, specifications and installation instructions.

1.02 PRODUCT DELIVERY

- A. Mark and tag insulated conductors and cables for delivery to the site. Include:
 - 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.).
 - 6. Environmental suitability information (listed or marked "sunlight resistant" where exposed to direct rays of sun; wet locations listed/marked for use in wet locations; other applications listed/marked suitable for the applications).

PART 2 PRODUCTS

2.01 INSULATED CONDUCTORS AND CABLES

- A. Date of Manufacture: No insulated conductor more than one year old when delivered to the site will be acceptable.
- B. Acceptable Companies: American Insulated Wire Corp., General Cable Industries Inc., Cerro Wire & Cable Co. Inc., Pirelli Cable Corp., Rockbesto and the Okonite company.
- C. 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. Conductor sizes No. 8 and larger shall be stranded.
- D. Types:
 - 1. Electric Light and Power Wiring:

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- a. General: Rated 600V copper, NFPA 70 Type XPLE or XPLO. Polyvinylchloride insulation cables or PVC sheath is NOT ACCEPTABLE. All wiring, power or control shall be insulated with low smoke, zero halogen, thermosetting or thermoplastic jacket. All cables shall meet ICEA and FM requirements and pass the IEEE 383 vertical flame test.
 - b. Color code for control and instrument shall be K-2. Control cables shall be #14 AWG minimum. Shielded instrumentation cables shall be provided with drain wire in contact with shield, 600V with nylon jacket conforming to UL requirements.
 - c. USE, USE-2: Dual rated heat and moisture resistant insulation rated 600 V with jacket or dual purpose insulation/protective covering conforming to UL requirements for type USE service entrance cables.
 - d. Cables specified for direct burial shall have an aluminum sheath with a durable jacket designed for burial in harsh environments. Conductors shall be cross-linked-polyethylene.
 - e. Tray cables shall be rated for intended use with sunlight proof outer jacket.
2. Class 1 Wiring:
 - a. No. 18 and No. 16 AWG: Insulated copper conductors suitable for 600 volts, NFPA 70 types KF-2, KFF-2, PAFF, PF, PFF, PGF, PGFF, PTF, SF-2, SFF-2, TF, TFF, TFN, TFFN, ZF, or ZFF.
 - b. Larger than No. 16 AWG: Insulated copper conductors suitable for 600 volts, in compliance with NFPA 70 Article 310.
 - c. Conductor with other types and thickness of insulation may be used if listed for Class 1 circuit use.
3. Class 2 Wiring:
 - a. Multiconductor Cables: NFPA 70 Article 725, Types CL2P, CL2R, CL2.
 - b. Other types of cables may be used in accordance with NFPA 70 Table 725-61 "Cable Uses and Permitted Substitutions", as approved.
4. Class 3 Wiring:
 - a. Single Conductors No. 18 and No. 16 AWG: Same as Class 1 No. 18 and No. 16 AWG conductors except that:
 - 1) Conductors are also listed as CL3.
 - 2) Voltage rating not marked on cable except where cable has multiple listings and voltage marking is required for one or more of the listings.
 - b. Multiconductor Cables: NFPA 70 Article 725, Types CL3P, CL3R, CL3.
 - c. Other types of cables may be used in accordance with NFPA 70, Table 725-61 "Cable Uses and Permitted Substitutions", as approved.

2.02 CONNECTORS

- A. General:
 - 1. Connectors specified are part of a system. Furnish connectors and components, and use specific tools and methods as recommended by connector manufacturer to form complete connector system.
 - 2. Connectors shall be UL 486 A listed, or UL 486 B listed for combination dual rated copper/aluminum connectors (marked AL7CU for 75 degrees C rated circuits and AL9CU for 90 degrees C rated circuits).
- B. Splices:
 - 1. Spring Type:
 - a. Rated 105° C, 600V; Buchanan/Ideal Industries Inc.'s B-Cap, Electrical Products Div./3M's Scotchlok Type Y, R, G, B, O/B+, R/Y+, or B/G+, or Ideal Industries Inc.'s Wing Nuts or Wire Nuts.
 - b. Rated 150° C, 600V; Ideal Industries Inc.'s High Temperature Wire-Nut Model 73B, 59B.
 - 2. Indent Type with Insulating Jacket:
 - a. Rated 105° C, 600V; Buchanan/Ideal Industries Inc.'s Crimp Connectors, Ideal Industries Inc.'s Crimp Connectors, Penn-Union Corp.'s Penn-Crimps, or Thomas & Betts Corp.'s STA-KON.
 - 3. Indent Type (Uninsulated): Anderson/Hubbell's Versa-Crimp, VERSAtile, Blackburn/T&B Corp.'s Color-Coded Compression Connectors, Electrical Products Div./3M's Scotchlok 10000, 11000 Series, Framatome Connectors/Burndy's Hydent, Penn-Union Corp.'s BCU, BBCU Series, or Thomas & Betts Corp.'s Compression Connectors.
 - 4. Connector Blocks: NIS Industries Inc.'s Polaris System, or Thomas & Betts Corp.'s Blackburn AMT Series.
 - 5. Resin Splice Kits: Electrical Products Div./3M's Scotchcast Brand Kit Nos. 82A Series, 82-B1 or 90-B1, or Scotchcast Brand Resin Pressure Splicing Method.
 - 6. Heat Shrinkable Splices: Electrical Products Div./3M's ITCSN, Raychem Corp.'s Thermofit Type WCS, or Thomas & Betts Corp.'s SHRINK-KON Insulators.
 - 7. Cold Shrink Splices: Electrical Products Div./3M's 8420 Series.
- C. Gutter Taps: Anderson/Hubbell's GP/GT with GTC Series Covers, Blackburn/T&B Corp.'s H-Tap Type CF with Type C Covers, Framatome Connectors/Burndy's Polytap KPU-AC, H-Crimp Type YH with CF-FR Series Covers, ILSCO's GTA Series with GTC Series Covers, Ideal Industries Inc.'s Power-Connect GP, GT Series with GIC covers, NSI Industries Inc.'s Polaris System, OZ/Gedney Co.'s PMX or PT with PMXC, PTC Covers, Penn-Union Corp.'s CDT Series, or Thomas & Betts Corp.'s Color-Keyed H Tap CHT with HTC Covers.
- D. Terminals: Nylon insulated pressure terminal connectors by Amp-Tyco/Electronics, Electrical Products Div./3M, Framatome Connectors/Burndy, Ideal Industries Inc., Panduit Corp., Penn-Union Corp., Thomas & Betts Corp., or Wiremold Co.

- E. Lugs:
1. Single Cable (Compression Type Lugs): Copper, one or 2 hole style (to suit conditions), long barrel; Anderson/Hubbell's VERSAtile VHCL, Blackburn/T&B Corp.'s Color-Coded CTL, LCN, Framatome Connectors/Burndy's Hylug YA, Electrical Products Div./3M Scotchlok 31036 or 31145 Series, Ideal Industries Inc.'s CCB or CCBL, NSI Industries Inc.'s L, LN Series, Penn-Union Corp.'s BBLU Series, or Thomas & Betts Corp.'s 54930BE or 54850BE Series.
 2. Single Cable (Mechanical Type Lugs): Copper, one or 2 hole style (to suit conditions); Blackburn/T&B Corp.'s Color-Keyed Locktite Series, Framatome Connectors/Burndy's Qiklug Series, NSI Industries Inc.'s Type TL, Penn-Union Corp.'s VI-TITE Terminal Lug Series, or Thomas & Betts Corp.'s Locktite Series.
 3. Multiple Cable (Mechanical Type Lugs): Copper, configuration to suit conditions; Framatome Connectors/Burndy's Qiklug Series, NSI Industries Inc.'s Type TL, Penn-Union Corp.'s VI-TITE Terminal Lug Series, or Thomas & Betts Corp.'s Color-Keyed Locktite Series.

2.03 TAPES

- A. Insulation Tapes:
1. Plastic Tape: Electrical Products Div./3M's Scotch Super 33+ or Scotch 88, Plymouth Rubber Co.'s Plymouth/ Bishop Premium 85CW.
 2. Rubber Tape: Electrical Products Div./3M's Scotch 130C, or Plymouth Rubber Co.'s Plymouth/Bishop W963 Plysafe.
- B. Moisture Sealing Tape: Electrical Products Div./3M's Scotch 2200 or 2210, or Plymouth Rubber Co.'s Plymouth/Bishop 4000 Plyseal-V.
- C. Electrical Filler Tape: Electrical Products Div./3M's Scotchfil, or Plymouth Rubber Co.'s Plymouth/Bishop 125 Electrical Filler Tape.
- D. Color Coding Tape: Electrical Products Div./3M's Scotch 35, or Plymouth Rubber Co.'s Plymouth/Bishop Premium 37 Color Coding.

2.04 WIRE-PULLING COMPOUNDS

- A. To suit type of insulation; American Polywater Corp.'s Polywater Series, Electric Products Div./3M's WL, WLX, or WLW, Greenlee Textron Inc.'s Y-ER-EAS, Cable Cream, Cable Gel, Winter Gel, Ideal Industries Inc.'s Yellow 77, Aqua-Gel II, Agua-Gel CW, or Thomas & Betts Corp.'s Series 15-230 Cable Pulling Lubricants, or Series 15-631 Wire Slick.

