# Boiler Replacements at Flory Gardens and Vistula Manor IFB24-B006

# Specifications

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# DOCUMENT 003143 - PERMIT APPLICATION

## 1.1 PERMIT APPLICATION INFORMATION

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of the Bidders' own investigations.

B. General Permit Application: Engineer will submit plans and pay fees for the general plan review with the City of Toledo. There will be separate permits for Flory Gardens and Vistula Manor.

C. Inspection Fees: Inspections and related fees are to be scheduled by and paid for by the Contractor.

D. Specific Permits and Fees: Contractor is responsible for submitting plans, paying fees, and organizing the required inspections to complete the Scope of Work for all other permits and inspections including but not limited to:

1. Ohio Department of Commerce Inspections.
2. City/County Building Inspection.
3. Pressure Piping Inspections.
4. Electrical Inspection.
5. Local Fire Department or Authority Inspection.
6. Owner’s Risk/Loss Insurer Inspections.

E. Provide copies of all building permits to the Owner and Engineer prior to the start of work.

END OF DOCUMENT 003143

# SECTION 011000 - SUMMARY

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Contractor's use of site and premises.
4. Coordination with occupants.
5. Work restrictions.
6. Specification and Drawing conventions.

### 1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

### 1.4 PROJECT INFORMATION

A. Project Identification: Lucas County Metropolitan Housing Authority - Boiler and Water Heater Replacement at Five Locations.

1. Project Locations:

a. Flory Gardens Apartments: 3425 Nebraska Avenue, Toledo, OH 43607
b. Vistula Manor: 615 Cherry St., Toledo, OH 43604.

### 1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:

1. Flory Gardens: Replacement of existing heating water boiler systems and domestic hot water systems. Refer to the drawings for phasing of the work to minimize interruptions to the domestic hot water supply to the buildings. Removal of asbestos containing textured ceiling coatings in boiler rooms, including the repair and painting of the ceilings.

2. Vistula Manor: Replacement of existing heating water boiler system.
3. Provide one-year Preventative Maintenance Service Contract per Specification Section 017700 – "Closeout Procedures"

## 1.6 CONTRACTOR'S USE OF SITE AND PREMISES

A. Restricted Use of Site: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section.

B. Limits on Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways parking garage, loading areas, and entrances serving premises clear and available to Owner, Owner's tenants, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.

a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

## 1.7 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy Project site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

## 1.8 WORK RESTRICTIONS

A. Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work to between 8:30 a.m. to 5:00 p.m., Monday through Friday, unless otherwise indicated. Work hours may be modified to meet Project requirements if approved by Owner and authorities having jurisdiction.

1. Weekend Hours: As pre-approved by Owner.
2. Early Morning Hours: As pre-approved by Owner.
3. Hours for Utility Shutdowns: 10:00 a.m. to 2:00 p.m.
4. Hours for Core Drilling 10:00 a.m. to 2:00 p.m.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging for temporary utility services according to requirements indicated:

1. Notify Owner not less than fourteen (14) days in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than fourteen (14) days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Owner's property is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

G. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.

1. Maintain list of approved screened personnel with Owner's representative.

## 1.9 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.

3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

# SECTION 012300 - ALTERNATES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

### 1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if the Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternates into the Work. No other adjustments are made to the Contract Sum.

### 1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include, as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation, whether or not indicated as part of alternate.

B. Execute accepted alternates under the same conditions as other Work of the Contract.

C. Schedule: A Part 3 "Schedule of Alternates" Article is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012300

# SECTION 012500 - SUBSTITUTION PROCEDURES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

### 1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

### 1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size,

durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
e. Samples, where applicable or requested.
f. Certificates and qualification data, where applicable or requested.
g. List of similar installations for completed projects with project names and addresses and names and addresses of Engineers and owners.
h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project, from City of Toledo.
j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

2. Engineer's Action: If necessary, Engineer will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Engineer will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.

a. Forms of Acceptance: Change Order, Construction Change Directive, or Engineer's Supplemental Instructions for minor changes in the Work.
b. Use product specified if Engineer does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Requested substitution provides sustainable design characteristics that specified product provided.
c. Substitution request is fully documented and properly submitted.
d. Requested substitution will not adversely affect Contractor's construction schedule.
e. Requested substitution has received necessary approvals of authorities having jurisdiction.
f. Requested substitution is compatible with other portions of the Work.
g. Requested substitution has been coordinated with other portions of the Work.
h. Requested substitution provides specified warranty.
i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Engineer will consider requests for substitution if received within 10 days after the Notice of Award. Requests received after that time may be considered or rejected at discretion of Engineer.

1. Conditions: Engineer will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Engineer will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Engineer for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Requested substitution provides sustainable design characteristics that specified product provided.
e. Substitution request is fully documented and properly submitted.
f. Requested substitution will not adversely affect Contractor's construction schedule.
g. Requested substitution has received necessary approvals of authorities having jurisdiction.
h. Requested substitution is compatible with other portions of the Work.
i. Requested substitution has been coordinated with other portions of the Work.
j. Requested substitution provides specified warranty.
k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

# SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

### 1.3 MINOR CHANGES IN THE WORK

A. Engineer will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

### 1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Engineer will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Engineer are not instructions either to stop work in progress or to execute the proposed change.
2. Within 15 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
    d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and

finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

e. Quotation Form: Use forms acceptable to Engineer.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Engineer.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use form acceptable to Engineer.

## 1.5 CHANGE ORDER PROCEDURES

A. On Owner’s approval of a Work Changes Proposal Request, Owner will issue a Change Order.

## 1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Work Change Directive: Engineer may issue a Work Change Directive. Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Work Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Work Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600

# SECTION 012900 - PAYMENT PROCEDURES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 DEFINITIONS

A. Schedule of Values/Amounts: A form furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

### 1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Provide a cost breakdown with the following minimum subcategories:

    a. Bond and Insurance
    b. General Conditions
    c. Mobilization
    d. Punch List Items
    e. Close Out Items
    f. Warranty
    g. Demolition
    h. Plumbing Equipment
    i. Plumbing Installation
    j. Mechanical Equipment
    k. Mechanical Installation
    l. Sheet Metal Work
    m. Insulation
    n. General Trades Work.
    o. Temperature Controls
    p. Testing, Adjusting and Balancing
    q. Electrical Equipment
    r. Electrical Installations

2. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
3. Submit the schedule of values to Engineer at earliest possible date, but no later than14 days before the date scheduled for submittal of initial Applications for Payment.

4. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
5. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
6. Bonds prior to the start of work.
7. And all other applicable items as indicated in the Project IFB.

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section, unless otherwise indicated or required.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Owner's name.
    c. Owner's Project number.
    d. Name of Engineer.
    e. Engineer 's Project number.
    f. Contractor's name and address.
    g. Date of submittal.

2. Arrange schedule of values consistent with format of HUD 510000 or other approved form.
3. On separate document, arrange the schedule of values in tabular form, with separate columns to indicate the following for each item:

    a. Related Specification Section or division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.

        1) Labor.
        2) Materials.
        3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

a. Differentiate between items stored on-site and items stored off-site (HUD-51003 & 51004),

6. Retain "Purchase Contracts" Subparagraph below if Specifications include purchase contracts. See the Evaluations in Section 011000 "Summary" for discussion of purchase contracts.
7. Overhead Costs, Proportional Distribution: Include total cost and proportionate share of general overhead and profit for each line item.
8. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
9. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
10. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
11. Change Orders are to be submitted on form HUD-51002 with the Application for Payment.

## 1.4 APPLICATIONS FOR PAYMENT

A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Engineer and paid for by Owner.

B. Submit certified payrolls and Davis-Bacon and Related Acts (DBRA) Submittals as required by the Owner.

C. Payment Application Times: Submit Application for Payment to Engineer by the fifteenth of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy of Application for Payment seven days prior to due date for review by Engineer .

D. Application for Payment Forms: Use HUD-51000 series forms for Application for Payment.

E. Application Preparation: Complete every entry on form. Execute by a person authorized to sign legal documents on behalf on Contractor. Engineer will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application (HUD-51002 Schedule of Change of Orders).

4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include with the Application for Payment HUD forms 51003 and 51004 indicating equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

G. Transmittal: Submit electronic copies of each Application for Payment to Engineer. Include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

H. Waivers: Prior to submitting final Application for Payment, submit Contractor’s Release and Certification form.

1. Certified Payroll Reports (CPR’s) for period.
2. Signature Authorization Letter (if applicable)
3. Union Wage Sheets and required Journeyman/Apprentice ratio.
4. List of all employees on the job, including name, address, and phone number (if not submitted via LCPtracker)
5. Documentation of the Deductions listed in the “Other” category on CPR’s.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. Schedule of Values/Amounts.
2. Contractor's construction schedule.
3. Products list (preliminary if not final).
4. Submittal schedule (preliminary if not final).
5. List of Contractor's staff assignments.
6. List of Contractor's principal consultants.
7. Initial progress report.
8. And all other applicable items as indicated in the Project IFB.

J. Application for Payment at Substantial Completion: After Engineer issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.

a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 017700 "Closeout Procedures."

2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Certification of completion of final punch list items.
3. AIA Document G707.
4. Evidence that claims have been settled.
5. Final liquidated damages settlement statement.
6. Proof that taxes, fees, and similar obligations are paid.
7. Contractor’s Release & Certification.
8. Final Wage Payment Affidavit.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

# SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. RFIs.
4. Digital project management procedures.
5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Requirements:

1. Section 017300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
2. Section 017700 "Closeout Procedures" for coordinating closeout of the Contract.

### 1.3 DEFINITIONS

A. RFI: Request for Information. Request from Owner, Engineer, or Contractor seeking information required by or clarifications of the Contract Documents.

### 1.4 INFORMATIONAL SUBMITTALS

A. 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, telephone number, and email address 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.

B. Key Personnel Names: Within 7 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in temporary field office, and in prominent location in each built facility. Keep list current at all times.

## 1.5 GENERAL COORDINATION PROCEDURES

A. Coordination: 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. 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.
2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination of Multiple Contracts: Each contractor shall cooperate with Prime Contractor, who shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its own operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.

1. 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.
2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled activities of other contractors and direction of Prime Contractor to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

## 1.6 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated 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 coordination drawings on standard printed data. Include the following information, as applicable:

   a. Use applicable Drawings as a basis for preparation of coordination 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 coordination 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 functional and spatial relationships of components of Architectural , structural, civil, mechanical, and electrical systems.
   d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
   e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
   f. Indicate required installation sequences.
   g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Engineer indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

1. Floor Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Supplement plan drawings with section drawings where required to adequately represent the Work.

2. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
3. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
4. Mechanical and Plumbing Work: Show the following:

    a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    c. Fire-rated enclosures around ductwork.

5. Electrical Work: Show the following:

    a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
    b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
    c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
    d. Location of pull boxes and junction boxes, dimensioned from column center lines.

6. Review: Engineer will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Engineer determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Engineer will so inform Contractor, who shall make suitable modifications and resubmit.
7. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 013300 "Submittal Procedures."

C. Coordination Drawing Process: Prepare coordination drawings in the following manner:

1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
4. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
5. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
6. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Engineer to review and resolve conflicts on the coordination drawings.

D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:

1. File Preparation Format:

a. Same digital data software program, version, and operating system as original Drawings.
b. DWG, Version AutoCAD (latest release), operating in Microsoft Windows operating system.

2. File Submittal Format: Submit or post coordination drawing files using PDF format.

3. Engineer will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.

a. Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
b. Digital Data Software Program: Drawings are available in AutoCAD (latest release).
c. Contractor shall execute a data licensing agreement.

## 1.7 REQUEST FOR INFORMATION (RFI)

A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Engineer will return without response those RFIs submitted to Engineer by other entities controlled by Contractor.
2. Coordinate and submit RFIs in a prompt manner to avoid delays in 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. Owner name.
3. Owner's Project number.
4. Name of Engineer.
5. Engineer's Project number.
6. Date.
7. Name of Contractor.
8. RFI number, numbered sequentially.
9. RFI subject.
10. Specification Section number and title and related paragraphs, as appropriate.
11. Drawing number and detail references, as appropriate.
12. Field dimensions and conditions, as appropriate.

13. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
14. Contractor's signature.
15. 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: Software-generated form with substantially the same content as indicated above, acceptable to Engineer.

1. Attachments shall be electronic files in PDF format.

D. Engineer's Action: Engineer will review each RFI, determine action required, and respond. Allow seven days for Engineer's response for each RFI. RFIs received by Engineer after 1:00 p.m. will be considered as received the following working day.

1. The following Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Engineer's actions on submittals.
    g. Incomplete RFIs or inaccurately prepared RFIs.

2. Engineer's action may include a request for additional information, in which case Engineer's time for response will date from time of receipt by Engineer of additional information.
3. Engineer's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal.

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Engineer in writing within 5 days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Engineer.
4. RFI number, including RFIs that were returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.

7. Date Engineer'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.

F. On receipt of Engineer's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Engineer within three days if Contractor disagrees with response.

## 1.8 DIGITAL PROJECT MANAGEMENT PROCEDURES

A. Use of Engineer's Digital Data Files: Digital data files of Engineer's CAD drawings (background drawings only) will be provided by Engineer for Contractor's use during construction.

1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project Record Drawings.
2. Engineer makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
3. Digital Drawing Software Program: Contract Drawings are available in AutoCAD (latest release).
4. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Engineer.

    a. Subcontractors and other parties granted access by Contractor to Engineer's digital data files shall execute a data licensing agreement in the form of Agreement acceptable to Owner and Engineer.

5. The following digital data files will be furnished for each appropriate discipline:

    a. Floor plans.

B. PDF Document Preparation: Where PDFs are required to be submitted to Engineer, prepare as follows:

1. Assemble complete submittal package into a single indexed file, incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
3. Certifications: Where digitally submitted certificates and certifications are required, provide a digital signature with digital certificate on where indicated.

## 1.9 PROJECT MEETINGS

A. General: Engineer/Owner will schedule and conduct bi-weekly meetings and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting.
2. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Engineer will distribute the meeting minutes to everyone concerned, including Owner and Engineer, within five days of the meeting.