2.05 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 inch minimum

- thickness, machine engraved to expose inner core color (white).
- 2. Aluminum: Standard aluminum alloy plate stock, minimum .032 inches thick, engraved areas enamel filled or background enameled with natural aluminum engraved characters.

2.06 WIRE MANAGEMENT PRODUCTS

- A. Cable Clamps and Clips, Cable Ties, Spiral Wraps, etc: Catamount/T&B Corp., or Ideal Industries Inc.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install conductors in raceways after the raceway system is completed, clear of burrs and debris.
- B. No grease, oil, or lubricant other than wire-pulling compounds specified may be used to facilitate the installation of conductors.

3.02 CIRCUITING

- A. Do not change, group or combine circuits other than as indicated on the drawings.

3.03 COMMON NEUTRAL CONDUCTOR

- A. A common neutral may be used for 2 or 3 branch circuits where the circuits are indicated on the drawings to be enclosed within the same raceway, provided each branch circuit is connected to different phase busses in the panelboard.
- B. Exceptions - The following circuits shall have a separate neutral:
 - 1. Circuits containing ground fault circuit interrupter devices.
 - 2. Circuits containing solid state dimmers.
 - 3. Circuits recommended by equipment manufacturers to have separate neutrals.

3.04 CONDUCTOR SIZE

- A. Conductor Size:
 - 1. For Electric Light and Power Branch Circuits: Install conductors of size shown on drawings. Where size is not indicated, the minimum size allowed is No. 12 AWG.
 - 2. For Class 1 Circuits:
 - a. No. 18 and No. 16 AWG may be used provided they supply loads that do not exceed 6 amps (No. 18 AWG), or 8 amps (No. 16 AWG).
 - b. Larger than No. 16 AWG: Use to supply loads not greater than the ampacities given in NFPA 70 Section 310-15.

3. For Class 2 Circuits: Any size to suit application.
4. For Class 3 Circuits: Minimum No. 18 AWG.

3.05 COLOR CODING

- A. Color Coding for 120/208 Volt Electric Light and Power Wiring:
 1. Color Code:
 - a. Power: 1, 2, 3 and 4
 2. White to be used only for an insulated grounded conductor (neutral). If neutral is not required use black and red, or black, red and blue for phase to phase circuits.
 - a. "White" for Sizes No. 6 AWG or Smaller:
 - 1) Continuous white outer finish, or:
 - 2) Three continuous white stripes on other than green insulation along its continuous length.
 - b. "White" for Sizes Larger Than No. 6 AWG:
 - 1) Continuous white outer finish, or:
 - 2) Three continuous white stripes on other than green insulation along its continuous length, or:
 - 3) Distinctive white markings (color coding tape) encircling the conductor, installed on the conductor at time of its installation. Install white color coding tape at terminations, and at 1' 0" intervals in gutters, pullboxes, and manholes.
 3. Colors (Black, Red, Blue):
 - a. For Branch Circuits: Continuous color outer finish.
 - b. For Feeders:
 - 1) Continuous color outer finish, or:
 - 2) Color coding tapes encircling the conductors, installed on the conductors at time of their installation. Install color coding tapes at terminations, and at 1' 0" intervals in gutter, pullboxes, and manholes.
- C. More Than One Nominal Voltage System Within A building: Permanently post the color coding scheme at each branch-circuit panelboard.
- D. Existing Color Coding Scheme: Where an existing color coding scheme is in use, match the existing color coding if it is in accordance with the requirements of NFPA 70.
- E. Color Code For Wiring Other Than Electric Light and Power: In accordance with ICEA/NEMA WC-30 "Color Coding of Wires and Cables". Other coding methods may be used, as approved.

3.06 IDENTIFICATION

- A. Identification Tags: Use tags to identify feeders and designated circuits. Install tags so that they are easily read without moving adjacent feeders or requiring

removal of arc proofing tapes. Attach tags with non-ferrous wire or brass chain.

1. Interior Feeders: Identify each feeder in pullboxes and gutters. Identify by feeder number and size.
 2. Exterior Feeders: Identify each feeder in manholes and in interior pullboxes and gutters. Identify by feeder number and size, and also indicate building number and panel designation from which feeder originates.
 3. Street and Grounds Lighting Circuits: Identify each circuit in manholes and lighting standard bases. Identify by circuit number and size, and also indicate building number and panel designation from which circuit originates.
- B. Identification Plaque: Where a building or structure is supplied by more than one service, or has any combination of feeders, branch circuits, or services passing through it, install a permanent plaque or directory at each service, feeder and branch circuit disconnect location denoting all other services, feeders, or branch circuits supplying that building or structure or passing through that building or structure and the area served by each.

3.07 WIRE MANAGEMENT

- A. Use wire management products to bundle, route, and support wiring in junction boxes, pullboxes, wireways, gutters, channels, and other locations where wiring is accessible.

3.08 EQUIPMENT GROUNDING CONDUCTOR

- A. Install equipment grounding conductor:
1. Where specified in other Sections or indicated on the drawings.
 2. In conjunction with circuits recommended by equipment manufacturers to have equipment grounding conductor.
- B. Equipment grounding conductor is not intended as a current carrying conductor under normal operating circumstances.
- C. Color Coding For Equipment Grounding Conductor:
1. Color Code: Green.
 2. "Green" For sizes No. 6 AWG or Smaller:
 - a. Continuous green outer finish, or:
 - b. Continuous green outer finish with one or more yellow stripes, or:
 - c. Bare copper (see exception below).
 3. "Green" For Sizes Larger Than No. 6:
 - a. Stripping the insulation or covering from the entire exposed length (see exception below).
 - b. Marking the exposed insulation or covering with green color coding tapes.
 - c. Identify at each end and at every point where the equipment grounding conductor is accessible.
 4. Exception For use of Bare Copper: Not allowed for use where NFPA 70

specifically requires equipment grounding conductor to be insulated, or where specified in other Sections or indicated on the drawings to be insulated.

3.09 INSULATED CONDUCTOR AND CABLE SCHEDULE - TYPES AND USE

- A. Electric Light and Power Circuits:
 - 1. XPLE or XPLO: Wiring in dry or damp locations (except where special type insulation is required).
 - 2. XPLE OR XPLO Wiring in wet locations (except where type USE or USE-2 insulated conductors are specifically required, or special type insulation is required).
 - 3. USE, or USE-2: Wiring indicated on the drawings to be direct burial in earth.
 - 4. USE, or USE-2 Marked "Sunlight Resistant":
 - a. Service entrance wiring from overhead service to the service equipment.

3.10 CONNECTOR SCHEDULE - TYPES AND USE

- A. Temperature Rating: Use connectors that have a temperature rating, equal to, or greater than the temperature rating of the conductors to which they are connected.
- B. Splices:
 - 1. Dry Locations:
 - a. For Conductors No. 8 AWG or Smaller: Use spring type pressure connectors, indent type pressure connectors with insulating jackets, or connector blocks (except where special type splices are required).
 - b. For Conductors No. 6 AWG or Larger: Use connector blocks or uninsulated indent type pressure connectors. Fill indentions in uninsulated connectors with electrical filler tape and apply insulation tape to insulation equivalent of the conductor, or insulate with heat shrinkable splices or cold shrink splices.
 - c. Gutter Taps in Panelboards: For uninsulated type gutter taps 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 or cold shrink splices are used).
 - 3. Wet Locations: Use uninsulated indent type pressure connectors and insulate with resin splice kits, cold shrink splices or heat shrinkable splices. Exception: Splices above ground which are totally enclosed and protected in NEMA 3R, 4, 4X enclosures may be spliced as specified for damp locations.

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- C. Terminations:
1. For Conductors No. 10 AWG or Smaller: Use terminals for:
 - a. 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 (reduced section not longer than one foot). Use compression or mechanical type connectors suitable for reducing connection.

END OF SECTION

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SECTION 260526

GROUNDING AND BONDING

PART 1 GENERAL

1.01 SUBMITTALS

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

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ground Clamps (Cable to Pipe): Blackburn/T&B Corp.'s GUV, Framatome Connectors/Burndy Corp.'s GAR, GD, GP, GK, or OZ/Gedney Co.'s ABG, CG.
- B. Ground Clamps (Cable to Rod): Blackburn/T&B Corp.'s GG, GGH, JAB, JABH, GUV, Dossert Corp.'s GN, GPC, Framatome Connectors/Burndy Corp.'s GP, GX, GRC, or OZ/Gedney Co.'s ABG.
- C. Ground Lugs: Copper, one or 2 hole style (to suit conditions), long barrel; Anderson/Hubbell's VERSAtile VHCL, Blackburn/T&B Corp.'s Color-Coded CTL, LCN, Framatome Connectors/Burndy's Hylug YA, Electrical Products Div./3M Scotchlok 31036 or 31145 Series, Ideal Industries Inc.'s CCB or CCBL, or Thomas & Betts Corp.'s 54930BE or 54850BE Series.
- D. Exothermic Type Weld: Erico Inc.'s Cadweld Process, or Furseweld/T&B Corp.'s Exothermic Welding System.
- E. Compression Connectors: Amp Inc.'s Ampact Copper Grounding System, or Burndy Corp.'s Hyground System.
- F. Rod Electrodes: Copper clad (minimum .010 jacket) ground rods minimum 5/8 inches diameter by 8'-0" long.
- G. Plate Electrodes: Copper plates minimum 0.06 inches thick by 2'-0" square feet of surface area.
- H. Grounding Electrode Conductors and Bonding Conductors: All grounding shall be performed per IEEE and NEC. All electrical equipment shall be grounded or bonded per IEEE and NEC requirements.
- I. Hardware: Silicon-bronze bolts, nuts, flat and lock washers etc. as manufactured by Dossert Corp., Framatome Connectors/Burndy Corp., or OZ/Gedney Co.