B. Preconstruction Conference: Engineer/Owner will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Engineer, but no later than 10 days after Notice to Proceed.

1. Attendees: Authorized representatives of Owner, Engineer and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
2. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Responsibilities and personnel assignments.
    b. Tentative construction schedule.
    c. Phasing.
    d. Critical work sequencing and long lead items.
    e. Designation of key personnel and their duties.
    f. Lines of communications.
    g. Procedures for processing field decisions and Change Orders.
    h. Procedures for RFIs.
    i. Procedures for testing and inspecting.
    j. Procedures for processing Applications for Payment.
    k. Distribution of the Contract Documents.
    l. Submittal procedures.
    m. Preparation of Record 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.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

# SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's Construction Schedule.
2. Construction schedule updating reports.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.

### 1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time belongs to Owner.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

## 1.4 INFORMATIONAL SUBMITTALS

A. Format for Submittals: Submit required submittals in the following format:

1. Working electronic copy of schedule file.
2. PDF file.

B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.

C. Construction Schedule Updating Reports: Submit with Applications for Payment.

## 1.5 QUALITY ASSURANCE

A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.

## 1.6 COORDINATION

A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

## 1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1.

B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting, using CPM scheduling.

1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.
2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.

C. Time Frame: Extend schedule from date established for the Notice of Award to date of Substantial Completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
2. Temporary Facilities: Indicate start and completion dates for the following as applicable:

a. Securing of approvals and permits required for performance of the Work.
b. Temporary facilities.
c. Owner interfaces and furnishing of items.
d. Interfaces with Separate Contracts.
e. Regulatory agency approvals.
f. Punch list.

3. Procurement Activities: Include procurement process activities for the following long lead-time 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.

4. Submittal Review Time: Include review and resubmittal times indicated in Section 013300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
5. Startup and Testing Time: Include no fewer than 7 days for startup and testing.
6. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Engineer’s administrative procedures necessary for certification of Substantial Completion.

7. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and Final Completion.

E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.

1. Phasing: Arrange list of activities on schedule by phase.
2. Work under More Than One Contract: Include a separate activity for each contract.
3. Work Restrictions: Show the effect of the following items on the schedule:

    a. Coordination with existing construction.
    b. Limitations of continued occupancies.
    c. Uninterruptible services.
    d. Partial occupancy before Substantial Completion.
    e. Use-of-premises restrictions.
    f. Provisions for future construction.
    g. Seasonal variations.
    h. Environmental control.

4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:

    a. Subcontract awards.
    b. Submittals.
    c. Purchases.
    d. Fabrication.
    e. Sample testing.
    f. Deliveries.
    g. Installation.
    h. Tests and inspections.
    i. Adjusting.
    j. Curing.
    k. Building flush-out.
    l. Startup and placement into final use and operation.

5. 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 to provide for the following:

    a. Completion of mechanical installation.
    b. Completion of electrical installation.
    c. Substantial Completion.

F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.

G. 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 Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and the Contract Time.

H. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report 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 Completion percentage for each activity.

I. Recovery Schedule: When periodic update indicates the Work is 7 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.

J. Distribution: Distribute copies of approved schedule to Engineer Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor 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 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.

## 1.8 GANTT-CHART SCHEDULE REQUIREMENTS

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 10 days of date established for the Notice to Proceed.

1. Base schedule on the startup construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013200

# SECTION 013300 - SUBMITTAL PROCEDURES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 013100 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
2. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.

### 1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Engineer's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

### 1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Engineer and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.

2. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 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 Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Engineer's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

## 1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Engineer.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.
13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Engineer.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Engineer on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Electronic Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

## 1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Email: Prepare submittals as PDF package and transmit to Engineer and Owner by sending via email. Include PDF transmittal form. Include information in email subject line as requested by Engineer.

    a. Engineer will return annotated file. Annotate and retain one copy of file as a digital Project Record Document file.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Engineer reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Engineer'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 resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Engineer will advise 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. Resubmittal Review: Allow 15 days for review of each resubmittal.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

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 Engineer's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Engineer's action stamp.

## 1.7 SUBMITTAL REQUIREMENTS

A. 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 unsuitable 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. Manufacturer's catalog cuts.
b. Manufacturer's product specifications.
c. Standard color charts.
d. Statement of compliance with specified referenced standards.
e. Testing by recognized testing agency.
f. Application of testing agency labels and seals.
g. Notation of coordination requirements.
h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams that show 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 before Shop Drawings, and before or concurrently with Samples.

B. 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. Identification of products.
    b. Schedules.
    c. Compliance with specified standards.
    d. Notation of coordination requirements.
    e. Notation of dimensions established by field measurement.
    f. Relationship and attachment to adjoining construction clearly indicated.
    g. Seal and signature of professional engineer if specified.

C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

    a. Project name and submittal number.
    b. Generic description of Sample.
    c. Product name and name of manufacturer.
    d. Sample source.
    e. Number and title of applicable Specification Section.
    f. Specification paragraph number and generic name of each item.

3. Email Transmittal: Provide PDF transmittal. Include digital image file illustrating Sample characteristics and identification information for record.

D. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
2. Field Test Reports: Submit written 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.
3. 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.
4. 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.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

## 1.8 CONTRACTOR'S REVIEW

A. Action Submittals 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 Engineer.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Engineer will not review submittals received from Contractor that do not have Contractor's review and approval.

## 1.9 ENGINEER'S REVIEW

A. Action Submittals: Engineer will review each submittal, indicate corrections or revisions required, and return.

1. PDF Submittals: Engineer will indicate, via markup on each submittal, the appropriate action.

B. Informational Submittals: Engineer will review each submittal and or will return it if it does not comply with requirements. Engineer will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Engineer.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Engineer will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Engineer without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

# SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 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 Requirements:

1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

### 1.3 USE CHARGES

A. Installation, removal, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities engaged in the Project to use temporary services and facilities without cost, including, but not limited to testing agencies, and authorities having jurisdiction.

B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

C. Electric Power Service from Existing System: Electric power from 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 Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

C. Moisture- and Mold-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage and mold. Describe delivery, handling, storage, installation, and protection provisions for materials subject to water absorption or water damage.

1. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and requirements for replacing water-damaged Work.
2. 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.
3. Indicate methods to be used to avoid trapping water in finished work.

D. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Include the following:

1. Locations of dust-control partitions at each phase of work.
2. HVAC system isolation schematic drawing.
3. Waste-handling procedures.
4. Other dust-control measures.

E. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:

1. Methods used to meet the goals and requirements of the Owner.
2. Concrete cutting method(s) to be used.
3. Location of construction devices on the site.
4. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
5. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
6. Indicate locations of sensitive equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

## 1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations 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.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.

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.

### 2.2 TEMPORARY FACILITIES

A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.

### 2.3 EQUIPMENT

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

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
2. Heating, Cooling, and Dehumidifying Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

## PART 3 - EXECUTION

### 3.1 TEMPORARY FACILITIES, GENERAL

A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

## 3.2 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Locate facilities to limit site disturbance.

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. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.

1. Prior to commencing work, isolate the HVAC system in area where work is to be performed.
2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
3. Perform daily construction cleanup and final cleanup.

## 3.3 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with Owner, for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

C. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Electric Power Service: Connect to Owner’s existing electrical power service. Maintain equipment in a condition acceptable to the Owner.

## 3.4 SUPPORT FACILITIES INSTALLATION

A. Comply with the following:

1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
2. Utilize designated area within existing building for temporary field offices.
3. Maintain support facilities until Engineer schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Use of Planned Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.

1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
2. Prepare subgrade and install subbase and base for temporary roads and paved areas in accordance with Section 312000 "Earth Moving."
3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course in accordance with Section 321216 "Asphalt Paving."

C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

D. Storage and Staging: Use designated areas of Project site for storage and staging needs.

E. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction.

F. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use.

1. Do not load elevators beyond their rated weight capacity.
2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work, so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.

G. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.

1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas, so no evidence remains of correction work.

## 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.

B. 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.

1. Comply with work restrictions specified in Section 011000 "Summary."

C. 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 workday.

D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

E. Temporary Egress: Provide temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction. Provide signage directing occupants to temporary egress.

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.

1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

G. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.

1. Construct dustproof partitions with gypsum wallboard, with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.

2. Construct dustproof partitions with two layers of 6-mil polyethylene sheet on each side. Cover floor with two layers of 6-mil polyethylene sheet, extending sheets 18 inches up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.

    a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches between doors. Maintain water-dampened foot mats in vestibule.

3. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
4. Provide walk-off mats at each entrance through temporary partition.

H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.

1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with requirements of authorities having jurisdiction.
3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

## 3.6 MOISTURE AND MOLD CONTROL

A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.

B. Exposed Construction Period: 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.
5. Keep deck openings covered or dammed.

C. Partially Enclosed Construction Period: 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 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. Do not install material that is wet.
6. Discard and replace stored or installed material that begins to grow mold.
7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.

D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:

1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

    a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective and require replacing.
    b. Remove and replace materials that cannot be completely restored to their manufactured moisture level within 48 hours.

## 3.7 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. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION 015000

# SECTION 017300 - EXECUTION

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Progress cleaning.
6. Starting and adjusting.
7. Protection of installed construction.

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.

### 1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

### 1.4 QUALITY ASSURANCE

A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Engineer of locations and details of cutting and await directions from Engineer before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. 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 results in increased maintenance or decreased operational life or safety. Operational elements include the following:

    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Fire-suppression systems.
    d. Plumbing piping systems.
    e. Mechanical systems piping and ducts.
    f. Control systems.
    g. Communication systems.
    h. Fire-detection and -alarm systems.
    i. Electrical wiring systems.
    j. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

    a. Water, moisture, or vapor barriers.
    b. Membranes and flashings.
    c. Exterior curtain-wall construction.
    d. Sprayed fire-resistive material.
    e. Equipment supports.
    f. Piping, ductwork, vessels, and equipment.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Owner’s/Engineer’s opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.

B. In-Place Materials: Use materials for patching 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 provide a match acceptable to Owner/Engineer for the visual and functional performance of in-place materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before

fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Engineer.

## 3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings. If discrepancies are discovered, notify Engineer promptly.

## 3.4 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with

other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Engineer.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Repair or remove and replace damaged, defective, or nonconforming Work.

1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

## 3.5 CUTTING AND PATCHING

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

C. Temporary Support: Provide temporary support of work to be cut.

D. 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.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. 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 to minimize interruption to occupied areas.

G. 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. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum 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 and 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.

H. 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 practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical 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 minimize 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, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

## 3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

## 3.7 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

## 3.8 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 017300

# SECTION 017419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Disposing of nonhazardous demolition and construction waste.

### 1.3 DEFINITIONS

A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.

C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner’s property.

### 1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition and construction waste becomes property of Contractor.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 DISPOSAL OF WASTE

A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

END OF SECTION 017419

# SECTION 017700 - CLOSEOUT PROCEDURES

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for requirements for Applications for Payment for Substantial Completion and Final Completion.
2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

### 1.3 DEFINITIONS

A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Engineer's use prior to Engineer's inspection, to determine if the Work is substantially complete.

### 1.4 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

## 1.5 CLOSEOUT SUBMITTALS

A. Record Drawings.

B. O&M Data and Warranties.

C. Final Payroll Reports/Certification and supporting documents.

D. Final Wage Payment & Affidavit.

E. Contractors Release & Certification.

F. Certificates of Release: From authorities having jurisdiction.

G. Certificate of Insurance: For continuing coverage.

H.

## 1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

## 1.7 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Engineer. Label with manufacturer's name and model number.

    a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.

5. Submit testing, adjusting, and balancing records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.
2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
3. Complete startup and testing of systems and equipment. Heating boiler and domestic hot water systems must be fully functioning and operating on automatic controls.
4. Perform preventive maintenance on equipment used prior to Substantial Completion.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
6. Terminate and remove temporary facilities from Project site, along with construction tools, and similar elements.
7. Complete final cleaning requirements.
8. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Engineer, that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

## 1.8 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining Final Completion, complete the following:

1. Submit a final Application for Payment in accordance with Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Engineer. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit Final Completion photographic documentation.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Engineer/Owner will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

## 1.9 LIST OF INCOMPLETE ITEMS

A. Organization of List: 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 list of spaces in sequential order,, listed by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Engineer.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. PDF Electronic File: Engineer will return annotated file.

## 1.10 SUBMITTAL OF PROJECT WARRANTIES

A. As a condition precedent to the final payment, the contractor shall execute to the owner a guarantee in a form approved by the owner. Guarantee shall warrant that all work will remain in serviceable and perfect condition (ordinary wear and tear, abuse and causes beyond the control of the contractor excluded) for a period of one year from date of final completion and

acceptance of work and that the contractor will make good at his own expense, without cost to the owner, any imperfections in whole or in part which may develop in this work during the period above specified, including any damage to other work caused by such imperfections or repairing of same.

B. Time of Submittal: Submit written warranties on request of Engineer for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

C. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

D. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

E. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit on digital media acceptable to Engineer by email to Engineer.

F. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

G. Provide additional copies of each warranty to include in operation and maintenance manuals.

## 1.11 PREVENTATIVE MAINTENANCE SERVICE CONTRACT

A. Provide a price for a one-year renewable preventative maintenance service contract on all mechanical systems associated with this project.

1. Include quarterly preventative maintenance checks as outlined in the boiler and pump manufacturer’s service manual including:

a. Check pressure / temperature gauge.
b. Bleed air from system.
c. Check relief valve.

d. Check condensate drain.
e. Test low water cutoff.
f. Check for leaks in boiler and piping.
g. Clean condensate trap.
h. Check flue vent system.
i. Inspect ignition and flame sensor electrodes.
j. Check Central settings.
k. Clean strainers.
l. Check pump flow.

## PART 2 - PRODUCTS

### 2.1 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 comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## PART 3 - EXECUTION

### 3.1 FINAL CLOSEOUT ITEMS

A. Provide Closeout submittals included in Part 1.5.

B. Complete the following:

1. Return keys and fobs to Maintenance Supervisor.
2. Entry lock cylinders turned over to Property Management.
3. Tools, spare parts, maintenance, and extra products in quantities specified.
4. Startup testing of systems and instruction of Property Management employees on the operation of new equipment and maintenance.
5. Remove all temporary facilities & utilities.
6. Notification for insurance changeover.
7. Utility changeover.

### 3.1 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 before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
f. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
g. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
h. Vacuum and mop concrete.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean strainers.
n. Leave Project clean and ready for occupancy.

## 3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations required by Section 017300 "Execution" before requesting inspection for determination of Substantial Completion.

END OF SECTION 017700

# SECTION 017823 - OPERATION AND MAINTENANCE DATA

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Product maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

### 1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

### 1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Engineer will comment on whether content of operation and maintenance submittals is acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:

1. Submit on digital media acceptable to Engineer. Enable reviewer comments on draft submittals.

C. Initial Manual Submittal: Submit draft copy of each manual at least 7 days before commencing demonstration and training. Engineer will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 7 days before commencing demonstration and training. Engineer will return copy with comments.

1. Correct or revise each manual to comply with Engineer's comments. Submit copies of each corrected manual within 7 days of receipt of Engineer's comments and prior to commencing demonstration and training.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

## 1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

## 1.6 REQUIREMENTS FOR OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.

3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Engineer.
7. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

## 1.7 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
5. Reordering information for specially manufactured products.
6. Approved product submittals.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

# SECTION 017839 - PROJECT RECORD DOCUMENTS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 017300 "Execution" for final property survey.
2. Section 017700 "Closeout Procedures" for general closeout procedures.
3. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

### 1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set of marked-up record prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set of marked-up record prints.
2) Engineer will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit one paper-copy set of marked-up record prints.
2) Print each drawing, whether or not changes and additional information were recorded.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints 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 record prints.

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. Locations and depths of underground utilities.
d. Revisions to routing of piping and conduits.
e. Revisions to electrical circuitry.
f. Actual equipment locations.
g. Duct size and routing.
h. Locations of concealed internal utilities.
i. Changes made by Change Order or Construction Change Directive.
j. Changes made following Engineer written orders.
k. Details not on the original Contract Drawings.
l. Field records for variable and concealed conditions.
m. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record prints 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.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Engineer.
e. Name of Contractor.

1.5 MAINTENANCE OF RECORD DOCUMENTS

A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Engineer’s reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017839

# SECTION 017900 - DEMONSTRATION AND TRAINING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.
2. Demonstration and training video recordings.

### 1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For facilitator.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

### 1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.

b. Name of Engineer.
c. Name of Contractor.
d. Date of video recording.

2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
4. At completion of training, submit complete training manual(s) for Owner's use prepared in same paper and PDF file format required for operation and maintenance manuals specified in Section 017823 "Operation and Maintenance Data."

## 1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

## 1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Engineer.

1.7 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:

    a. System, subsystem, and equipment descriptions.
    b. Performance and design criteria if Contractor is delegated design responsibility.
    c. Operating standards.
    d. Regulatory requirements.
    e. Equipment function.
    f. Operating characteristics.
    g. Limiting conditions.
    h. Performance curves.

2. Documentation: Review the following items in detail:

    a. Emergency manuals.
    b. Systems and equipment operation manuals.
    c. Systems and equipment maintenance manuals.
    d. Product maintenance manuals.
    e. Project Record Documents.
    f. Identification systems.
    g. Warranties and bonds.
    h. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:

    a. Instructions on meaning of warnings, trouble indications, and error messages.
    b. Instructions on stopping.
    c. Shutdown instructions for each type of emergency.
    d. Operating instructions for conditions outside of normal operating limits.
    e. Sequences for electric or electronic systems.
    f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.
b. Equipment or system break-in procedures.
c. Routine and normal operating instructions.
d. Regulation and control procedures.
e. Control sequences.
f. Safety procedures.
g. Instructions on stopping.
h. Normal shutdown instructions.
i. Operating procedures for emergencies.
j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.
b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning.
e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:

a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

## 1.8 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."

B. Set up instructional equipment at instruction location.

## 1.9 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

1. Engineer will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner, through Engineer, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

## 1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode.

1. Submit video recordings on thumb drive.
2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:

a. Name of Contractor/Installer.
b. Business address.
c. Business phone number.
d. Point of contact.
e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.

a. Produce segments to present a single significant piece of equipment per segment.
b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017900

# SECTION 078413 - PENETRATION FIRESTOPPING

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:

a. Penetrations in fire-resistance-rated walls.
b. Penetrations in horizontal assemblies.
c. Penetrations in smoke barriers.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

### 1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Approval according to FM Approval 4991, "Approval Standard for Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:

a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.

1) UL in its "Fire Resistance Directory."
2) Intertek Group in its "Directory of Listed Building Products."
3) FM Approval in its "Approval Guide."

## 2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

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

a. 3M Fire Protection Products.
b. A/D Fire Protection Systems Inc.
c. Everkem Diversified Products, Inc.
d. Grabber Construction Products.
e. Hilti, Inc.
f. HoldRite; Reliance Worldwide Company.
g. International Fireproof Technology Inc.
h. NUCO Inc.
i. Passive Fire Protection Partners.
j. RectorSeal Firestop; a CSW Industrials Company.
k. Roxtec.
l. Specified Technologies, Inc.
m. STC Sound Control.
n. Tremco, Inc.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.

D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.

E. Manufactured Piping Penetration Firestopping System: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

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

   a. ProVent Systems, Inc.
   b. RectorSeal Firestop; a CSW Industrials Company.

2. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
3. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
4. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
5. Sleeve: Molded-PVC plastic, of length to match slab thickness and with integral nailing flange on one end for installation in cast-in-place concrete slabs.
6. Stack Fitting: ASTM A48/A48M, gray-iron, hubless-pattern wye branch with neoprene O-ring at base and gray-iron plug in thermal-release harness. Include PVC protective cap for plug.
7. Special Coating: Corrosion resistant on interior of fittings.

F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.

1. Permanent forming/damming/backing materials.
2. Substrate primers.
3. Collars.
4. Steel sleeves.

## 2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.

E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.

F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.

G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

## 2.4 MIXING

A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

# PART 3 - EXECUTION

## 3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

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

## 3.2 PREPARATION

A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:

1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

## 3.3 INSTALLATION

A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.

C. Install fill materials by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

## 3.4 FIELD QUALITY CONTROL

A. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.

B. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

## 3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 078413

# SECTION 02 82 00 - ASBESTOS ABATEMENT

## 1.1 SECTION INCLUDES

A. General
B. Supplementary Conditions, Asbestos Abatement
C. Project Identification and Scope of Work, Asbestos Abatement
D. Asbestos Abatement Technical Specifications
E. Asbestos Work Area Photographs

## 1.2 GENERAL

A. This work is subject to the provisions of the Contract Document as they pertain to and affect the work specified in this section.

## 1.3 SUPPLEMENTARY CONDITIONS, ASBESTOS ABATEMENT

A. REQUIREMENTS: Refer to the Instructions to Bidders, General Conditions, and the Specifications. The following requirements of the Supplementary Conditions, Asbestos Abatement, when not in agreement, take precedent over the requirements of Instructions to Bidders and General Conditions which are a part of this Contract.

B. ABATEMENT CONTRACTOR QUALIFICATIONS: To demonstrate qualifications to perform the Work, the abatement contractor must he prepared to submit within five days of Owner's request written evidence of the following:
1. Evidence of current status as an Ohio EPA Asbestos Abatement Contractor.
2. Evidence of required insurance coverage.

C. SITE SECURITY

1. During Asbestos Abatement activities, the Contractor is responsible for fencing, barricades, signs, and warnings such that a reasonable person would be aware that they should not enter the regulated area or the work site.

D. EMPLOYEE CONDUCT

1. All of the Contractor’s employees shall abide by Federal, State, and Local laws while on the work site.
2. Employees of the Contractor are restricted to only those areas of the building directly impacted by the project.

E. PROJECT COORDINATION

1. No other Contractors will be allowed in the asbestos work area until the removal is completed.
2. The Asbestos Contractor shall coordinate with the Owner, Architect, and Consultant the work schedule and staging of the work areas.

F. STOP WORK ORDER

1. The Owner or Owner's Representative is authorized to issue a "Stop Work Order" to the Contractor at any time it is determined that the Contractors work practices have compromised (or may compromise) the health and/or safety of any individual or the Owner's facility; or if the work is persistently and substantially in violation of the Specifications.

1.4 PROJECT IDENTIFICATION, SUMMARY, AND WORK COVERED UNDER THIS SECTION

A. PROJECT NAME: Boiler Replacement Project – Phase 2

PROJECT LOCATION: **FLORY GARDENS APARTMENTS**
3425 Nebraska Ave., Toledo, OH

ASBESTOS PROJECT DESIGNER:
Brumbaugh-Herrick, Inc.
7920 N. Woodbridge Rd.
Monclova, OH 43542
419-392-2011
Contact: Brett Brumbaugh
Asbestos Project Designer
Certifications: AHES #ES3488, AHPD #PD60095
E-mail: brett@brumbaugh-herrick.com

PROJECT OWNER:
Lucas Metropolitan Housing Authority (LMHA)
201 Belmont Avenue
Toledo, OH 43604
Contact: Craig Bartley

B. **SCOPE OF WORK, ASBESTOS ABATEMENT ACTIVITIES:**

Provide all labor and material for the asbestos abatement of materials affected by the replacement of the boilers at the Flory Gardens LMHA housing site. All abatement work shall be in accordance with current OSHA and Ohio EPA asbestos requirements in accordance with the applicable OSHA work practices for each type of material. Measurements, locations, and quantities are approximate and Contractor is to field verify all information prior to submitting a Bid.

**FLORY GARDENS**

| ASBESTOS MATERIALS | LOCATIONS | ASBESTOS QUANTITIES |
|---|---|---|
| Textured ceiling coating | Mechanical Rooms 1-10 | 2,160 SF |

1.5 ASBESTOS ABATEMENT

A. GENERAL REQUIREMENTS

1. Potential Asbestos Hazard

a. The disturbance or dislocation of asbestos-containing materials may cause asbestos fibers to be released into the building's atmosphere, thereby creating a potential health hazard to workers and building occupants. Apprise all workers, supervisory personnel, subcontractors and consultants who will be at the jobsite of the seriousness of the hazard and of proper work procedures which must be followed.

b. Where in the performance of the work, workers, supervisory personnel, subcontractors, or consultants may encounter, disturb, or otherwise function in the immediate vicinity of any identified asbestos-containing materials, take appropriate continuous measures as necessary to protect all building occupants from the potential hazard of exposure to airborne asbestos. Such measures shall include the procedures and methods described herein, and compliance with regulations of applicable federal, state and local agencies.

2. Asbestos Abatement Work, Contractor Use of Premises

a. Water, both hot and cold, will be available to the contractor. Sewer facilities to receive properly filtered project waste water will be available. Electric power, 110V, is available for Contractor use. Contractor shall be prepared for the possible temporary interruption of electrical service and either pull power for a nearby unit or use generator
b. Contractor employees are forbidden from smoking on the premises.

3. Clean-up

a. Contractor or Sub-contractor shall remove from the project site all his waste materials and rubbish resulting from his/her operations. If Contractor fails to clean up within seven (7) days after completion, the Owner may do so and the cost thereof shall be charged to the Contractor as a deduction in the contract price.

4. Electrical Safety

a. The importance of electrical safety cannot be overemphasized. It is a project requirement that all electrical equipment be powered from circuits that are ground fault circuit interrupter (GFCI or GFI) protected at their source, which must be outside any negative pressure regulated area. Ground fault circuit interrupters are to be supplied by the Contractor.

5. Fire Safety

a. The contractor is to abide by the OSHA fire safety requirements as outlined in 29CFR:1926.24, 1926.150 and 151.

6. Protection of the Work

a. The Contractor is responsible for restoring the work area and auxiliary areas utilized during the project to conditions equal to or better than original. Any excessive damages caused by the Contractor during the performance of the project (paint damage, water damage, broken glass) shall be repaired by the Contractor at no additional cost to the Owner.

7. Site Security

a. During asbestos abatement activities, the Contractor is responsible for such barricades, signs and warnings such that a reasonable person would be aware that they should not enter regulated areas.

B. PROJECT COORDINATION

1. Related Documents

a. Drawings, general provisions of the Contract, including General and Supplementary Conditions, and other Specification sections apply to the work of this section.

2. Description of Work

a. Minimum administrative and supervisory requirements necessary for coordination of work on the project include but are not necessarily limited to the following:

1). Supervisory personnel
2). Special reports
3). Contingency plan

4). Submittals

3. Administrative and Supervisory Personnel

a. Provide a General Superintendent who is experienced in the administration and supervision of asbestos abatement projects including regulations, work practices, protective measures for building and personnel, disposal practices, etc. This person must have had at least two years' experience in asbestos abatement work. This person must meet the 29 CFR 1926.1001 qualifications as Competent Person and the Ohio EPA qualifications as an Asbestos Supervisor.

4. Special Reports

a. In addition to routine reporting, provide Reports of Unusual Events whenever an event of unusual and significant nature occurs at the site. These are events such as rupture of temporary enclosures, bursting of a water line, etc. Prepare and submit a special report listing the chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. When such events are known or predictable in advance, advise Consultant in advance at the earliest opportunity.

b. Prepare and submit Accident Reports for significant accidents at the work site and anywhere else project work is in progress. Record and document data and actions; comply with industry standards. For this purpose, a significant accident is defined to include events where personal injury is sustained, or property loss of substance is sustained, or where the event posed a significant threat of loss or personal injury.

5. Contingency Plan

a. Prepare a Contingency Plan for emergencies including fire, accident, power failure, negative air system failure, supplied air system failure, or any other event that may require modification or abridgment of decontamination or work area isolation procedures. Include in the plan specific procedures for decontamination or work area isolation. Note that nothing in this specification should impede safe exiting or providing adequate medical attention in the event of an emergency.
b. Post the Contingency Plan in the clean room of the Personnel Decontamination Unit.