PART 3 EXECUTION

3.01 INSTALLATION

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A. Connections:

1. Make grounding and bonding connections, except buried connections, with silicon-bronze hardware and ground clamps, ground lugs or compression connectors, to suit job conditions.
2. For buried connections use exothermic type weld or compression connectors.

END OF SECTION

SECTION 260529

FASTENERS, ATTACHMENTS, AND SUPPORTING DEVICES

PART 1 GENERAL

1.01 SUBMITTALS

- A. Shop Drawings: Show support details if different from methods specified or shown on the drawings.
- B. Product Data: Catalog sheets, specifications and installation instructions.

PART 2 PRODUCTS

2.01 ANCHORING DEVICES

- A. Sleeve Anchors Type 3, Class 3: Molly/Emhart's Parasleeve Series, Phillips' Red Head, FS Series, or Ramset's Dynabolt Series.
- B. Wedge Anchors Type 4, Class 1 Hilti's Kwik Bolt Series, Molly/Emhart's Parabolt Series, Phillips' Red Head WS, or Ramset's Trubolt Series.
- C. Non-Drilling Anchors (FS FF-S-325 Group VIII, Type 1): Hilti's Drop-In Anchor Series, Phillips' Red Head J Series, or Ramset's Dynaset Series.
- D. Stud Anchors (FS FF-S-325 Group VIII, Type 2): Phillips' Red Head JS Series.

2.02 CAST-IN-PLACE CONCRETE INSERTS

- A. Continuous Slotted Type Concrete Insert, Galvanized:
 - 1. Load Rating 1300 lbs./ft.: Kindorf's D-986.
 - 2. Load Rating 2400 lbs./ft.: Kindorf's D-980.
 - 3. Load Rating 3000 lbs./ft.: Hohmann & Barnard Inc.'s Type CS-H.
 - 4. Load Rating 4500 lbs./ft.: Hohmann & Barnard Inc.'s Type CS-HD.
- B. Threaded Type Concrete Insert: Galvanized ferrous castings, internally threaded.
- C. Wedge Type Concrete Insert: Galvanized box-type ferrous castings, designed to accept bolts having special wedge shaped heads.

2.03 MISCELLANEOUS FASTENERS

- A. Except where shown otherwise on the Drawings, furnish type, size, and grade required for proper installation of the Work, selected from the following: Furnish galvanized fasteners for exterior use, or for items anchored to exterior walls, except where stainless steel is

indicated.

1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
2. Lag Bolts: FS FF-B-561, square head type.
3. Machine Screws: FS FF-S-92, cadmium plated steel.
4. Machine Bolts: FS FF-B-584 heads; FF-N-836 nuts.
5. Wood Screws: FS FF-S-111 flat head carbon steel.
6. Plain Washers: FS FF-W-92, round, general assembly grade carbon steel.
7. Lock Washers: FS FF-W-84, helical spring type carbon steel.
8. Toggle Bolts: Tumble-wing type; FS FF-B-588, type, class and style as required to sustain load.

- B. Stainless Steel Fasteners: Type 302 for interior Work; Type 316 for exterior Work; Phillips head screws and bolts for exposed Work unless otherwise specified.

2.04 TPR (THE PEEL RIVET) FASTENERS

- A. 1/4 inch diameter, threadless fasteners distributed by Subcon Products, 315 Fairfield Road, Fairfield, NJ 07004 (800) 634-5979.

2.05 POWDER DRIVEN FASTENER SYSTEMS

- A. Olin Corp.'s Ramset Fastening Systems, or Phillips Drill Company Inc.'s Red Head Powder Actuated Systems.

2.06 HANGER RODS

- A. Mild low carbon steel, unless otherwise specified; fully threaded or threaded each end, with nuts as required to position and lock rod in place. Unless galvanized or cadmium plated, provide a shop coat of red lead or zinc chromate primer paint.

2.07 "C" BEAM CLAMPS

- A. With Conduit Hangers:
1. For 1 Inch Conduit Maximum: B-Line Systems Inc.'s BG-8, BP-8 Series, Caddy/Erco Products Inc.'s BC-8P and BC-8PSM Series, or GB Electrical Inc.'s HIT 110-412 Series.
 2. For 3 Inch Conduit Maximum: Appleton Electric Co.'s BH-500 Series beam clamp with H50W/B Series hangers, Kindorf's 500 Series beam clamp with 6HO-B Series hanger, or OZ/Gedney Co.'s IS-500 Series beam clamp with H-OWB Series hanger.
 3. For 4 Inch Conduit Maximum: Kindorf's E-231 beam clamp and E-234 anchor clip and C-149 series lay-in hanger; Unistrut Corp.'s P2676 beam clamp and P-1659A Series anchor clip with J1205 Series lay in hanger.
- B. For Hanger Rods:
1. For 1/4 Inch Hanger Rods: B-Line Systems Inc.'s BC, Caddy/Erco Products Inc.'s BC, GB Electrical Inc.'s HIT 110, Kindorf's 500, 510, or Unistrut Corp.'s P1648S, P2398S, P2675, P2676.
 2. For 3/8 Inch Hanger Rods: Caddy/Erco Products Inc.'s BC, Kindorf's 231-3/8, 502, or Unistrut Corp.'s P1649AS, P2401S, P2675, P2676.

3. For 1/2 Inch Rods: Appleton Electric Co. BH-500 Series, Kindorf's 500 Series, 231-1/2, OZ/Gedney Co.'s IS-500 Series, or Unistrut Corp.'s P1650AS, P2403S, P2676.
4. For 5/8 Inch Rods: Unistrut Corp.'s P1651AS beam clamp and P1656A Series anchor clip.
5. For 3/4 Inch Rods: Unistrut Corp.'s P1653S beam clamp and P1656A Series anchor clip.

2.08 CHANNEL SUPPORT SYSTEM

- A. Channel Material: 12 gage steel.
- B. Finishes:
 1. Phosphate and baked green enamel/epoxy.
 2. Pre-galvanized.
 3. Electro-galvanized.
 4. Hot dipped galvanized.
 5. Polyvinyl chloride (PVC), minimum 15 mils thick.
- C. Fittings: Same material and finish as channel.
- D. UL Listed Systems:
 1. B-Line Systems Inc.'s B-22 (1-5/8 x 1-5/8 inches), B-12 (1-5/8 x 2-7/16 inches), B-11 (1-5/8 x 3-1/4 inches).
 2. Grinnell Corp.'s Allied Power-Strut PS 200 (1-5/8 x 1-5/8 inches), PS 150 (1-5/8 x 2-7/16 inches), PS 100 (1-5/8 x 3-1/4 inches).
 3. Kindorf's B-900 (1-1/2 x 1-1/2 inches), B-901 (1-1/2 x 1-7/8 inches), B-902 (1-1/2 x 3 inches).
 4. Unistrut Corp.'s P-3000 (1-3/8 x 1-5/8 inches), P-5500 (1-5/8 x 2-7/16 inches), P-5000 (1-5/8 x 3-1/4 inches).
 5. Versabar Corp.'s VA-1 (1-5/8 x 1-5/8 inches), VA-3 (1-5/8 x 2-1/2 inches).

2.09 MISCELLANEOUS FITTINGS

- A. Side Beam Brackets: B-Line Systems Inc.'s B102, B103, B371-2, Kindorf's B-915, or Versabar Corp.'s VF-2305, VF-2507.
- B. Pipe Straps:
 1. Two Hole Steel Conduit Straps: B-Line Systems Inc.'s B-2100 Series, Kindorf's C-144 Series, or Unistrut Corp.'s P-2558 Series.
 2. One Hole Malleable Iron Clamps: Kindorf's HS-400 Series, or OZ/ Gedney Co.'s 14-G Series, 15-G Series (EMT).
- C. Deck Clamps: Caddy/Erco Products Inc.'s DH-4-T1 Series.
- D. Fixture Stud and Strap: OZ/Gedney Co.'s SL-134, or Steel City's FE-431.
- E. Supporting Fittings for Pendent Mounted Industrial Type LED Fixtures on Exposed Conduit System:
 1. Ball Hanger: Appleton Electric Co.'s AL Series, or Crouse-Hinds Co.'s AL Series.

2. Flexible Fixture Hanger: Appleton Electric Co.'s UNJ-50, UNJ-75, or Crouse-Hinds Co.'s UNJ115.
 3. Flexible (Hook Type) Fixture Hanger: Appleton Electric Co.'s FHMF, or Crouse-Hinds Co.'s UNH-1.
 4. Eyelet: Unistrut Corp.'s M2250.
 5. Eyelet with Stud: Kindorf's H262, or Unistrut Corp.'s M2350.
 6. Conduit Hook: Appleton Electric Co.'s FHSN, or Crouse-Hinds Co.'s UNH-13.
- F. Supporting Fasteners (Metal Stud Construction): Metal stud supports, clips and accessories as produced by Caddy/Erco Products Inc.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Where specific fasteners are not specified or indicated for securing items to in-place construction, provide appropriate type, size, and number of fasteners for a secure, rigid installation.
- B. Install anchoring devices and other fasteners in accordance with manufacturer's printed instructions.
- C. Make attachments to structural steel wherever possible.