6. Notifications

a. Notify other entities at the Project Site of the nature of the asbestos abatement activities, location of asbestos containing materials, and requirements relative to asbestos set forth in these specifications and applicable regulations.

7. Permits and Licenses

a. Contractor is responsible for obtaining such permits as necessary to conduct the work.

8. Submittals Before the Start of Work

a. Submit the following to the Consultant for review and approval:

1). Evidence of satisfactory completion of required training and satisfactory physical exams for all workers for this project.
2). The Action Plan
3). The Contingency Plan
4). Copies of Regulatory Notifications (to be submitted to Consultant prior to the start date)

b. No work shall begin until these submittals are returned by Consultant, with written authorization to proceed.

## 1.6 CODES AND REGULATIONS

A. Description of the Work

1. This section sets forth governmental regulations and industry standards which are included and incorporated herein by reference and made a part of the specification. This section also sets forth those notices and permits which are known to the Owner and which either must be applied for and received, or which must be given to governmental agencies before start of work.

B. Codes & Regulations

1. General Applicability of Codes, Regulations, and Standards: Except to the extent that more explicit or more stringent requirements are written directly into the Contract documents, all applicable codes, regulations, and standards have the same force and effect (and are made part of the contract documents by reference) as if copied directly into the contract documents, or as if published copies are bound herewith.

2. Contractor Responsibility: The Contractor shall assume full responsibility and liability for the compliance with all applicable Federal, State, and local regulations pertaining to work practices, hauling, disposal, and protection of workers, visitors to the site, and persons occupying areas adjacent to the site.

3. The Contractor is responsible for providing medical examinations and maintaining medical records of personnel as required by the applicable Federal, State, and local regulations. The Contractor shall hold the Owner and Owner's Representative harmless for failure to comply with any applicable work, hauling, disposal, safety, health, or other regulation on the part of himself, his employees, or his subcontractors.

4. Federal Requirements which govern asbestos abatement work or the hauling and disposal of asbestos waste materials include but are not limited to:

   a. Occupational Safety and Health Administration:

      1). 29 CFR 1910 - General Industry Standards

      2). 29 CFR 1926 - Construction Industry Standards

      3). Especially:

         a). 29 CFR 1910.20 - Access to Employee Exposure Medical Records

         b). 29 CFR 1910.134 - Respiratory Protection

         c). 29 CFR 1910.145 - Specifications for Accident Prevention, Signs and Tags

         d). 29 CFR 1910.1200 - Hazard Communication

         e). 29 CFR 1926.1101 - Asbestos Standard for Construction (final rules)

   b. Environmental Protection Agency:

      1). 40 CFR 61, Subpart A - National Emission Standard for Hazardous Air Pollutants (NESHAPS)

      2). 40 CFR 61, Subpart M - NESHAPS Asbestos Regulation

      3). 40 CFR 763, Subpart E - Asbestos-Containing Materials in Schools

   c. Department of Transportation:

      1). 49 CFR 107, et seq. - Hazardous Material Regulations

      2). 49 CFR 171-180 - Hazardous Material Regulations

   d. State Requirements which govern asbestos abatement work or the hauling and disposal of asbestos waste materials include but are not limited to:

      1). Ohio EPA regulations as issued in the Ohio Administrative Code and the Ohio Revised Code.

C. Standards

1. Standards which govern asbestos abatement work or hauling and disposal of asbestos waste materials include but are not limited to:

a. Compressed Gas Association

1). Compressed Air for Human Respiration - Pamphlet G-7

2). Commodity Specification for Air - Specification G-7.1

b. American National Standards Institute

1). American National Standard Practice for Respiratory Protection - ANSI Z88.2-1980

D. Notices, State and Local Agencies

1. Notifications: Ohio EPA Notification (10-day)

2. Licenses: Maintain current licenses as required for the removal, transporting, disposal, or other regulated activity relative to the work of this Contract.

3. Posting: Post certification cards of all workers and the Supervisor at the site during work hours.

1.7 AIR MONITORING - LABORATORY SERVICES

A. General Requirements

1. This section describes air monitoring carried out by the Owner to verify that the building beyond the work area and outside environment remain uncontaminated.

2. Air monitoring within the work area is required of the Contractor by OSHA. It is not covered in this section and is not the purpose of the Owner's air monitoring.

B. Air Monitoring

1. The purpose of the Owner's air monitoring will be to produce a definitive record showing that the non-work areas of the building have not been contaminated by the work.

2. Should any event occur that would reasonably be expected to cause such contamination, Contractor shall immediately stop work and implement the pre-approved Contingency Plan. Examples of such events are the failure of the filtration system or a breach in the containment barrier.

C. Sampling and Analytical Methods

1. PCM air samples will be collected on 25 mm cassette-mounted filters at sampling rate between 4 and 16 liters per minute. The filter medium will be mixed cellulose ester having a pore size less than or equal to 1.2 micrometers. They will be analyzed according to NIOSH Method 7400A.

D. On-Site Laboratory Testing

1. An On-Site Laboratory may be operated by the Consultant to perform analysis of the PCM air samples. A complete record of all air monitoring tests and results will be furnished to the Owner's Representative, the Owner, and the Contractor.

E. Final Air Clearance Testing

1. PCM Clearance Areas**:** Testing will be done in accordance with AHERA and OEPA regulations. All 3 PCM clearance air samples taken inside the work area must be below 0.01 f/cc as analyzed according to NIOSH method 7400A.

1.8 WORK AREA CLEARANCE - REGULATED AREAS

A. Description of Requirements

1. This section describes the procedures that will be used for determining the acceptability of the Work as determined by the concentration of airborne asbestos fibers within the work area.

B. Work Activity Sequence

1. Final air samples will be collected after a specific sequence of activities have taken place. These activities are intended to assure that the work area will be satisfactorily cleaned so that the area will pass the air test. The final visual inspection shall be conducted in accordance with the ASTM Standard E-1368-90 (Standard Practice for Visual Inspection of Asbestos Abatement Projects).

2. Negative air machines are to be operated until a sufficient amount of room air volumes have been HEPA filtered. After this "air flushing" of the work area, the Owner's Representative will conduct aggressive air sampling. Aggressive techniques such as the active use of a 1 HP leaf blower over all exposed surfaces in the work area will be used. Fans may or may not be used for continued air circulation.

3. Sampling will start no later than four hours after the aggressive procedure is completed. Negative air is to be continuously maintained in the work area until the results of the air sampling have been received.

C. Final Air Sampling

1. Final air sampling will be conducted by the Owner's Representative.

2. PCM Clearance Areas: Sampling and analysis will be conducted by the Consultant with on-site analysis. All sampling will be conducted in accordance with AHERA regulations with all 3 clearance samples being below 0.01 f/cc for clearance.

D. Release Criterion

1. PCM clearance samples: The protocol of 763.90 of AHERA will be followed. If all sample results are below 0.01 f/cc the clearance requirements have been met and the work area can be prepared for re-occupancy by the Owner.

2. If any PCM sample(s) exceed 0.01 f/cc the clearance requirements have not been achieved the entire work area must be recleaned and re-tested.

E. Contractor's Responsibility

1. In the event that re-testing is required, the Contractor shall pay such Owner's Representative's fees as necessary so that no added cost accrues to the Owner as a result of the aborted test and subsequent re-testing.

1.9 ABATEMENT ACTIVITY WORK CLOSE-OUT

A. Description of Requirements

1. This section describes the submissions that will be required from the Contractor before the Work will be considered complete. Requirements for final cleanup, after work area clearance has been achieved, are described.

B. Prerequisites to Substantial Completion

1. Submit the following:

a. A copy of the Contractor's project log book, including daily log form and sign in sheets.

b. A set of red-lined prints of Contract drawings, to show where the installed work differs substantially from the work as originally shown.

c. A complete set of copies of Reports of Unusual Events and Accident Reports.

d. A record of each Contractor employee working on the project *including* a completed Worker Qualification Form, a copy of the most recent physical examination, Ohio Asbestos Worker or Supervisor Certification Card, AHERA approved training certificates (initial and most recent refresher), and the most recent respirator fit test.

e. A complete set of landfill receipts and EPA Waste Manifest forms for each load of asbestos containing waste.

f. Copies of any and all regulatory agency notifications, inquiries, complaints, warrants, or any other communications relating to the project from governmental agencies.

g. Complete set of Contractor's personal air monitoring records for the project.

2. Complete the following:

a. Final cleanup requirements & repair or touch-up as necessary.

b. Restoration of Owner's utilities to the condition in which they were received.

3. Inspection Procedures:

a. Upon receipt of Contractor's Request for Inspection, Owner's Representative will either advise the Contractor of unfulfilled prerequisites or proceed with the inspection. Following initial inspection, Owner's Representative will either prepare the Certificate of Substantial Completion, or will advise the Contractor of work which must be performed before the certificate will be issued (the punch list). The Owner's Representative will repeat the inspection when requested and when assured that the Work has been substantially completed.

C. Final Cleanup Requirements

1. Clean exposed hard-surfaced finishes affected by the work to a dirt-free condition, free of dust, stains, films, and similar distracting substances.

2. Clean the Project Site, including yards and grounds, of litter and foreign substances left during the course of this work.

D. Prerequisites for Final Acceptance

1. Complete the following before requesting the Owner's Representative's final inspection for Certification of Final Acceptance, and final payment as required by the General Conditions. List known exceptions, if any, in the request.

a. Submit the final payment request with final releases and supporting documentation not previously submitted and accepted.

b. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

c. Submit waivers of lien from every entity (including Contractor) who could lawfully and possibly file a lien arising out of the Contract and related to work covered by the payment. Owner reserves the right to designate which entities involved in the work must submit waivers.

d. Submit a certified copy of the Owner's Representative's final punch-list of itemized work to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance.

e. Reinspection Procedure: The Owner's Representative will reinspect the Work upon receipt of the Contractor's notice that the work, including punch-list items resulting from earlier inspections, has been completed, except for those items whose completion has been delayed because of circumstances that are acceptable to the Owner's Representative.

f. Upon completion of reinspection, the Owner's Representative will either prepare a Certificate of Final Acceptance, or will advise the Contractor of work that is incomplete or of obligations that have not been fulfilled, but are required for final acceptance.

g. If necessary, the reinspection procedure will be repeated.

## 1.10 ABATEMENT PROCEDURES

A. Related Documents

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

B. Description of Requirements

1. This section describes the procedures that will be used for determining the acceptability of the Work as determined by:

a. Adherence to OSHA work procedures,
b. Visual inspection, and
c. Final PCM air clearance sampling.

2. All abatement work must be done in accordance with the OSHA asbestos standard 29 CFR 1926.1101 for Class 1 and Class 2 asbestos materials.

C. Release Criteria

1. There are three criteria for acceptability of this removal work. They are:

a. The work procedures meet the requirements.
b. The Visual Inspection is satisfactory.
c. The PCM final air clearance samples are below the AHERA clearance level.

2. If any of these requirements are not met the Contractor shall reclean as necessary to achieve the required results.

1.11 ISOLATION AREAS

A. Description of Requirements

1. The Contractor shall set up the work area isolation/decontamination facilities in accordance with current OSHA regulations.

2. Class 2 or Class 1 Areas <25 lf or 10 sf of ACM

a. The Contractor shall set up the work area isolation/decontamination facilities consisting of one equipment room as follows:

1). The equipment room or area shall be adjacent to the regulated area for the decontamination of employees and their equipment which is contaminated with asbestos and shall consist of an area covered with an impermeable drop cloth on the floor.
2). The equipment area shall be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area as determined by visible accumulations of dust or debris.
3). The disposable work clothing shall be cleaned with a HEPA vacuum before it is removed, then placed immediately in a proper disposal bag and wetted with amended water.
4). All equipment and surfaces of containers filled with ACM shall be cleaned prior to removing them from the equipment room or area.
5). The competent person shall ensure that all employees enter and exit the regulated area through the equipment room or area.

3. Class 1 Areas > 25 lf or 10 sf of ACM

a. A summary of the requirements is as follows:

1). The equipment room shall be an area of sufficient size so as to accommodate at least one worker (allowing enough room to remove protective clothing), a 6-mil disposal bag and container, and any equipment which the Contractor wishes to store when not in use.

2). The wash room shall have two curtained doorways of opaque polyethylene film, one to the work area and one to the uncontaminated area. At least one shower with shower head supplied with hot and cold water or warm water shall be installed in this room for personnel decontamination. This room shall also be equipped with high pressure, low volume sprays to be used for the decontamination of disposal containers and equipment. The wash room shall be constructed so that all waste water is collected and pumped through a five (5) micron filter system.

3). Filtrate shall be disposed of as contaminated waste. From the filter, wastewater shall be drained off in any conventional manner to a sanitary wastewater system. Careful attention shall be paid to the construction of the shower to ensure that it is watertight. No leakage shall be permitted. The Contractor shall supply and maintain soap, shampoo and disposable towels at all times in the shower area.

4). The clean room shall be of sufficient size to accommodate at least one worker, towels for the workers, and storage for street clothing. The clean room shall be in the uncontaminated area.

b. If the work area isolation structure fails to prevent air flow out of the work area during personnel or equipment movement through the isolation structure, additional air locks shall be installed until air flow is eliminated.

B. Construction of Work Area Isolation Structures:

1. The wash room shall be constructed of 6 mil polyethylene and suitable framing so as to make it as airtight as possible. Where joining separate sheets of polyethylene is necessary, taping alone shall not be sufficient. The sheets of polyethylene shall be overlapped at least 3 inches and joined with an unbroken line of adhesive in such a manner as to prohibit air movement; tape shall then be used to further seal the joint on both the inside and outside of the chamber.

2. Work area isolation structure shall be constructed to prohibit passers-by from casually observing activities within the work area isolation structure or dressing

areas in the uncontaminated area. The clean room and equipment room shall be constructed to permit workers to privately dress and undress.

3. Other work area isolation systems shall be considered as long as they maintain the intended integrity of this system. Any proposed changes must be submitted in writing (with drawings) prior to commencement of work and must be approved in writing.

C. Maintenance of Isolation Systems and Barriers:

1. Ensure that barriers are effectively sealed and taped. Repair damaged barriers and remedy defects immediately upon discovery.