3.02 FASTENER SCHEDULE

- A. Material:
 1. Use cadmium or zinc coated anchors and fasteners in dry locations.
 2. Use hot dipped galvanized or stainless steel anchors and fasteners in damp and wet locations.
 3. For corrosive atmospheres or other extreme environmental conditions, use fasteners made of materials suitable for the conditions.
- B. Types and Use: Unless otherwise specified or indicated use:
 1. Cast-in-place concrete inserts in fresh concrete construction for direct pull-out loads such as shelf angles or fabricated metal items and supports attached to concrete slab ceilings.
 2. Anchoring devices to fasten items to solid masonry and concrete when the anchor is not subjected to pull out loads, or vibration in shear loads.
 3. Toggle bolts to fasten items to hollow masonry and stud partitions.
 4. TPR fasteners to fasten items to plywood backed gypsum board ceilings.
 5. Metallic fasteners installed with electrically operated or powder driven tools for approved applications, except:
 - a. Do not use powder driven drive pins or expansion nails.
 - b. Do not attach powder driven or welded studs to structural steel less than 3/16 inch thick.
 - c. Do not support a load, in excess of 250 lbs from any single welded or powder driven stud.

- d. Do not use powder driven fasteners in precast concrete.

3.03 ATTACHMENT SCHEDULE

- A. General: Make attachments to structural steel or steel bar joists wherever possible. Provide intermediate structural steel members where required by support spacing. Select steel members for use as intermediate supports based on a minimum safety factor of 5.
 1. Make attachments to steel bar joists at panel points of joists.
 2. Do not drill holes in main structural steel members.
 3. Use "C" beam clamps for attachment to steel beams.
- B. Where it is not possible to make attachments to structural steel or steel bar joists, use the following methods of attachment to suit type of construction unless otherwise specified or indicated on the drawings:
 1. Attachment to Steel Roof Decking (No Concrete Fill):
 - a. Decking With Hanger Tabs: Use deck clamps.
 - b. Decking Without Hanger Tabs:
 - 1) Before Roofing Has Been Applied: Use 3/8 inch threaded steel rod welded to a 4 x 4 x 1/4 inch steel plate and installed through 1/2 inch hole in roof deck.
 - 2) After Roofing Has Been Applied: Use welding studs, or self-drilling/tapping fasteners. Exercise extreme care when installing fasteners to avoid damage to roofing.
 2. Attachment to Concrete Filled Steel Decks (Total thickness, 2-1/2 inches or more):
 - a. Before Fill Has Been Placed:
 - 1) Use thru-bolts and fish plates.
 - 2) Use welded studs. Do not support a load in excess of 250 pounds from a single welded stud.
 - b. After Fill Has Been Placed: Use welded studs. Do not support a load in excess of 250 lbs from a single welded stud.
 3. Attachment to Cast-In-Place Concrete:
 - a. Fresh Concrete: Use cast-in-place concrete inserts.
 - b. Existing Concrete: Use anchoring devices.
 4. Attachment to Cored Precast Concrete Decks:
 - a. New Construction: Use thru-bolts and fish plates before Construction Work Contractor has placed concrete fill over decks.
 - b. Existing Construction: Toggle bolts may be installed in cells for a maximum load 15_LBS .
 5. Attachment to Hollow Block or Tile Filled Concrete Deck:
 - a. New Construction: Use cast-in-place concrete inserts by having Construction Work Contractor omitting blocks and pouring solid blocks with insert where required.
 6. Attachment to Waffle Type Concrete Decks:
 - a. New Construction:
 - 1) Use cast-in-place concrete inserts in fresh concrete.
 - 2) If concrete fill has been applied over deck, thru-bolts and fish plates may be used where additional concrete or roofing is to be placed over the deck.

7. Attachment to Precast Concrete Planks: Use anchoring devices, except do not make attachments to precast concrete planks less than 2-3/4 inches thick.
8. Attachment to Precast Concrete Tee Construction:
 - a. New Construction:
 - 1) Use tee hanger inserts between adjacent flanges.
 - 2) Use thru-bolts and fish plates, except at roof deck without concrete fill.
 - b. Existing Construction:
 - 1) Use anchoring devices installed in webs of tees. Install anchoring devices as high as possible in the webs.
 - c. Do not use powder driven fasteners.
 - d. Exercise extreme care in drilling holes to avoid damage to reinforcement.
9. Attachment to Wood Construction: Use side beam brackets fastened to the sides of wood members to make attachments for hangers.
 - a. Under 15 lbs Load: Attach side beam brackets to wood members with 2 No. 18 x 1-1/2 inch long wood screws, or 2 No. 16 x 1-1/2 inch long drive screws.
 - b. Over 15 lbs Load: Attach side beam brackets to wood members with bolts and nuts or lag bolts. Do not use lag bolts in wooden members having a nominal thickness (beam face) under 2 inches in size. Install bolts and nuts or lag bolts in the side of wood members at the mid-point or slightly above. Install plain washers under all nuts.

LOAD	LAG BOLT SIZE	BOLT DIA.
15 lbs to 30 lbs	3/8 x 1-3/4 inches	3/8 inch
31 lbs to 50 lbs	1/2 x 2 inches	1/2 inch
Over 50 lbs to load limit of structure.	Use bolt & nut	5/8 inch

- c. Bottom chord of wood trusses may be utilized as structural support, but method of attachment must be specifically approved.
 - d. Do not make attachments to the diagonal or vertical members of wood trusses.
 - e. Do not make attachments to the nailing strips on top of steel beams.
10. Attachment to Metal Stud Construction: Use supporting fasteners manufactured specifically for the attachment of raceways and boxes to metal stud construction.
 - a. Support and attach outlet boxes so that they cannot torque/twist. Either:
 - 1) Use bar hanger assembly, or:
 - 2) In addition to attachment to the stud, also provide far side box support.

3.04 CONDUIT SUPPORT SCHEDULE

- A. Provide number of supports as required by National Electrical Code. Exception: Maximum support spacing allowed is 4'-0" for conduit sizes 3 inches and larger supported from wood trusses.
- B. Use pipe straps and specified method of attachment where conduit is installed proximate to surface of wood or masonry construction.
 1. Use hangers secured to surface with specified method of attachment where conduit is

suspended from the surface.

- C. Use "C" beam clamps and hangers where conduit is supported from steel beams.
- D. Use deck clamps and hangers where conduit is supported from steel decking having hanger tabs.
 - 1. Where conduit is supported from steel decking which does not have hanger tabs, use clamps and hangers secured to decking, utilizing specified method of attachment.
- E. Use channel support system supported from structural steel for multiple parallel conduit runs.
- F. Where conduits are installed above ceiling, do not rest conduit directly on runner bars, T-Bars, etc.
 - 1. Conduit Sizes 2-1/2 Inches and Smaller: Support conduit from ceiling supports or from construction above ceiling.
 - 2. Conduit Sizes Over 2-1/2 Inches: Support conduit from beams, joists, or trusses above ceiling.

3.05 LIGHTING FIXTURE SUPPORT SCHEDULE

- A. General: Do not support fixtures from ceilings or ceiling supports unless it is specified or indicated on the drawings to do so.
 - 1. Support fixtures with hanger rods attached to beams, joists, or trusses. Hanger rod diameter, largest standard size that will fit in mounting holes of fixture.
 - a. Where approved, channel supports may span and rest upon the lower chord of trusses and be utilized for the support of lighting fixtures.
 - b. Where approved, channel supports may span and be attached to the underside of beams, joists, or trusses and be utilized for the support of lighting fixtures.
 - 2. Use 2 nuts and 2 washers on lower end of each hanger rod to hold and adjust fixture (one nut and washer above top of fixture housing, one nut and washer below top of fixture housing).
 - a. Where specified that an adequately supported outlet box is to support a fixture or be utilized as one point of support, support the box so that it may be adjusted to bring the face of the outlet box even with surface of ceiling.
- B. Specific Installations Where Fixtures May Be Supported From New Ceilings Being Installed By Construction Work Contractor:
 - 1. Support surface mounted LED fixtures and incandescent fixtures directly from plywood backed gypsum board ceilings.
 - 2. Support surface mounted LED fixtures and incandescent fixtures directly from framing or furring members of fire rated suspended ceilings (double gypsum board).
 - 3. Support recessed mounted LED fixtures and incandescent fixtures directly from furring members of furred gypsum board ceilings.
 - 4. Support recessed mounted LED fixtures and incandescent fixtures directly from the suspension system of suspended acoustical ceilings. Exception: Support each fixture weighing more than 50 pounds (including lamps) independent of the suspended ceiling grid.
 - 5. Deliver documents which state actual fixture weights and indicate fixture locations

to the Construction Work Contractor (thru the Director's Representative).