2. Visually inspect all enclosures at the beginning of each work period, and intermittently thereafter.

3. Smoke test methods may be used by the Owner's Representative to test work areas from the time a negative pressure is first established until final clearance tests are accepted. The Contractor is required by OSHA to conduct smoke testing of the containment area at least twice daily.

4. The negative pressure shall be maintained 24 hours a day, 7 days per week. At no time shall the Contractor allow air to flow from the work area (including periods when asbestos hazard abatement work is not in progress) except through an AFD exhausting HEPA-filtered air outside the building.

5. The Contractor shall provide local exhaust and ventilation within the work area with the flow of air away from the workers.

6. Local Exhaust and Ventilation (LEV) means to extract contaminated air from the immediate vicinity of the workers with uncontaminated air, so as to reduce the worker's exposure to concentrations of airborne fiber during the work.

1.12 EMERGENCY PROTECTION

A. Description of Requirements:

1. Prepare a contingency plan for emergencies including fire, accident, power failure, negative pressure system failure, supplied air system failure, or any other event that may require modification or abridgment of decontamination or work area isolation procedures. Include in plan specific procedures for decontamination or work area isolation. Note that nothing in this plan should impede safe exiting or providing of adequate medical attention in the event of an emergency.

2. The Contractor shall establish emergency and fire entrances and exits to work areas. All emergency entrances shall be equipped with two (2) full sets of protective clothing and respirators at all times. The Contractor shall mark all exits from the work area so that they are readily visible in the event of an emergency.

3. Local medical emergency personnel, both ambulance crews and hospital emergency room staff, shall be notified prior to commencement of asbestos hazard abatement operations as to the possibility of having to handle contaminated or injured workers and shall be advised on safe decontamination.

4. The Contractor shall be prepared to administer first aid to injured personnel after decontamination. Seriously injured personnel shall be treated immediately or evacuated without delay for decontamination. When an injury occurs, the Contractor shall stop work and implement fiber reduction techniques (e.g., wetting asbestos-containing materials) until the injured person has been removed from the work area.

5. Before the Contractor begins stripping of the asbestos containing material, the local police and fire department shall be notified as to the dangers of entering the work areas and they shall be invited to attend an informal training program to be conducted by the Contractor which will provide information regarding asbestos hazard abatement activities, decontamination practices, etc. The Contractor shall make every effort to help these agencies form plans of action should their personnel need to enter contaminated areas, and assist during emergency procedures.

6. The Contractor shall post in the clean room the numbers and locations of emergency services including but not limited to fire, ambulance, doctor, hospital, police, power company, and telephone company.

## 1.13 FACILITY PROTECTION

A. Description of Requirements

1. The Contractor shall comply with OSHA and EPA regulations concerning signs and labeling.

B. Facility Protection

1. Existing facilities and functions in adjacent areas may remain in use throughout the asbestos hazard abatement process. All existing services to these adjacent areas shall be maintained throughout this period. All existing fire protection and alarm systems, both within and without the work area, shall be maintained in proper working order throughout the asbestos hazard abatement project.

2. Protect all existing furniture and equipment, existing building finishes that are to remain, and existing systems and functions from damage during asbestos hazard abatement work. Extra precautions are to be taken in protecting: doors and trim, fire protection equipment, equipment and controls, etc. Any damage to building, services, finishes and/or equipment shall be remedied by the Contractor at his cost.

3. In the event that any area of the building or any area outside the building is contaminated by Contractor activities (except the isolated work areas after asbestos hazard asbestos hazard abatement work commences and the disposal landfill), the Contractor shall bear all expenses for determination of the contamination and necessary decontamination as determined by the Owner.

## 1.14 DISPOSAL OF ASBESTOS-CONTAINING WASTE MATERIALS

A. Description of Requirements

1. Comply with the multiple codes and regulations which apply to this work.

B. Submittals

1. In addition to the submittals required by regulation, provide to Owners Representative:

a. Prior to the start of work, a copy of the EPA or State asbestos landfill permit.

C. Removal Activities

1. Actual configuration of disposal containers will comply with local EPA District and/or landfill requirements, but as a minimum disposal containers shall be two 6-mil polyethylene bags (one inside the other, both separately sealed).

2. All polyethylene film, tape, cleaning material, and all other disposable material or items used in the work area shall be treated as contaminated waste.

3. As disposal containers are filled, they shall be sealed and moved to a staging area adjacent to the work area isolation structure. The Contractor shall remove waste materials from within the work area on a regular basis, and not permit accumulation of disposal containers to obstruct work progress or building exit ways.

4. Disposal containers may be temporarily stored at the site, outside the work area, if secured in a van-type or semi-trailer truck that is completely and securely lined with polyethylene film, including a curtained doorway at the opening. A similarly sealed, enclosed and locked container is also acceptable.

5. Disposal containers shall not be loaded so as to make handling unduly difficult or unsafe, or threaten the integrity of the container, polyethylene barriers or building structures.

6. Warning labels, having waterproof print and permanent adhesive, shall be affixed to the sides of the disposal containers (unless the containers have pre-printed labels). Warning labels shall be conspicuous and legible, and they shall be in accordance with EPA, OSHA and DOT regulations. All disposal bags or containers shall also have the Generator name, address, etc. in accordance with current NESHAP regulations.

7. All waste disposal containers shall be decontaminated and removed from the work area before final clean-up is started and the isolation barrier is taken down.

## 1.15 CONTINGENCY PLAN

A. Plan Submittals:

1. Prepare a Contingency Plan for emergencies including fire, accident, power failure, negative air system failure, supplied air system failure, or any other event that may require modification or abridgment of decontamination or work area isolation procedures. Include in the plan specific procedures for decontamination or work area isolation. List the telephone numbers and locations of the emergency services, including but not limited to fire, ambulance, doctor, hospital, police, power company and telephone company. Note that nothing in this specification should impede safe exiting or providing adequate medical attention in the event of an emergency. Post the Contingency Plan in the Clean Room or on the job site.

B. Notifications

1. Notify other entities at the Project Site of the nature of the asbestos abatement activities, location of asbestos containing materials, and requirements relative to asbestos set forth in these specifications and applicable regulations.

1.16 FORMS

A. Description of Requirements:

1. Pursuant to good recordkeeping, final documentation, and job management, the Owner's Representative requires the attached forms to be utilized as necessary during the Project.

B. Explanation:

1. Waiver of Liability Form to be completed for each person entering the work area not employed by the Contractor or the Owner's Representative.

2. Certification of Visual Inspection Form to be completed by the Contractor's Competent Person and the Owner's Representative to verify each cleared area.

3. Daily Inspection Form to be completed by Owner's Field Representative each day for each site.

4. Worker Qualification Form to be submitted for each Contractor employee working on the site. (Contractor's Form with same information may be substituted.) The form *must* be accompanied by a copy of the most recent physical examination, Asbestos Worker or Asbestos Hazard Abatement Specialist Card, AHERA approved training certificates (initial and most recent refresher), and most recent respirator fit test.

5. Contractor Personal Air Sampling Form to be submitted with final documents. (Contractor's form with same information may be substituted.)

6. Contractor Personal Air Sample Log form to be submitted with final documents. (Contractor's form with same information may be substituted.)

7. Waste Shipment Record (Ohio EPA) to be completed for each load of asbestos material.

## ASBESTOS WORKER QUALIFICATION FORM

**EMPLOYEE NAME**: _____

**EMPLOYEE ADDRESS**: _____

**NAMES OF PERSONS TO CONTACT IN AN EMERGENCY (2 REQUIRED)**
Name_____ Relationship_____Phone_____
Name_____ Relationship_____Phone_____

**MEDICAL EXAMINATION & PULMONARY FUNCTION TEST:**
Latest Physical Date_____
Provider_____

**ASBESTOS TRAINING PROGRAMS ATTENDED:**
Initial Course Provider_____ Date_____
Refresher Course Provider_____ Date_____

**EXPERIENCE AND DATES OF ASBESTOS-RELATED WORK:**
Project_____ Date_____
Project_____ Date_____
Project_____ Date_____

Do you now have, or have you had, any respiratory problems? YES NO
Have you worked in the past with asbestos or fiberglass type materials? YES NO

This project involves the handling, removal, and disposal of asbestos from the building. Asbestos is considered a health hazard.

I certify that my statements and answers are true and that I am familiar with all applicable OSHA, EPA, and State regulations concerning the handling, removal, and disposal of friable asbestos-containing material.

EMPLOYEE SIGNATURE _____ DATE _____

I certify that the above information is true, to the best of my knowledge, and that this worker has had the necessary medical examination and training required for asbestos abatement work.

EMPLOYER SIGNATURE _____ DATE _____

## CERTIFICATE OF WORKER'S ACKNOWLEDGMENT

PROJECT NAME: _____ DATE: _____

PROJECT ADDRESS: _____

CONTRACTOR'S NAME: _____

**Working with asbestos can be dangerous. Inhaling asbestos fibers has been linked with various types of cancer. If you smoke and inhale asbestos fibers, the chance that you will develop lung cancer is greater than that of the non-smoking public.**

Your employer's Contract with the Owner for the above referenced project requires that:

1) You be supplied with the proper respirator and be trained in its use;
2) You be trained in safe work practices and in the use of equipment found on the job;
3) You receive a medical examination. These things have been done at no cost to you.

**RESPIRATORY PROTECTION**: You must have been trained in the proper use of respirators and informed of the type of respirator to be used on the above referenced project. You must be given access to a copy of the written respiratory protection program issued by your employer. You must be equipped, at no cost, with the respirator to be used on the above project.

**TRAINING COURSE:** You must have been trained in the dangers inherent in handling asbestos and breathing asbestos dust, and in proper work procedures, and in personal and area protective measures. The topics covered in the course must have included the following:

Physical characteristics of asbestos
Health hazards associated with asbestos
Respiratory protection
Use of protective equipment
Pressure Differential Systems
Work practices including hands-on or on-the job training
Personal Decontamination procedures
Air monitoring, personal and area

**MEDICAL EXAMINATION:** You must have had a medical examination within the past 12 months at no cost to you. This examination must have included: health history and pulmonary function tests, and may have included an evaluation of a chest X-ray.

By signing this document, you are acknowledging only that the Owner of the building you are about to work in has advised you of your rights to training and protection relative to your employer, the Contractor.

Signature _____ SSN (last 4) _____

Printed Name _____

**CERTIFICATION OF FINAL VISUAL INSPECTION**
**for**
**ASBESTOS ABATEMENT PROJECTS**

OWNER: **Lucas Metro Housing Authority**

BUILDING: _____

## CONTRACTOR'S REPRESENTATIVE CERTIFICATION

In accordance with the project specifications, the Contractor's Representative hereby certifies that they have visually inspected the entire asbestos work area including all applicable surfaces (pipes, ledges, walls, ceilings, floors, decon unit, poly, etc.) and have found no visible dust, debris, or residue.

NAME: _____ DATE: _____

SIGNATURE: _____

COMPANY: _____

## OWNER'S REPRESENTATIVE CERTIFICATION

The Owner's Representative hereby certifies that they have conducted a final visual inspection of the work area at the request of the Contractor's Representative, and verifies that this inspection has been thorough and, to the best of their knowledge and belief, the Contractor's certification above is a true and honest one.

NAME: _____ DATE: _____

SIGNATURE: _____

**Ohio EPA**

**Recommended Asbestos Medical Examination Determination**

**Information to the Examining Physician:** Please complete this form in order to assist the employer to comply with the Chapter 3710 of the Ohio Revised Code. This chapter requires that licensed asbestos hazard abatement contractors possesses a worker protection program consistent with the requirements of the United States Occupational Safety and Health Administration Asbestos Construction Standard 29 CFR 1926.1101.

Name of Individual Examined: _____

Employer: _____

Home Address of Individual: _____

Date of Examination: _____

Based upon the results of my examination of the above-named individual, I hereby declare that he or she (check and complete as necessary);

| | |
|---|---|
| | Is physically able to perform work as required by OSHA 29 CFR 1926.1101 and wear a negative pressure respirator. |
| | Is physically able to perform work as required by OSHA 29 CFR 1926.1101 and wear a negative pressure respirator **under the following limitations**: _____ |
| | Is **not** physically able to perform work as required by OSHA 29 CFR 1926.1101 and wear a negative pressure respirator. |

Name of Medical Facility: _____

Address of Medical Facility: _____

Telephone Number of Medical Facility: _____

Printed Name of Examining Physician: _____

Signature of Examining Physician: _____

**ASBESTOS HAZARD ABATEMENT PROJECT AGREEMENT**
**(To be kept on-site at all times during project)**

In accordance with Ohio Revised Code 3701-34-11 the following is the written project agreement for this asbestos project:

Project: **LMHA Boiler Replacement Project – Phase 2**
**Flory Gardens Apartments**

**Article 1** All persons working on this project shall be licensed by the Ohio EPA.

**Article 2** Final air clearance monitoring shall be by PCM with all 3 clearance samples less than 0.01 f/cc

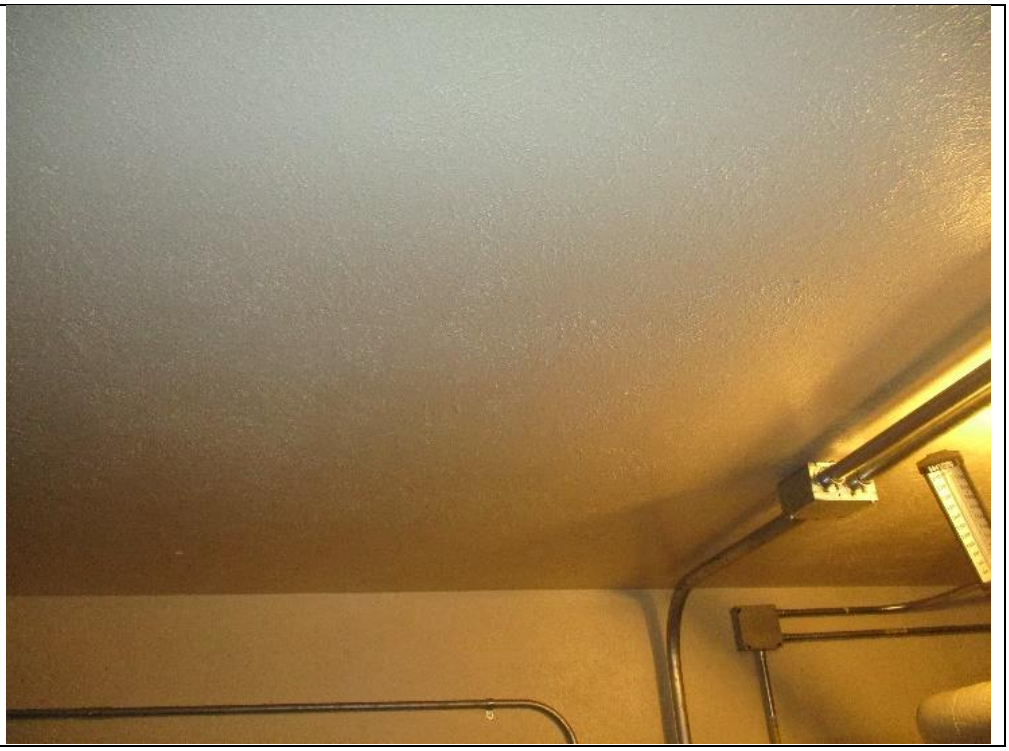
**Article 3** All clearance air sampling for this project will be conducted by a Certified Asbestos Hazard Evaluation Specialist.