- C. Number of Supports For Ceiling Mounted Lighting Fixtures: Provide at least the following number of supports. Provide additional supports when recommended by fixture manufacturer, or shown on the drawings.
 - 1. Commercial and Industrial LED Fixtures:
 - a. Support individual LED fixtures less than 2 feet wide at 2 points.
 - b. Support continuous row LED fixtures less than 2 feet wide at points equal to the number of fixtures plus one. Uniformly distribute the points of support over the row of fixtures.
 - c. Support individual LED fixtures 2 feet or wider at 4 corners.
 - d. Support continuous row LED fixtures 2 feet or wider at points equal to twice the number of fixtures plus 2. Uniformly distribute the points of support over the row of fixtures.
 - e. An adequately supported outlet box may be utilized as one point of support for fixtures weighing less than 50 pounds.
 - 2. Commercial and Industrial Incandescent Fixtures: Support fixture from adequately supported outlet box, to suit fixture design (fixture weight less than 50 pounds).
- D. Number of Supports For Wall Mounted Lighting Fixtures: Provide at least the following number of supports. Provide additional supports when recommended by fixture manufacturer, or shown on the drawings.
 - 1. Commercial and Industrial LED Fixtures:
 - a. Support individual LED fixtures 2 feet long or less at 2 points.
 - b. Support individual LED fixtures over 2 feet long at 3 points.
 - c. Support continuous row LED fixtures at points equal to twice the number of fixtures. Uniformly distribute the points of support.
 - d. Outlet box shall not be counted as a point of support.

3.06 CHANNEL SUPPORT SYSTEM SCHEDULE

- A. Use channel support system where specified or indicated on the drawings.
- B. Channel supports may be used, as approved, to accommodate mounting of equipment.
- C. Material and Finish:
 - 1. Dry Locations: Use 12 gage steel channel support system having any one of the specified finishes.
 - 2. Damp Locations: Use 12 gage steel channel support system having any one of the specified finishes except green epoxy/enamel.
 - 3. Wet Locations: Use 12 gage steel channel support system having hot dipped galvanized, or PVC finish.

END OF SECTION

SECTION 260534

OUTLET, JUNCTION, AND PULL BOXES

PART 1 GENERAL

1.01 REFERENCES

- A. NEMA, and UL.

1.02 SUBMITTALS

- A. Product Data: Catalog sheets, specifications and installation instructions.
 - 1. For fire rated construction, prove that materials and installation methods proposed for use are in accordance with the listing requirements of the classified construction.

PART 2 PRODUCTS

2.01 GALVANIZED STEEL OUTLET BOXES

- A. Standard galvanized steel boxes and device covers by Appleton Electric Co., Beck Mfg./Picoma Industries, Cooper/Crouse-Hinds, Racor/Div. of Hubbell, or Steel City/T & B Corp.

2.02 GALVANIZED STEEL JUNCTION AND PULL BOXES

- A. Code gage, galvanized steel screw cover boxes by Delta Metal Products Inc., Hoffman Enclosures Inc., Hubbell Wiegmann, Lee Products Co., or Rittal/Electromate.

2.03 THREADED TYPE BOXES:

- A. Outlet Boxes:
 - 1. For Dry, Damp Locations: Zinc electroplate malleable iron or cast iron alloy boxes by Appleton Electric Co., Cooper/Crouse-Hinds Co., or OZ/ Gedney Co., with zinc electroplate steel covers to suit application.
 - 2. For Wet Locations: Malleable iron or cast iron alloy boxes with hot dipped galvanized or other specified corrosion resistant finish as produced by Cooper/Crouse-Hinds (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), with stainless steel cover screws, and malleable iron covers gasketed to suit application.
- B. Junction And Pull Boxes:
 - 1. For Dry, Damp Locations: Zinc electroplate cast iron boxes by Appleton Electric Co., Cooper/Crouse-Hinds, or OZ/Gedney Co., with zinc electroplate steel or cast iron cover.
 - 2. For Wet Locations: Cast iron boxes by Cooper/Crouse-Hinds' (hot dipped galvanized or Corro-free epoxy powder coat), or OZ/Gedney Co. (hot dipped galvanized), with stainless steel cover screws and cast iron cover gasketed to suit application.

- C. Conduit Bodies, Threaded (Provided with a Volume Marking):
1. For Dry, Damp Location: Zinc electroplate malleable iron or cast iron alloy bodies with zinc electroplate steel covers; Appleton Electric Co.'s Unilets, Cooper/Crouse-Hinds' Condulets, or OZ/Gedney Co.'s Conduit Bodies.
 2. For Wet Locations: Malleable iron or cast iron alloy bodies with hot dipped galvanized or other specified corrosion resistant finish; Cooper/Crouse-Hinds' Condulets (hot dipped galvanized or Corro-free epoxy power coat), or OZ/Gedney Co.'s Conduit Bodies (hot dipped galvanized) with stainless steel cover screws and malleable iron covers gasketed to suit application.

2.04 CORROSION RESISTANT BOXES

- A. Plastic Coated Outlet and Junction Boxes: Threaded type malleable iron boxes coated with 40 mils thick polyvinylchloride coating; Ocal/T&B Corp.'s Ocal-Blue System, PCD Inc.'s KorKap, KorKap XL, or Robroy Industries' Plastibond or Perma-Cote System.
- B. Non-Metallic Junction and Pullboxes: Glass fiber reinforced polyester; Carlon/Div. of Lamon and Sessions' Himeline Series, Cooper/Crouse-Hinds' Krydon Products, or Robroy Industries' Stahlin Enclosures.

2.05 OUTLET BOXES AND RELATED PRODUCTS FOR FIRE RATED CONSTRUCTION

- A. Parameters For Use of Listed Metallic Outlet or Switch Boxes: UL Electrical Construction Equipment Directory - Metallic Outlet Boxes (QCIT).
- B. Wall Opening Protective Materials: As listed in UL Fire Resistance Directory - Wall Opening Protective Materials (CLIV), or UL Electrical Construction Equipment Directory - Wall Opening Protective Materials (QCSN).

PART 3 EXECUTION

3.01 PREPARATION

- A. Before proceeding with the installation of junction and pull boxes, check the locations with the Director's Representative and have same approved.

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 center lines at the following elevations above finished floor:

Switches	4'-0"
Single & Duplex Receptacles	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 NFPA 70, provide supplementary junction and pull boxes as follows:
1. When required to facilitate installation of wiring.
 2. At every third 90 degree turn in conjunction with raceway sizes over 1 inch.
 3. At intervals not exceeding 100 feet in conjunction with raceway sizes over 1 inch.

3.03 OUTLET, JUNCTION, AND PULL BOX SCHEDULE

- A. Boxes For Concealed Conduit System:
1. Non-Fire Rated Construction:
 - a. Depth: To suit job conditions and comply with NFPA 70 Article 370.
 - b. For Lighting Fixtures: Use galvanized steel outlet boxes designed for the purpose.
 - 1) For Fixtures Weighing 50 lbs. or Less: Box marked "FOR FIXTURE SUPPORT".
 - 2) For Fixtures More Than 50 lbs: Box listed and marked with the weight of the fixture to be supported (or support fixture independent of the box).
 - c. For Ceiling Suspended Fans:
 - 1) For Fans Weighing 35 lbs or Less: Marked "Acceptable for Fan Support."
 - 2) For Fans Weighing More Than 35 lbs, up to 70 lbs: Marked "Acceptable for Fan Support up to 70 lbs (or support fan independent of the box)."
 - d. For Junction and Pull Boxes: Use galvanized steel boxes with flush covers.
 - e. For Switches, Receptacles, Etc:
 - 1) Plaster or Cast-In-Place Concrete Walls: Use 4 inch or 4-11/16 inch galvanized steel boxes with device covers.
 - 2) 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.
 2. Recessed Boxes in Fire Rated (2 hour maximum) Bearing and Nonbearing Wood or Steel Stud Walls (Gypsum Wallboard Facings):
 - a. Use listed single and double gang metallic outlet and switch boxes. The surface area of individual outlet or switch boxes shall not exceed 16 square inches.
 - b. The aggregate surface area of the boxes shall not exceed 100 square inches per 100 square feet of wall surface.
 - c. Securely fasten boxes to the studs. Verify that the opening in the wallboard facing is cut so that the clearance between the box and the wallboard does not exceed 1/8 inch.
 - d. Separate boxes located on opposite sides of walls or partitions by a minimum horizontal distance of 24 inches. This minimum separation distance may be reduced when wall opening protective materials are installed according to the requirements of their classification.
 - e. Use wall opening protective material in conjunction with boxes installed on opposite sides of walls or partitions of staggered stud construction in accordance with the classification requirements for the protective material.
 3. Other Fire Rated Construction: Use materials and methods to comply with the listing requirements for the classified construction.

B. Boxes For Exposed Conduit System:

1. Dry and Damp Locations: Use zinc electroplate or hot dipped galvanized threaded type malleable iron or cast iron alloy outlet, junction, and pullboxes or conduit bodies provided with a volume marking in conjunction with ferrous raceways unless otherwise specified or indicated on the drawings.
 - a. Galvanized steel boxes may be used in conjunction with conduit sizes over 1 inch in non-hazardous dry and damp locations.
 - b. Galvanized steel boxes may be used in conjunction with electrical metallic tubing where it is allowed (specified) to be installed exposed as branch circuit conduits at elevations over 10'-0" above finished floor.
2. Wet Locations: Use threaded type malleable iron or cast iron alloy outlet junction, and pullboxes or conduit bodies (provided with a volume marking) with hot dipped galvanized or other specified corrosion resistant coating in conjunction with ferrous raceways unless otherwise specified or indicated on the drawings.
 - a. Use corrosion resistant boxes in conjunction with plastic coated rigid ferrous metal conduit.
3. 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.