**Article 4** The project activities are detailed in the Specifications and Project Design by Brumbaugh-Herrick, Inc. The summary of the activities are as follows:

| ASBESTOS MATERIALS | LOCATIONS | ASBESTOS QUANTITIES |
|---|---|---|
| Textured ceiling coating | Mechanical Rooms 1-10 | 2,160 SF |

**Article 5** All asbestos hazard abatement activities on this project shall be conducted in accordance with all applicable federal, state, and local asbestos regulations.

**PHOTOGRAPHS OF ASBESTOS MATERIALS**
**FLORY GARDENS APARTMENTS**

| | |
|---|---|
| **Photo 1**<br>Textured ceiling coating |  |

# SECTION 220000 - PLUMBING SPECIFICATION

## PART 1 - GENERAL

### 1.1 GENERAL SCOPE

A. The work required under this specification shall include all labor, materials, tools, equipment, power, transportation, hoisting implements, etc., necessary for the completion of the plumbing work of the contract: All as specified herein, shown on the drawings or reasonably implied by either, complete in every respect unless specified otherwise herein. The work included in this contract shall consist of the installation, test and guarantee of all work described on the plans and specifications.

### 1.2 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this and the other Sections of Division 22. This work shall be conducted as a prime contract.

### 1.3 PRE-BID QUESTION PROCEDURE

A. If a contractor, subcontractor, or supplier needs an interpretation of the contract documents prior to bid date, he or she must do so in writing by the following procedure:

1. Clearly identify the part of the contract documents in question (reference specification section and page, drawing number and plan or section, etc.).
2. Clearly state the question and/or discrepancy.
3. Send via e-mail to the project manager at MDA Engineering, Inc., Kevin Lafferty, P.E. LEED AP, klafferty@mdaengr.com.
4. A response will be issued to all questions:

    a. In writing,
    b. In a timely fashion,
    c. To all appropriate parties.

5. Response worthy of issuing in the form of addendum will be issued as such.
6. Requests for contract document interpretation may also be made via:

    a. Pre-bid meeting (if applicable)
    b. Electronic mail
    c. Personal delivery to MDA Engineering, Inc.

7. Requests for contract document interpretation may not be made verbally (in person, by telephone, etc.).

## 1.4 DRAWINGS AND SPECIFICATIONS

A. Drawings indicate general arrangement of system and are to be followed insofar as possible. Deviations from drawings may be necessitated by field conditions. Detailed layouts of proposed departures to be submitted to Engineer for approval.

B. Drawings and specifications to be considered cooperative and anything appearing in specifications, but not on drawings, or vice versa, to be considered part of the contract and to be executed.

C. Drawings indicate size and approximate location of various parts of work and are to be used as a general guide for installation. However, drawings are, to a considerable extent, diagrammatic and exact locations of piping, ductwork, etc., may appear on the drawings or must be worked out on job. However, no changes in sizes to be made without written approval of Engineer. Errors or omissions discovered by bidding contractors prior to bid openings, to be called to attention of Engineer without delay.

D. If a specific item is specified or on drawings for multiple trades, this contractor shall include all items in the bid regardless of other trades. Resolution will be by addendum or change order.

E. Should a conflict in requirements of the contract documents, technical specifications and/or drawings occur, the more stringent requirement shall apply and be included in the base bid.

## 1.5 ALTERNATES

A. Refer to drawings and front end specifications for lists of alternates and work associated with such alternates.

## 1.6 PROJECT CLOSEOUT

A. In order to achieve a complete and commissioned project, each contractor is responsible for the following items:

1. Building inspection certificates.
2. As-built drawings.
3. Final payment request.
4. Waiver of liens.
5. Demonstration certificates signed by owner.
6. Delivery of extra materials.
7. Return of borrowed keys and working permits.
8. Letter declaring punch list items completed.
9. Operation and maintenance manuals.
10. Final guarantee and execution of warranties.
11. Other requirements specified in division 1 specifications.

## 1.7 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1.

## 1.8 EQUIPMENT AND SYSTEMS DEMONSTRATION

A. Each contractor is responsible for verifying the complete operation of the equipment and systems installed as a part of the work. After the contractor is satisfied the work meets the specified intents and sequences of operation, the contractor shall schedule, through the Engineer, a session during which all aspects of the work are explained to the Owner's personnel and/or representatives.

B. Provide LMHA staff with system training regarding basic operations, adjustments, maintenance and troubleshooting methods. This shall include distribution of maintenance manuals along with actual system demonstrations.

## 1.9 INSPECTION OF EXISTING AND GENERAL CONDITIONS

A. The Contractor will be held to have personally inspected the site of the proposed work to arrive at a clear understanding of the conditions under which the work is to be performed, the extent of other Contractor's activities in the area, and to become fully acquainted with the receiving and storage spaces available. The Contractor shall be held to have compared the premises and site with the drawings and specifications, and shall be satisfied as to the conditions of the premises, the actual elevations, and any other conditions affecting the carrying out of the work, before the delivery of this proposal.

B. No allowances or extra consideration on behalf of the Contractor will subsequently be allowed by reason of the Contractor's failure to have become familiar with site conditions, error or oversight on the part of the Contractor or due to interferences by the owner's or other Contractor's activities.

C. Items specified on plumbing schedules and plans are the basis of design. Equality of other equipment shall be determined by the Owner and Engineer. Any modification to these documented methods that is made necessary by alternate equipment is the responsibility of the supplier of the alternate equipment.

D. Contractor is directed to include all necessary over time and premium time (Saturday, Sunday, Holidays) required for the completion of the intended work to meet specified schedules.

E. Do not scale plumbing drawings. For exact dimensions use dimensioned drawings or actual field conditions.

## 1.10 CODES, PERMITS AND COMPLIANCE

A. Contractor shall obtain and pay for all permits, licenses and inspections required by laws of governing bodies. Comply with all applicable codes and ordinances and all legal requirements. No extra compensation will be allowed for any changes necessary for code compliance regardless of the method of installation shown on the drawings or specified.

B. All plumbing work shall comply with current editions of all applicable state and local codes and ordinances.

C. All equipment, devices, and materials shall be the latest products of manufacturer and shall conform to the requirements noted on plans.

## 1.11 WORKMANSHIP

A. Workmanship shall be of the highest quality conforming to the best plumbing installation practice. Any work or material which is rejected must be removed immediately and replaced. No sub-standard work will be accepted.

B. The brevity of this specification shall not be construed as relieving the Contractor of his responsibility to perform all work in a first class workmanlike manner.

## 1.12 SUBMITTALS AND RECORD DRAWINGS

A. Submit shop drawings and catalog data for approval for all equipment and materials specified for this project prior to ordering or manufacture of such. Shop drawings not stamped with Contractor approval will be rejected.

B. The Contractor shall keep an accurate record of all deviations from the approved design documents and specifications which may occur in the work as actually constructed and shall submit same to the Engineer or Owner’s representative at completion of the job.

C. Submittals shall be coordinated through the Engineer.

## 1.13 TESTS AND GUARANTEE

A. All tests for various systems shall be performed as required, consistent with good general practice and in compliance with codes and authorities.

B. As a condition precedent to the final payment, the Contractor shall execute to the Owner a guarantee in a form approved by the Owner. Guarantee shall warrant that all work included in this division of the specifications will remain in serviceable and perfect condition (Ordinary wear and tear, abuse and causes beyond the control of the Contractor excluded) for a period of one year from date of final completion and acceptance of work, and that the Contractor will make good at his own expense, without cost to the Owner, any imperfections in whole or in part which may develop in this work during the period above specified, including any damage to other work caused by such imperfections or repairing of same.

C. All plumbing systems, devices and related items shall be tested. Replace any and all defective device items or systems before completion of the project.

1.14 COORDINATION

A. Field verify exact location of all new equipment with existing conditions and coordinate with the general and other Contractors prior to rough-in and/or installing any of this work.

B. Field verify all clearances and conditions prior to the start of any piping, fixtures, etc.; Verify locations of all piping, fixtures, equipment, devices, etc., with, HVAC, Fire Protection, Structural and Electrical drawings prior to rough-in. Report any discrepancies to the Engineer prior to proceeding with work.

C. All interruptions of services to existing or operable facilities shall be scheduled with the Owner a minimum 72 hours in advance. The Contractor shall not interrupt or restore services without prior consent of the Owner. The interruption shall be only for the specified scheduled time. The Owner or Electrical Contractor will be responsible for disconnecting and start-up of electrical or process systems.

D. Coordinate all power wiring, safety disconnect means, motor control and control wiring for plumbing equipment with the Electrical Contractor.

E. Refer to electrical drawings for work involving electrical power supply wiring from power source to unit connection points.

F. Locate and install all handicap devices as indicated in accordance with Americans with Disabilities Act Guidelines.

G. Prepare coordination drawings to a scale of one-quarter inch equals one-foot or larger; detailing major elements, components and systems of mechanical equipment and materials in relationship with other systems, installations, elevations, and building components. The Contractor assumes all responsibility for installation of all systems if coordination drawings are not prepared.

H. Coordinate final invert elevations of all sanitary drainage piping with the existing conditions prior to installation.

1.15 IDENTIFICATION

A. Install snap-on plastic or adhesive pipe markers with system identification and direction of flow on all piping systems.

B. Install engraved plastic laminate sign or equipment marker on or near each major item of plumbing equipment.

C. Install valve tag on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shut-off valves, faucets, convenience and lawn-watering hose bibbs, and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule mounted in each major equipment room.

## 1.16 DEMOLITION, REMOVALS, CLEAN-UP, PROTECTION AND TOUCH-UP

A. Remove all existing piping, fixtures, equipment, devices, etc., scheduled for removal or not required to remain in service. Contractor shall coordinate removal with Owner and all other trades on the project. All piping, etc., shall be removed back to the point of service. Provide additional piping, etc., to maintain functional systems.

B. This Contractor shall dispose of all materials generated from removal and installation of this work. Debris shall be removed from the project site weekly. This Contractor shall provide to the Owner any salvageable materials as directed by the Owner or Engineer.

C. Upon completion of work, this Contractor shall thoroughly clean all apparatus furnished by this contract.

D. All equipment, fixtures, items, devices and appurtenances shall be protected from debris and damage while stored at the site, and during and after installation.

E. Scarred factory-finished mechanical equipment shall be touched up with factory furnished paint. Rusted or marred surfaces of plumbing equipment shall be cleaned and primed before painting.

F. Patch finished surfaces and building components using new materials matching existing materials and experienced installers.

G. All cutting and patching of roof, walls, floors, and slabs, etc. is the responsibility of this contractor unless specifically stated otherwise on the drawings.

## 1.17 MAINTENANCE MANUALS

A. Prepare Maintenance Manuals. Provide a minimum of four copies to the Engineer for approval. Include the following information for equipment items:

1. Complete information on project equipment and services as was submitted during the course of the project. This information is solely intended to provide the Owner with accurate, usable information on how to care for his facility.
2. Description of function, normal operating characteristics and limitations, performance curves, Engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
3. Manufacturer’s printed warranties.
4. Manufacturer’s printed operating procedures to include start-up, break-in and routing and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.

5. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassemble; aligning and adjusting instructions.
6. Servicing instructions and lubrication charts and schedules.

## PART 2 - BASIC MATERIALS AND METHODS

### 2.1 PIPE AND EQUIPMENT INSULATION

A. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this section according to ASTM E 84, by a Testing and Inspecting Agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable Testing and Inspecting Agency.

1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

B. Insulation Materials

1. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

a. Preformed Pipe Insulation: Comply with ASTM C 547, Type I, with factory-applied, all purpose, vapor-retarder jacket.

2. Flexible elastomeric thermal insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials. For concealed piping installations (in walls, below floors, or non-accessible chases only).

a. Adhesive: as recommended by insulation material manufacturer.
b. Ultraviolet-Protective Coating: as recommended by insulation manufacturer.

3. Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in preforming insulation to cover valves, elbows, tees, and flanges.

C. Field-Applied Jackets

1. General: ASTM C 921, Type I, unless otherwise indicated.
2. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant Kraft paper and aluminum foil.

D. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping and equipment, including fittings, valves, and specialties.

E. Interior Insulation Application Schedule

1. Refer to Interior Insulation Application Schedule on Construction Documents for requirements.
2. The application schedules are for below and above ground insulation of piping and equipment systems inside the building.

## 2.2 VALVES

A. Ball Valves

1. Ball valves, **3** inches and smaller: MSS SP-110, Class 150, 600-psi CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for plumbing applications; full port for HVAC application; blowout proof; bronze or brass stem; Teflon seats and seals; threaded or soldered end connections:

    a. Operator: Vinyl-covered steel lever handle.
    b. Operator: Lever operators with lock.
    c. Stem Extensions: For valves installed in insulated piping.
    d. Memory Stop: For operator handles where used for balancing applications.