- C. Specific Purpose Outlet Boxes: Use to mount equipment when available and suitable for job conditions. Unless otherwise specified, use threaded type boxes with finish as specified for exposed conduit system, steel (painted) for surface metal raceway system and galvanized steel for recessed installations.

- D. Stencil cover of pullboxes used on systems over 600 V, in white lettering minimum 1/2 inches high, the words "DANGER HIGH VOLTAGE - KEEP OUT".

END OF SECTION

SECTION 260925

WIRELESS LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.01 DESCRIPTION of WORK

- A. Provide a wireless lighting control system consisting of control switches, and other controlling devices for automatic control of lighting in individual interior spaces as shown on drawings.

1.02 SYSTEM DESCRIPTION

- A. The general operation of lighting and controlled loads shall include:
 - 1. Interior lighting: Each room shall have at least one accessible lighting control to independently activate general lighting within the room. Where shown on the drawings, rooms shall be provided with automatic controls capable of limiting the hours of lighting use to the occupancy hours of the room.

1.03 SUPPLEMENTAL SUBMITTALS

- A. Product Data: Catalog cut sheets with performance specifications demonstrating compliance with specified requirements.
- B. System one-line diagram showing types of switches and sensors and wiring.
- C. Specification Conformance Document: Indicate whether the submitted equipment:
 - 1. Meets specification exactly as stated.
 - 2. Meets specification via an alternate means and indicate the specific methodology used.
- D. Field tests as specified in Part 3
- E. Warranty

1.04 QUALITY ASSURANCE

- A. Manufacturer: Minimum 10 years experience in manufacture of lighting control devices.
- B. Manufacturer's Quality System: Registered to ISO 9001:2000 Quality Standard, including in-house engineering for product design activities.
- C. Wireless occupancy sensor shall be tested and comply with the limits for a class B device, pursuant to part 15 of the FCC rules.

1.05 MAINTENANCE MATERIAL REQUIREMENTS

- A. Manufacturer is to make ordering of new equipment for expansions, replacements, and spare parts available to end user.
- B. Manufacturer is to make new replacement parts available for minimum of ten years from date of manufacture.

1.06 WARRANTY

- A. Provide manufacturer's 5 year parts warranty.

PART 2- PRODUCTS

2.01 GENERAL

- A. Provide system hardware that is designed, tested, manufactured, and warranted by a single manufacturer.
- B. Lighting Controls: Ten-year operational life while continually at any temperature in an ambient temperature range of 0°C (32°F) to 40°C (104°F) and 90 percent non-condensing relative humidity.
- C. Designed and tested to withstand discharges without impairment of performance when subjected to discharges of 15,000 volts per IEC 801-2.

2.02 MANUFACTURERS

- A. Wireless Occupancy Sensors
 - 1. Leviton LevNet RF
 - 2. Lutron Maestro Wireless
 - 3. Philips OccuSwitch Wireless
 - 4. Hubbel wiSTAR

2.03 WIRELESS WALL-MOUNT OCCUPANCY SENSORS

- A. Wireless Wall-Mount Sensors
 - 1. Provide 180° or 90° coverage range as indicated on drawings.
 - 2. Have an operational lifetime of 10 years without the need to replace batteries when installed per manufacturer's instructions.
 - 3. Communicate directly to compatible RF receiving devices through use of a radio frequency communications link.
 - 4. Not require external power packs, power wiring, or communication wiring.

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5. Provide a clearly visible method of indication to verify that motion is being detected during testing and that the unit is communicating to compatible RF receiving devices (dimmers and switches).
6. Utilize Infrared as its sensing mechanism coupled with XCT Technology. Signal processing technology detects passive infrared (PIR) signals without the need to change the sensor's sensitivity threshold.
7. Have optional, readily accessible, user adjustable controls for timeout, automatic/manual-on, and sensitivity.
8. Have the ability to be placed in test mode to verify correct coverage and operation from the front of the unit.
9. Have a radio frequency line of sight range of up to 50 feet and through walls range of up to 30 feet between sensor and compatible RF receiving device(s).
10. Turn off lighting automatically after reasonable and adjustable time delay once the last person to occupy the space vacates a room or area. Adjustable timeout shall be available for 15 minutes.
11. For 180° field-of-view model, the sensor can cover 1500 sqft area with minor motion detection and shall be:
 - a. Lutron Maestro model LRF2-VWLB-P-WH
 - b. Philips OccuSwitch Wireless model LRM1776
 - c. Leviton LevNet model WSWDR-H9W

For 90° field-of-view model, the sensor can cover upto 1225 sqft with minor motion detection and shall be:

- a. Lutron Maestro model LRF2-VKLB-P-WH
- b. Philips OccuSwitch Wireless model LRM1771
- c. Hubbell wiSTAR model WIS-OSW-WH
- d. Leviton LevNet model WSWDR-H9W

B. Wireless Ceiling Sensor

Provide matching ceiling mounting bracket and hardware. Wireless Ceiling-Mount Sensors shall be

1. Leviton LevNet model WSC15-M9N
2. Philips OccuSwitch Wireless model LRM1743

3. Hubbell wiSTAR WIS-OSC-WH
4. Lutron Maestro model LRF2-VCR2B-P-WH

C. Wireless Receiver Switch

The local lighting switch shall be:

1. Lutron Maestro model MRF2-8S-DV-WH
2. Philips OccuSwitch Wireless model LRA1721
3. Leviton model WSS20-GUZ

D. Wall Sensor and Switch Combination

The combination wall sensor/switch uses both ultrasonic and infrared detection technology and provides 180° field-of-view, pushbutton for manual ON/OFF, Time Delay adjustment for delayed-OFF setting from 30 seconds to 30 minutes. The maximum sensing distance in front of the sensor shall be 40 feet and each side shall be 30 feet. Combination sensor and switch shall be:

1. For Occupancy Mode
 - a. Leviton OSSMT-GDW (with neutral) or OSSMT-GDW (non-neutral version)
 - b. Philips OccuSwitch LRS2220-DV-SS
 - c. Hubbell LHMTS(single)-LHMTD(dual circuit)
 - d. Lutron MS-B102 (with neutral) or Lutron MS-A102(non-neutral version)
3. Provide matching designer-style wallplates of type specified in Article 2.04.

2.04 WALL PLATES

- A. Provide wall plate for wiring devices. Material shall be 0.035-inch thick, satin-finished stainless steel. Metal screw heads to match plate finish.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. The wireless sensor cannot detect occupancy through solid objects. Therefore, install sensor free from obstruction.

- B. Do not locate sensor near forced air vents as hot moving air can cause the sensor to false trigger. Leave at least four feet minimum distance between air vents and the sensor.

3.02 MOUNTING

- A. Provide wall or corner mounting brackets compatible with drywall and plaster walls.
- B. Provide all necessary mounting hardware including vandal resistant locking screw(s) and instructions for both temporary and permanent mounting.
- C. Provide temporary mounting means to allow user to check proper performance and relocate as needed before permanently mounting sensor. Temporary mounting method shall be designed for easy, damage-free removal.
- D. Sensor lens shall illuminate during test mode when motion is detected to allow installer to verify coverage prior to permanent mounting.

3.03 FIELD QUALITY CONTROL

- A. Install equipment in accordance with manufacturer's installation instructions.
- B. Provide complete installation of system in accordance with Contract Documents.
- C. Provide equipment at locations and in quantities indicated on Drawings. Provide any additional equipment required to provide control intent.
- D. Perform the following field tests and inspections and prepare test reports:
 - 1. After installing switches and sensors, and after electrical circuitry has been energized, adjust and test for compliance with requirements.
 - 2. Operational Test: Verify actuation of each sensor and adjust time delays.

END OF SECTION

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SECTION 262726

WIRING DEVICES

PART 1 GENERAL

1.01 SUBMITTALS

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

PART 2 PRODUCTS

2.01 SWITCHES

- A. Local Switches, Single Pole:
1. 15A, 120/277 V ac; Bryant's 4801, Crouse-Hinds/AH's 1891, General Electric's GE5931-1G, Hubbell's 1201/1101, Leviton's 1201/1101, Pass & Seymour's 15AC1, or Woodhead's 1891.
 2. 20A, 120/277 V ac; Bryant's 4901, Crouse-Hinds/AH's 1991, General Electric's GE 5951-1G, Hubbell's 1121/1221, Leviton's 1121/1221, Pass & Seymour's 20AC1, or Woodhead's 1991.