B. Check Valves

1. Swing Check Valves, 2 inches and Smaller: MSS SP-80; Class 125, 200-psi CWP, or Class 150, 300-psi CWP; horizontal swing, y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded or soldered end connections.
2. Swing Check Valves, 2-1/2 inches and Larger: MSS SP 71, Class 125, 200-psi CWP, ASTM A 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.
3. Wafer Check Valves: Class 125, 200 psi CWP, ASTM A 126 cast-iron body, bronze disc/plates, stainless-steel pins and springs, BUNA N seals, installed between flanges.

C. Circuit Setters

1. Valves 1/2” to 2” pipe size, NPT or sweat.

    a. All valves to be of bronze body/brass ball construction with glass and carbon filled TFE seat rings. Valves to have differential pressure read-out ports across valve seat area. Read-out ports to be fitted with internal EPT insert and check valve. Valve bodies to have 1/4” NPT tapped drain/purge port. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated nameplate to assure specific valve setting. Valves to be leak-tight at full rated working pressure.

b. Design Pressure/Temperature: 1/2" and 1" sweat connections: 200 psig at 250 deg. F.

2. Preformed insulation: All valves to be provided with molded insulation to permit access for balance and read-out.

D. Balance Valves

1. Manual Balance Valve with Flow Meter; Low-Lead; pipe sizes 1/2 to 1-inches; 150-psi max. working pressure; NSF/ANSI 372-2011 Certified; NSF/ANSI 61 Certified.

a. Manual balancing valve with magnetic movement flow indicator; no-cloud site gauge for director flow rate reading; low-lead brass valve body, stainless steel ball, chrome-plated brass ball control stem, stainless steel flow meter bypass valve stem, stainless steel flow meter springs, flow meter float and indicator cover, PTFE ball seal seat, EPDM seals, and inlet flow check valve, and 2-inch diameter temperature gauge (30 to 210 deg. F.).

E. Strainers: Y pattern, except where otherwise indicated, full size of connecting piping. Include type 304 stainless steel screens with 3/64 inch perforations except where other screens are indicated.

1. Pressure Rating: 125-psig minimum steam working pressure except where otherwise indicated.
2. Sizes 2 inches and Smaller: Bronze body, with female threaded ends.
3. Sizes 2 1/2 inches and Larger: Cast-iron body, with interior FDA-approved epoxy coating and flanged ends.
4. Y-Type Strainers: Screwed screen retainer with centered blowdown.

a. Drain: Pipe plug.
b. Drain: Factory-or field installed hose-end drain valve.

F. Natural Gas Valves

1. Gas Valves, 2-inch NPS and Smaller: 125 psig WOG minimum, equivalent to ASME B16.33, lubricated, straightaway pattern, cast-iron or ductile-iron body. Include tapered plug, o-ring seals, square or flat head, and threaded ends conforming to ASME b1.20.1.
2. Gas Valves, 3-inch NPS and Smaller: MSS SP-110, 150 psig WOG, ASTM B 584 bronze body, chrome plated brass ball, standard port, 2 piece with threaded ends conforming to ASME B1.20.1.

## 2.3 PIPING

A. Regulatory Requirements: Comply with the provisions of the following:

1. ASME B 31.9 "Building Services Piping" for materials, products and installation.

2. Safety valves and pressure vessels shall bear the appropriate ASME label.
3. ASME "Boiler and Pressure Vessel Code", Section IX, "Welding and Brazing Qualification" for qualifications for welding processes and operators.
4. ASSE certified products: tested and certified by qualified laboratories for performance requirements of product standards.
5. Ohio Plumbing Code.
6. NFPA 54.
7. International Fuel Gas Code.
8. NSF Standard: Comply with NSF 61 Annex G, "Drinking Water System Components – Health Effects".

B. Provide components and installation capable of producing piping systems with the following minimum working pressure ratings, except where indicated otherwise:

1. Water Distribution Systems, Below Ground: 150 psig.
2. Water Distribution Systems, Above Ground: 125 Psig.
3. Soil, Waste, and Vent Systems: 10-Foot head of water.
4. Natural Gas Systems, Above Grade: 150 Psig.

C. Sanitary Waste and Vent Piping Below Floor.

1. Poly Vinyl Chloride (PVC) plastic DWV pipe; ASTM D 2665, Schedule 40, plain ends with socket-type DWV fittings.

D. Sanitary Waste and Vent Piping Above Floor.

1. Poly Vinyl Chloride (PVC) plastic DWV pipe; ASTM D 2665, Schedule 40, plain ends with socket-type DWV fittings. (**Not permitted in HVAC return air plenums**).
2. Hubless cast iron soil pipe; plain ends, CISPI 301, with stainless steel, heavy-duty couplings for hubless cast-iron soil pipe and fittings, ASTM C 564 Neoprene sealing gasket, with Type 304 stainless-steel housing or shield and stainless-steel clamps tightened to 80 inch pounds of torque. Coupling shall be 3 inches wide in sizes 1-1/2 to 4 inches and 4 1/2 inches wide in sizes 5 to 10 inches.
3. All horizontal storm piping and the first 24-inches of the vertical storm pipe drop to be insulated per Section 2 of this specification.

E. Heavy-Duty, Shielded, Stainless-Steel Couplings: ASTM C 1540, with stainless-steel shield, stainless-steel bands and tightening devices, and ASTM C 564, rubber sleeve.

1. Manufacturers:

a. ANACO - Huskey.
b. Clamp-All Corp.
c. Fernco.
d. Ideal Div.; Stant Corp.
e. MIFAB.
f. Mission Rubber Co.

F. Transition Couplings.

1. General Requirements: Fitting or device for joining piping with small differences in OD's or of different materials. Include end connections same size as and compatible with pipes to be joined.
2. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.
3. Shielded, Nonpressure Transition Coupling.

    a. Manufacturers:

        1) ANACO - Huskey.
        2) Fernco, Inc.
        3) Mission Rubber Co.

    b. Standard: ASTM C 1460.
    c. Description: Elastomeric or rubber sleeve with full-length, corrosion-resistant outer shield and corrosion-resistant-metal tension band and tightening mechanism on each end.

G. Domestic Water Supply Above Floor.

1. Hard Copper Tube; ASTM B 88; Type L, water tube, drawn temper, with wrought copper solder-joint pressure fittings ASME B16.22.
2. Copper Pressure-Seal-Joint Fittings:

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

        1) Elkhart Product Corporation; Industrial Division.
        2) NIBCO, Inc.
        3) Viega; Plumbing and Heating Systems.

    b. NPS and Smaller: Wrought-copper fitting with EPDM-rubber O-ring seal in each end.
    c. NPS 2-1/2 to NPS 4: Cast-bronze or wrought-copper fitting with EPDM-rubber O-ring seal in each end.

3. Grooved-Joint Copper-Tube Appurtenances:

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

        1) Anvil International.
        2) Shurjoint Piping Products.
        3) Victaulic Company.

H. Natural Gas Piping

1. General: Flanges, unions, transition and special fittings, and valves with pressure ratings same as or higher than system pressure rating may be used in applications below, except where otherwise indicated.
2. Low-Pressure, 2.0 psig or less, Natural Gas Systems: Use the following:

a. 2-inch NPS and Smaller: Black steel pipe, ASTM A53, Seamless, Grade B, Schedule 40, black, malleable-iron threaded fittings, and threaded joints.
b. 2-1/2- to 4-inch NPS: Black steel pipe, butt-welding fittings, and welded joints.

3. Damage and Touchup: Repair marred and damaged factory-applied finishes with materials and by procedures to match original factory finish.
4. Inspect, test and purge piping according to IFGC and NFPA 54, Part 4 "Gas Piping Inspection, Testing and Purging" and requirements of authorities having jurisdiction.

I. Natural Gas Pressure Regulators:

1. General Requirements:

a. Single stage and suitable for natural gas.
b. Steel jacket and corrosion-resistant components.
c. Elevation compensator.
d. End connections: Threaded for regulators NPS 2 and smaller.

2. Appliance Pressure Regulators: Comply with ANSI Z21.18.

a. Body and diaphragm case: die-cast aluminum.
b. Springs: Zinc-plated steel; interchangeable.
c. Diaphragm plate: Zinc-plated steel.
d. Seat disc: Nitrile rubber.
e. Seal plug: Ultraviolet-stabilized, mineral-filled nylon.
f. Factory-applied finish: Minimum three-layer polyester and polyurethane paint finish.
g. Regulator may include vent limiting device, instead of vent connection, if approved by authorities having jurisdiction.
h. Maximum inlet pressure: 2 psig.

J. Miscellaneous Fittings:

1. Bronze Flanges: ASME B16.24, Classes 150 and 300.
2. Copper Unions: ASME B16.18, Cast-Copper-Alloy body, hexagonal stock, with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends.

a. Threaded Ends: Threads conforming to ASME B1.20.1.

3. Malleable-Iron Unions: ASME B16.39, Classes 150 and 300, hexagonal stock, with ball-and-socket joint, metal-to-metal bronze seating surfaces, and female threaded ends having threads conforming to ASME B1.20.1.

K. Pipe Support

1. Install hangers with the minimum rod sizes and maximum spacing or where more stringent, comply with local building code requirements: Refer to Plumbing Schedules on Construction Documents for requirements.

L. Locations and Arrangements: Drawings (plans, schematics and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

M. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

N. Install drains at low points in mains, risers, and branch lines consisting of a tee fitting, 3/4" ball valve and short 3/4", threaded nipple and cap.

O. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test. Test CPVC systems at maximum 150 psi. Check to verify that stress due to pressure at bottom of vertical runs do not exceed either 90 percent of specified minimum yield strength or 1.7 times "SE" value in Appendix A of ASME B31.9, code for pressure piping, "Building Services Piping." After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components as appropriate, and repeat hydrostatic test until there are not leaks. Prepare written report of testing.

P. Cleaning

1. Clean and disinfect water distribution piping as follows:

    a. Purge new potable water distribution piping systems and parts of existing potable water systems that have been altered, extended, or repaired prior to use.
    b. Use purging and disinfecting procedure prescribed by authority having jurisdiction or, if a method is not prescribed by authority, the procedure described in either AWWA C651 or AWWA C652 or as described below:

        1) Flush piping system with clean, potable water until dirty water does not appear at outlets.
        2) Fill system or part thereof with water/chlorine solution containing at least 50 parts per million of chlorine. Isolate (valve off) and allow to stand for 24 hours.
        3) Drain system or part thereof of previous solution and refill with water/chlorine solution contain at least 200 parts per million of chlorine. Isolate and allow to stand for 3 hours.
        4) Flush system with clean, potable water until chlorine does not remain in water coming from system following allowed standing time.
        5) Submit water samples in sterile bottles to authority having jurisdiction. Repeat procedure if biological examination made by the authority shows evidence of contamination.

2. Prepare and submit reports for purging and disinfecting activities.

3. Clean interior of piping system. Remove dirt and debris as work progresses.

## PART 3 - PRODUCTS AND EXECUTION

### 3.1 BACKFLOW PREVENTERS

A. Manufacturers: Subject to compliance with requirements provide product by one of the following: AMES Company; Apollo, Beeco, Inc.; Conbraco Industries; Watts Regulator Company; Zurn - Wilkins Regulator Division.

B. Reduced-Pressure-Principal Backflow Preventer: ASSE 1013, consisting of shut off valves on inlet and outlet and strainer on inlet. Include test cocks and pressure-differential relief valve having ASME A112.1.2 air-gap fitting located between 2 positive-seating check valves for continuous pressure application.

### 3.2 WATER TEMPERING VALVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Apollo, Bradley; Caleffi; Powers Process Controls; Lawler; Armstrong; Watts; Zurn Industries.

B. System Water-Tempering Valves: ASSE 1017; 1016; 1070, Piston or discs controlling both hot-water and cold-water flow, capable of limited anti-scald protection and capacity at pressure loss. Include threaded inlets and outlet and temperature range or setting as indicated.

### 3.3 HOSE BIBBS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: J.R. Smith Manufacturing Company; MiFab, Prier; Wade; Watts Regulator Company; Woodford Manufacturing Company; Zurn Industries.

B. Refer to Plumbing Specialties Schedule on Construction Documents for hose bibb and freeze-proof wall hydrant types, model numbers, and applications.

### 3.4 BARRIER-FREE TIRE TRAP SEAL PROTECTION DEVICE

A. Standard: ASSE 1072 for flow rates.

B. Material: HDPE (High Density Polyethylene) Housing; EPDM rubber sealing gasket.

### 3.5 THERMOMETERS

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

B. Case: Plastic, 7 inches long.

C. Tube: Red or blue reading, mercury or organic-liquid filled, with magnifying lens.

D. Tube Background: Satin-faced, nonreflective aluminum with permanently etched scale markings.

E. Window: Glass or plastic.

F. Connector: Adjustable type, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device.

G. Stem: Metal, for thermowell installation and of length to suit installation.

H. Accuracy: Plus or minus 1 percent of range or plus or minus 1 scale division to maximum of 1.5 percent of range.

I. Scale Range:

1. Cold: 0 – 100 deg. F
2. Hot: 30 – 180 deg. F

## 3.6 FLOOR DRAINS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: J.R. Smith Manufacturing Company; Josam Company; MiFab; Sioux Chief; George Fischer; Orion Fittings; Spears; Wade; Zurn Industries, Watts Drainage Products.

B. Refer to Plumbing Specialties Schedule on Construction Documents for floor drain type, model number, and application.

C. Floor Drain Installation.

1. Install floor drains according to manufacturer’s written instructions, in locations indicated.
2. Install floor drains at low points of surface areas to be drained, or as indicated. Set tops of drains flush with finished floor.

## 3.7 CLEANOUTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: J.R. Smith Manufacturing Company; Josam Company, MiFab; Sioux Chief; Wade; Watts Drainage Products; Zurn Industries; George Fischer; Orion Fittings; Spears.