2.02 RECEPTACLES

- A. Specification Grade Receptacles:
1. Duplex receptacle, NEMA 5-15R (15A, 125 V, 2P, 3W); Bryant's 5252/5242 , Crouse-Hinds/AH's 5252/5242, General Electric's GEN5252-1, Hubbell's 5252/5242, Leviton's 5252/5242, Pass & Seymour's 5252/5242.
- B. Safety Grounding Receptacles:
1. Duplex receptacle, NEMA 5-15R (15A, 125 V, 2P, 3W); Bryant's SG-62, 8200S, Crouse-Hinds/AH's 6352, General Electric's GE4058-1, Hubbell's SG-62, Leviton's 5262-SG or Pass & Seymour's SG-62.
- C. Ground Fault Interrupter Receptacles:
1. Duplex receptacle rated 15A (NEMA 5-15R), circuit-ampacity 20A; Bryant's GFR52FT, Crouse-Hinds/AH's GF5242, General Electric's GF5242, Hubbell's GF5252, Leviton's 6599, Pass & Seymour's 1591S, or Daniel Woodheads 5252GF.
 2. Duplex receptacle rated 20A (NEMA 5-20R), circuit ampacity 20A; Bryant's GFR53FT, Crouse-Hind/AH's GF5342, General Electric's GF5342, Hubbell's GF 5352, Leviton's 6899, Pass & Seymour's 2091S, or Daniel Woodheads 5352GF.
- D. Duplex Receptacle with USB
1. Duplex receptacle, NEMA 5-15R (15A, 125 V, 2P, 3W); Leviton's T5632, Hubbell's USB15X2, or approved equal

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2.03 WALL PLATES

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- A. Stainless Steel Wall Plates: Type 302 stainless steel with satin finish; Bryant, Crouse-Hinds/AH's Series, General Electric, Hubbell, Leviton, or Pass & Seymour.
- B. Weatherproof Covers: Crouse-Hinds WLRs, WLRD, Hubbell or Pass & Seymour.
- C. Covers for Threaded Type Boxes: Stamped sheet steel, gasketed device covers as produced by Crouse-Hinds Co., or OZ/Gedney Co.

2.04 NAMEPLATES

- A. Phenolic Type: Standard phenolic nameplates with 3/16 inch minimum size lettering engraved thereon.
- B. Embossed Aluminum: Standard stamped or embossed aluminum tags, 3/16 inch minimum size lettering, as produced by Seton Name Plate Corp. or Tech Products Inc.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install wiring devices in outlet boxes.
- B. Local Switches:
 - 1. Install local switches rated 15A, 120/277 V ac for switches unless otherwise shown on the drawings or specified.
 - 2. Install switches indicated Sa, Sb, Sc, etc, for control of outlets, with corresponding letters on the same circuit.
 - 3. Where more than one switch occurs at same location in a 120 volt system, arrange switches in gangs and cover with one face plate.
 - 4. 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, 125 V, 2P, 3W, for duplex receptacles and single receptacles unless otherwise shown on the drawings or specified.
 - 2. Install receptacles with ground pole in the down position.
- D. Wall Plates:
 - 1. Install wall plates on all wiring devices in dry locations, with finish to match hardware in each area.
 - 2. Install hospital wall plates on Type HG receptacles.
 - 3. Install blank wall plates on outlet boxes which are for future equipment except telephone outlets.
 - 4. Install 5/8 inch bushed wall plates on telephone outlets.
 - 5. Fasten wall plates with vandal resistant screws in patients' area. Deliver 10 screw keys to the facility.
 - 5. Fasten wall plates with vandal resistant screws in offices and public access areas. For all other locations pop rivet wall plates to the wiring devices. Deliver 10 screw keys to the facility.

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- E. Weatherproof Covers: Install weatherproof covers on wiring devices in damp and wet locations.
- F. Nameplates: Provide phenolic or embossed aluminum nameplate for each special purpose receptacle indicating phase, ampere and voltage rating of the circuit. Attach nameplate with rivets or tamperproof fasteners to wall plate or to wall above receptacle. Wall plates may be engraved with required data in lieu of separate nameplates.
- G. 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 oak mats to fill the space between the finished wall surface and the plate.

END OF SECTION

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SECTION 265100

LED INTERIOR BUILDING LIGHTING

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK

- A. Provide luminaires, supports and accessories including plaster frames, trim rings and back boxes for plaster, drywall, or concrete ceilings as necessary.
- B. The types of luminaires to be installed are indicated and detailed on the luminaire schedule on the Drawings, which also provides details on manufacturers, catalog numbers, lamping, etc.
- C. Coordinate with other trades to avoid conflicts between installation of luminaires and supports with the installation of mechanical equipment, ceiling structures, etc.
- D. All luminaires shall operate on nominal 120 volts, 60 Hz single phase service as indicated on the Drawings and in the Specifications.

1.02 REFERENCE STANDARDS

- A. National Energy Policy Act of 2005, Public Law No. 109-58.
- B. IESNA LM-63 - ANSI Approved Standard File Format for Electronic Transfer of Photometric Data and Related Information; 2002.
- C. NFPA 70 - National Electrical Code; National Fire Protection Association; 2008, as modified by the 2014 Electrical Code.
- D. IESNA LM-79-08 IESNA - Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.
- E. IESNA LM-80-08 IESNA - Approved Method for Measuring Lumen Maintenance of LED Light Sources.
- F. IESNA TM-21-2011 – Projecting Long Term Lumen Maintenance of LED Light Sources.
- G. UL 1310 and 8750 – Light Emitting Diode (LED) Equipment for Use in Lighting Products.
- H. OSHA 29CFR1910.7 – luminaires shall be listed by nationally recognized testing laboratory approved by United States Department of Labor, Occupational Safety and Health Administration (OSHA).
- I. ANSI C82.11 – Performance requirement for high frequency ballasts.
- J. ANSI/IES RP-16-10 – Nomenclature and definitions for illuminating engineering.

- K. ANSI C62.41 – Recommended practice in low power circuits.
- L. IEC 61347-1 – General and safety requirements for lamp control gear.
- M. IEC 61347-2-13 – Particular requirements for electronic control gear for LED modules.
- N. IEC 62384 - DC or AC supplied electronic control gear for LED modules – performance requirements.
- O. IEC 61000-3-2 - Harmonic current emissions.
- P. IEC 61547 - EMC immunity requirements.
- Q. IEC 62386-101/102/207 – Digital addressable lighting interface (DALI).
- R. Federal Communications Commission (FCC) rules – Part 15 Class B: Radio Frequency Devices.
- S. Entertainment Services and Technology Association
 - 1. ESTA E1.3 - Entertainment Technology - Lighting Control System - 0 to 10V Analog Control Protocol.

1.03 DEFINITIONS

CALiPER	DOE Commercially Available LED Product Evaluation and Reporting program for the testing and monitoring of commercially available LED Luminaires and lights. http://www1.eere.energy.gov/buildings/ssl/m/caliper.html
CCT	Correlated Color Temperature: The temperature in units of kelvin of a blackbody whose chromaticity most nearly resembles that of the light source in question.
cd	Candela: SI Unit of luminous intensity, equal to 1 lumen per steradian (lm/sr).
Chromaticity	The property of color of light defined by the dominant or complementary wavelength and purity aspects of the color taken together.
CRI	Color Rendering Index – measure of the degree of color shift of reference objects when illuminated by the light source as compared to a reference source of comparable color temperature.
fc	Footcandle: Unit of illuminance, equal to 1 lm/ft ² .
L80	The extrapolated life in hours of the luminaire when the luminous output depreciates 20 percent from initial values.
LED	Light Emitting Diode
METS	Material Engineering and Testing Services of the Translab

MacAdam	Shape on the CIE chromaticity diagram that illustrates how much one can “stray” from the target before perceiving a difference from the target color.
NEMA	National Electrical Manufacturers Association
NRTL	Nationally Recognized Testing Laboratory
NVLAP	National Voluntary Laboratory Accreditation Program - A program under the US DOE to accredit independent testing laboratories to qualify.
PF	Power Factor - The ratio of the real power component to the total (complex) power component.
Rated Power	Power consumption that the luminaire was designed and tested for at ambient temperature (70°F or 21°C).
RoHS	Compliance aims to restrict certain dangerous substances commonly used in electronic equipment, including Lead, Cadmium, Mercury and others.
SPD	Surge Protection Device - A subsystem or component(s) that can protect the unit against short duration voltage and current surges.
SSL	Solid State Lighting
THD	Total Harmonic Distortion - The amount of higher frequency power on the power line.

1.04 SUPPLEMENTAL SUBMITTALS

A. Product Data

1. Provide standard print catalog sheets, Specifications, installation instructions, and photometric data from a recognized independent laboratory for each type of luminaire. Submittals that do not include distribution curves and photometric data will be rejected. All options and specified requirements shall be identified on submittal.

B. Mounting Details

Submit mounting details for each type of luminaire including attachments to structure, anchors, rods, hickeyes, etc.

C. Samples

1. Submit luminaire samples as requested.
2. Submit mounting hardware as requested.

- D. Submission of Substitute Luminaires (luminaires other than specified herein or on the Luminaire Schedule).
 - 1. Submittals for substitute luminaires shall be the standard print catalog sheets from the manufacturers (CADD drawings and computer printouts are not acceptable).
 - 2. Substitute luminaires shall meet or exceed photometric quality of luminaires designated on the schedule. Photometric data of substitute luminaires shall be substantiated by an independent testing lab, such as I.T.L. Photometric data by Lumen Micro or similar software programs are not acceptable.
 - 3. Substitute luminaires shall meet or exceed the quality of the luminaires designated on luminaires schedule in construction, finishing, materials, reflector, diffuser etc.
 - 4. Substitute luminaires shall closely match the appearance, dimensions and features of the luminaires designated.
 - 5. Submit one sample of each type of substitute luminaires as requested, with one set of mounting hardware for approval.
 - 6. In order to ensure that the work is performed in an orderly and expeditious manner, the Contractor
 - 7. No more than three (3) submittals shall be permitted for substitution of each specific luminaire type. Should the third submittal be rejected, the Contractor shall be required to provide the luminaires specified on the luminaire schedule.
- E. Qualifications
 - 1. Manufacturer
- F. Mock-up
- G. Spare parts
- H. Warranty

1.05 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer: Provide products of firms listed in Part 2 that are regularly engaged in the manufacture of lighting fixtures and components of types and ratings required and whose products have been in satisfactory use in similar service for not less than 5 years. The manufacturer of the lighting fixtures and components shall comply with the provisions of the appropriate code and standards. All fixtures shall be pretested before shipping.
- C. Design Qualification Testing

1. Design Qualification Testing shall be performed by a National Voluntary Laboratory Accreditation Program (NVLAP) testing facility. Such testing may be performed by the manufacturer or an independent testing lab hired by the manufacturer on new luminaire designs and when a major design change has been implemented on an existing design. A major design change is defined as a design change (electrical or physical), which changes any of the performance characteristics of the luminaire, results in a different circuit configuration for the power supply, or changes the layout of the individual LEDs in the module.
2. A quantity of two units for each design shall be submitted for Design Qualification Testing.
3. Product submittals shall be accompanied by product specification sheets or other documentation that includes the designed parameters as detailed in this specification. These parameters include (but are not limited to):
 - a. Maximum power in Watts.
 - b. L80 in hours, when extrapolated for the worse case operating temperature. TM21 report shall be submitted to demonstrate this.

Product submittals shall be accompanied by performance data that is derived in accordance with appropriate IESNA testing standards and tested in a laboratory that is NVLAP accredited for Energy Efficient Lighting Products.

1.06 LUMINAIRE PROTECTION

- A. The Contractor is required to protect luminaires from damage during installation and up to time of acceptance by the Owner. Broken luminaires, glassware, plastics, LED Modules, etc. shall be replaced by the Contractor with new parts, without any additional expense to the Owner until final acceptance.

1.07 SPARE PARTS

- A. Provide complete luminaires to the owner of 10% of the order Delivered
 1. Spares shall be provided and delivered to the Owner's Representative with an itemized list and a receipt taken, certifying that these spare parts have been delivered securely packed and received in acceptable condition.

1.08 WARRANTY

- A. The manufacturer shall provide a single source, 5 year limited warranty against loss of performance and defects in materials and workmanship for all components of the luminaire. Warranty is from the time of acceptance of the Luminaires. All warranty documentation shall be provided to customer prior to the first shipment.

- B. Provide manufacturer's warranty covering 5 years on drivers from date of installation. Refer to manufacturer's terms and conditions on the website for detailed information.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Provide luminaires as designated on the luminaire schedule. Luminaires of the luminaire schedule are designated by types, manufacturers and catalog numbers. Substitute luminaires by approved manufacturers listed in these specifications will be approved, provided that all requirements are satisfied.
- B. The requirements specified herein are minimum requirements and shall be supplemented by any other requirements indicated on the luminaire schedule. All luminaires, including those designated on the luminaire schedule on the drawings by Catalog Numbers, or Catalog Numbers mentioned in the Specifications, shall nevertheless be specially modified to meet the requirements of these specifications.
- C. All luminaires and components shall be UL listed or listed by another nationally recognized Testing Agency approved by the Department of Buildings and meet Electrical Code.

2.02 MANUFACTURERS

- A. LED luminaires For Building Interior: Selection shall be limited to luminaires as indicated on the drawings.
- B. Conformance: Fixtures shall be manufactured in strict accordance with the Contract Drawings and Specifications.
- C. Codes: Materials and installation shall be in accordance with the latest revision of the National Electrical Code and any applicable Federal, State, and local codes and regulations.
- D. UL or ETL US Listing: All fixtures shall be manufactured in strict accordance with the appropriate and current requirements of the "Standards for Safety" to UL 8750 or others as they may be applicable. A listing shall be provided for each fixture type, and the appropriate label or labels shall be affixed to each fixture in a position concealing it from normal view.
- E. Luminaire shall be DLC Certified (Design Lights Consortium)
- F. Base Bid Manufacturers: Are listed on fixture schedule and specification. Manufacturers listed without accompanying catalog numbers are responsible for meeting the quality standards and photometric distribution set by the specified product.
- G. Alternate Manufacturers: Identification by means of manufacturer's names and catalog numbers is to establish basic features, quality and performance standards. Any substitutions by other manufacturers listed must meet or exceed these standards and shall be approved by the owner. Mock-ups in a sample classroom will be required in addition to submissions indicated to prove the quality of light prior to approval to manufacture for the project.

- H. Luminaire shall carry the Lighting Facts label, verified based on LM-79 test reports. Refer to the following web site: www.lightingfacts.com.

2.03 DIRECT/INDIRECT LED LUMINAIRES

- A. Direct/indirect LED luminaire housing and end-caps shall be constructed of no less than 22 gauge die-formed steel, or extruded aluminum in white finish. Refer to Article 2.05 for technical requirements of the luminaire construction.
- B. Luminaires shall be provided with fully adjustable aircraft cable support for pendant mounting. Cable and cable adjuster shall be independently rated to support an 800# load. Cable suspension adjustment for mounting height shall be located on luminaires and not at ceiling.
- C. Distribution shall be between 70% up and 30% down with minimum of 90% efficiency.

PART 3 - EXECUTION

3.01 LUMINAIRE INSTALLATION

- A. General
 - 1. The Contractor shall be responsible for the proper and safe mounting and support of all luminaires. Installation shall meet all the requirements of the National Electrical Code. Provide all items of equipment (stems, hangers, rods, inserts, boxes, brackets, yokes, channels, frames, etc.) required to adequately and safely support each luminaire in a manner acceptable to the owner.
 - 2. Provide a luminaire at each location shown on Drawings of the type indicated by symbol or other notation. If the type is not specifically noted on Drawings, the Contractor shall provide without extra cost luminaires of the same type called for under similar condition elsewhere on the Drawings as determined by the owner.
 - 3. The Contractor shall examine the drawings and coordinate closely with the all General Construction trades on all work involved with each type of luminaire to be installed. Contractor shall verify all sizes, locations and conditions under which luminaire are to be installed. Provide plaster frames and running bars (black iron) etc. as required.
 - 4. The Contractor is required to protect luminaires from damage during installation, up to time of acceptance by the owner. Any broken or marred luminaire, glassware, plastics, lamps, etc. shall be replaced by the Contractor at no additional cost to the owner.
 - 5. A suitable outlet box shall be provided by the Contractor for each luminaire provided. The box shall be cast into concrete or supported using two double split type anchors when installed in concrete walls or ceiling.

6. Number of supports for luminaires shall be as specified in "Luminaire Support Schedule" in Article 3.07.
7. A surface or pendant type luminaire, regardless of its weight, shall not be mounted directly on the concealed or exposed ceiling spline of a lightweight, mechanical acoustical ceiling system. Such luminaires shall be supported from the building structure.
8. For all pendant mounted luminaires, regardless of weight and ceiling types, provide outlet boxes capable of supporting up to 150 pounds, Westinghouse model 01050/01052 or equal.

3.02 MOUNTING HEIGHT OF LUMINAIRES

- A. Luminaires shall be hung in accordance with the mounting heights indicated on Drawings and meeting Electrical Code. Mounting heights A.F.F. (distance above finished floor) are detailed on the Luminaire Schedule, or elsewhere on the drawings.
- B. The Contractor shall provide stems of sufficient length to assure luminaire mounting at the specified mounting height.

3.03 LUMINAIRE SUPPORT SCHEDULE

- A. Unless otherwise indicated on drawings, provide the following number of supports for luminaires.
 1. An adequately supported outlet box with luminaire stud may be utilized as one point of support for surface or recessed luminaires weighing less than 40 lbs. For all pendant mounted luminaires, regardless of weight and ceiling type, provide outlet boxes capable of supporting up to 150 lbs.; Westinghouse model 01050/01052 or equal.
- B. Ceiling Mounted Luminaires (Surface Mounted, Pendant Mounted or Recessed Mounted)
 1. Ceiling Mounted Luminaires:
 - a. Support individual luminaires less than 2 feet wide at 2 points.
 - b. Support continuous row of luminaires less than 2 feet wide at points equal to the number of luminaire sections plus one, except that supports shall not exceed 12 foot on centers and shall be evenly distributed over the entire length of the luminaire's row.
 - c. Support individual luminaires 2 feet or wider at 4 corners.
 - d. Support continuous row of luminaires 2 feet or wider at points equal to twice the number of luminaire sections plus 2. Uniformly distribute the points of support over the row of luminaires.

3. FIELD QUALITY CONTROL

- A. Perform field inspection, testing, and adjusting.
- B. Operate each luminaire after installation and connection. Inspect for improper connections and operation.
- C. Test and calibrate all controls associated with luminaires, i.e. daylighting, occupancy sensors, etc.).

3.11 LED CLEANING

- A. Clean electrical parts to remove conductive and deleterious materials.
- B. Remove dirt and debris from lens and enclosures
 - 1. For cleaning acrylic lenses or diffusers, use a feather duster or dry cotton cheesecloth to rid the lens/diffuser of any minor dust. For fingerprints, smudges, or other dirt present, use an ammonia-based cleaner (such as Windex) and wipe carefully with cotton cheesecloth (so as to avoid injury from any prismatic texture of the lens).
 - 2. Contractor shall replace the lens if Job site contamination cannot be removed using the above recommendations.
 - 3. Clean photometric control surfaces as recommended by manufacturer.

END OF SECTION

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