B. Refer to Plumbing Specialties Schedule on Construction Documents for roof drain type, and model number.

C. Cleanout Installations.

1. Install cleanouts according to manufacturer's written instructions, and in locations indicated.
2. Size same as drainage piping up to NPS 4. Use 4NPS for larger drainage piping unless otherwise indicated.
3. Locate at each change in direction of piping greater than 45 degrees.
4. Locate at Code required minimum intervals.
5. Locate at base of each vertical soil stack and waste stack.

## 3.8 INDIRECT FIRED WATER HEATER TANKS **(LMHA – FLORY GARDENS)**

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: A.O. Smith Company; Bradford White Corporation; Lochinvar Corporation.

B. Description: Factory-packaged, hot-water storage tank with heat-exchanger coil, controls, and specialties for heating domestic water with heating hot water in coil.

C. Flow Pattern: Standard-flow arrangement, with water from bottom of storage tank circulated across heat-exchanger coil and return to tank. Include ho-water outlet located at op of tank and temperature sensor in tank.

D. Tank Construction: (Non) ASME-Code, with 150-psig working-pressure rating.

E. Tappings: Factor fabricated of materials compatible with tank. Attach tappings to tank before testing and labeling.

1. NPS 2 and smaller: Threaded ends.

## 3.9 COMPRESSION TANK

A. Description: Factory-assembled and -tested; Steel, ASME and Non-ASME pressure-rated tank constructed with welded joints and factory-installed, butyl-rubber diaphragm. Include air pre-charge to minimum system-operating pressure at tank.

1. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
2. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
3. Air-Charging Valve: Factory installed.

## 3.10 DOMESTIC HOT WATER CIRCULATING PUMP – VARIABLE SPEED WET ROTOR

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

1. Armstrong Pumps Inc.
2. Bell & Gossett Domestic Pump; ITT Corporation.
3. Grundfos Pumps Corp.
4. TACO Incorporated.
5. WILO USA.

B. Description: Factory-assembled and -tested, in-line, wet rotor design.

1. The pump shall be a standard product of a single pump manufacturer. The pump, motor, and variable speed drive shall be an integral product designed and built by the same manufacturer.
2. Certified and listed: UL778; UL 60730-1A.

C. Pump Construction:

1. Pump Housing: 304 Stainless Steel.
2. Impeller: Composite PES.
3. Rotor Can: 304 Stainless Steel.
4. Rotor Cladding: 316 Stainless Steel.
5. Shaft: Ceramic.
6. Thrust Bearing: Carbon Graphite.
7. Gaskets: EPDM.
8. Bearing Plate: 304 Stainless Steel.
9. Control Box: Polycarbonate.

D. Capacities and Characteristics:

1. Maximum Working Pressure: 145 psig.
2. Minimum Media Temperature: 36 deg. F.
3. Maximum Media Temperature: 230 deg. F.
4. Maximum Continuous Operating Media Temperature: 203 deg F.
5. Electrical Characteristics:
   a. Volts: 115.
   b. 45W.

E. Motors.

1. Motor shall be 4-pole permanent-magnet and tested with the pump as one unit.
2. Motor shall be in the integrated Variable Speed Drive design consisting of a motor and a Variable Frequency Drive built and tested as one unit.
3. Motor to be cooled by the pumped fluid.
4. Motor to be self-ventilating.

F. Minimum insulation class for the motor shall be Class F.

G. Operating Modes.

1. AutoAdapt: Controls the pump performance automatically within the defined performance range based on the sensed demand.
2. Constant Pressure: A manual set, constant head is maintained, irrespective of flow up to the maximum speed of the pump.
3. Constant Speed: The pump runs as an uncontrolled pump by the means of a set of pump curves, adjustable between 3-curve sets from the control panel.

H. Interface and Communication.

1. The pump shall have an integrated operator interface consisting of; push button for navigation; and LEDs to signal pump operating mode.

I. Installation.

1. Pump shaft shall be installed horizontally, terminal box shall be located per manufactures recommendations.

END OF DOCUMENT 220000

# SECTION 230000 - MECHANICAL SPECIFICATION

## PART 1 - GENERAL

### 1.1 GENERAL SCOPE

A. The work required under this specification shall include all labor, materials, tools, equipment, power, transportation, hoisting implements, etc., necessary for the completion of the mechanical work of the contract: all as specified herein, shown on the drawings or reasonably implied by either, complete in every respect unless specified otherwise herein. The work included in this contract shall consist of the installation, test and guarantee of all work described on the plans and specifications.

### 1.2 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 Specification Sections, apply to this and the other Sections of Division 23. This work shall be conducted as a prime contract.

### 1.3 PRE-BID QUESTION PROCEDURE

A. If a contractor, subcontractor, or supplier needs an interpretation of the contract documents prior to bid date, he or she must do so in writing by the following procedure:

1. Clearly identify the part of the contract documents in question (reference specification section and page, drawing number and plan or section, etc.).
2. Clearly state the question and/or discrepancy.
3. Send via e-mail to the project manager at MDA Engineering, Inc., Kevin Lafferty, P.E. LEED AP, klafferty@mdaengr.com.
4. A response will be issued to all questions:

    a. In writing,
    b. In a timely fashion,
    c. To all appropriate parties.

5. Response worthy of issuing in the form of addendum will be issued as such.
6. Requests for contract document interpretation may also be made via:

    a. Pre-bid meeting (if applicable)
    b. Electronic mail
    c. Personal delivery to MDA Engineering, Inc.

7. Requests for contract document interpretation may not be made verbally (in person, by telephone, etc.).

## 1.4 DRAWINGS AND SPECIFICATIONS

A. Drawings indicate general arrangement of system and are to be followed insofar as possible. Deviations from drawings may be necessitated by field conditions. Detailed layouts of proposed departures to be submitted to Engineer for approval.

B. Drawings and specifications to be considered cooperative and anything appearing in specifications, but not on drawings, or vice versa, to be considered part of the contract and to be executed.

C. Drawings indicate size and approximate location of various parts of work and are to be used as a general guide for installation. However, drawings are, to a considerable extent, diagrammatic and exact locations of piping, ductwork, etc., may appear on the drawings or must be worked out on job. However, no changes in sizes to be made without written approval of Engineer. Errors or omissions discovered by bidding contractors prior to bid openings, to be called to attention of Engineer without delay.

D. If a specific item is specified or on drawings for multiple trades, this contractor shall include all items in the bid regardless of other trades. Resolution will be by addendum or change order.

## 1.5 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1.

## 1.6 EQUIPMENT AND SYSTEMS DEMONSTRATION

A. Each contractor is responsible for verifying the complete operation of the equipment and systems installed as a part of the work. After the contractor is satisfied the work meets the specified intents and sequences of operation, the contractor shall schedule, through the Engineer, a session during which all aspects of the work are explained to the owner’s personnel and/or representatives.

B. Provide LMH staff with system training regarding basic operations, adjustments, maintenance and troubleshooting methods. This shall include distribution of maintenance manuals along with actual system demonstrations.

## 1.7 INSPECTION OF EXISTING AND GENERAL CONDITIONS

A. The contractor will be held to have personally inspected the site of the proposed work to arrive at a clear understanding of the conditions under which the work is to be performed, the extent of other contractor’s activities in the area, and to become fully acquainted with the receiving and storage spaces available. The contractor shall be held to have compared the premises and site with the drawings and specifications, and shall be satisfied as to the conditions of the premises, the actual elevations, and any other conditions affecting the carrying out of the work, before the delivery of this proposal.

B. No allowances or extra consideration on behalf of the contractor will subsequently be allowed by reason of the contractor's failure to have become familiar with site conditions, error or oversight on the part of the contractor or due to interferences by the owner's or other contractor's activities.

C. Items specified on mechanical equipment schedules and plans are the basis of design. Equality of other equipment shall be determined by the owner and Engineer. Any modification to these documented methods that is made necessary by alternate equipment is the responsibility of the supplier of the alternate equipment.

D. Contractor is directed to include all necessary overtime and premium time (Saturday, Sunday, Holidays) required for the completion of the intended work to meet specified schedules.

E. Do not scale mechanical drawings. For exact dimensions, use dimensioned drawings or actual field conditions.

## 1.8 CODES, PERMITS AND COMPLIANCE

A. Engineer will obtain plan review approval for each Flory Gardens and Vistula Manor, separately thought the City of Toledo. Contractor shall obtain and pay for all permits, licenses and inspections required by laws of governing bodies. Comply with all applicable codes and ordinances and all legal requirements. No extra compensation will be allowed for any changes necessary for code compliance regardless of the method of installation shown on the drawings or specified.

B. All mechanical work shall comply with current editions of all applicable state and local codes and ordinances.

C. All equipment, devices and materials shall be the latest products of manufacturer and shall conform to the requirements noted on plans.

## 1.9 WORKMANSHIP

A. Workmanship shall be of the highest quality conforming to the best mechanical installation practice. Any work or material which is rejected must be removed immediately and replaced. No sub-standard work will be accepted.

B. The brevity of this specification shall not be construed as relieving the contractor of his responsibility to perform all work in a first-class workman like manner.

## 1.10 SUBMITTALS AND RECORD DRAWINGS

A. Submit shop drawings and catalog data for approval for all equipment and materials specified for this project prior to ordering or manufacture of such. Shop drawings not stamped with contractor approval will be rejected.

B. The contractor shall keep an accurate record of all deviations from the approved design documents and specifications which may occur in the work as actually constructed and shall submit same to the Engineer or owner's representative at completion of the job.

C. Submittals shall be coordinated through Engineer.

1.11 TESTS AND GUARANTEES

A. All tests for various systems shall be performed as required, consistent with good general practice and in compliance with codes and authorities.

B. As a condition precedent to the final payment, the contractor shall execute to the owner a guarantee in a form approved by the owner. Guarantee shall warrant that all work included in this Division of the specifications will remain in serviceable and perfect condition (ordinary wear and tear, abuse and causes beyond the control of the contractor excluded) for a period of one year from date of final completion and acceptance of work and that the contractor will make good at his own expense, without cost to the owner, any imperfections in whole or in part which may develop in this work during the period above specified, including any damage to other work caused by such imperfections or repairing of same.

C. All mechanical systems, devices and related items shall be tested. Replace any and all defective device items or systems before completion of the project.

1.12 COORDINATION

A. Field verify exact location of all new equipment with existing conditions and coordinate with the general and other contractors prior to rough-in and/or installing any of this work. Report any discrepancies to the Engineer prior to proceeding with work.

B. Field verify all clearances and conditions prior to the start of any piping, ductwork, etc., verify locations of all piping, ductwork, equipment, devices, etc., with electrical drawings and existing conditions prior to rough-in. Report any discrepancies to the Engineer prior to proceeding with work.

C. All interruptions of services to existing or operable facilities shall be scheduled with the owner a minimum two (2) weeks in advance. The contractor shall not interrupt or restore services without prior consent of the owner. The interruption shall be only for the specific scheduled time.

D. Coordinate all power wiring, safety disconnect means, motor control and control wiring for mechanical equipment with the electrical contractor.

E. Refer to electrical drawings for work involving electrical power supply wiring from power source to unit connection points.

F. Locate and install all required devices in accordance with American Disabilities Act guidelines.

G. Prepare coordination drawings to a scale of one quarter inch equals one foot or larger; detailing major elements, components and systems of mechanical equipment and materials in relationship with other systems, installations, elevations, and building components. The contractor assumes all responsibility for installation of all systems if coordination drawings are not prepared.

## 1.13 IDENTIFICATION

A. Install snap-on plastic or adhesive pipe markers with system identification and direction of flow on all piping systems.

B. Install engraved plastic laminate sign or equipment marker on or near each major item of mechanical equipment.

C. Install valve tag on valves and control devices in piping systems, except check valves, valves within factory-fabricated equipment units, plumbing fixture supply stops, shut-off valves, faucets, convenience and lawn-watering hose bibs, and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in valve schedule mounted in each major equipment room.

## 1.14 DEMOLITION, REMOVALS, CLEAN-UP, PROTECTION AND TOUCH-UP

A. Remove all existing piping, ductwork, equipment, devices, etc., scheduled for removal or not required to remain in service. Contractor shall coordinate removal with owner and all other trades on the project. All piping, ductwork, etc., shall be removed back to the point of service. Provide additional piping, ductwork, etc., to maintain functional systems.

B. This contractor shall dispose of all materials generated from removal and installation of this work. Debris shall be removed from the project site weekly. This contractor shall provide to the owner any salvageable materials as directed by the owner or Engineer.

C. Upon completion of work, this contractor shall thoroughly clean all apparatus furnished by this contract.

D. All equipment, items, devices and appurtenances shall be protected from debris and damage while stored at the site and during and after installation.

E. Scarred factory-finished mechanical equipment shall be touched up with factory furnished paint. Rusted or marred surfaces of mechanical equipment shall be cleaned and primed before painting.

F. Patch finished surfaces and building components using new materials matching existing materials and experienced installers.

G. All cutting and patching of roof, walls, floors, and slabs, etc. Is the responsibility of this contractor unless specifically stated otherwise on the drawings.

H. This contractor shall be responsible for all roof penetrations associated with installation of work on existing roof systems. All roof work shall be performed by a licensed and certified contractor so that all existing roof warranties are maintained.

I. This Contractor shall be responsible for securely anchoring all roof mounted equipment to roof curb/steel support structure. Comply with all Local and State Code requirements. All roof curbs supporting equipment shall be secured to roof structure and all roof mounted equipment shall be secured or strapped to roof curb/steel support structure.

## 1.15 GENERAL INSTALLATION REQUIREMENTS

A. Do not scale mechanical drawings. For exact dimensions use dimensioned drawings on actual field conditions.

B. Securely anchor all roof mounted equipment to roof curb/steel support structure. Comply with all national, state, and local jurisdiction criteria for wind and seismic loading. All roof curbs supporting equipment shall be anchored to roof structure and all equipment shall be anchored/strapped securely to roof curb/support steel. Prior to any construction submit roof mounted equipment and curb mounting details for review by the Engineer.

C. The Contractor shall familiarize him/herself with all conditions under which all work must be performed and verify/check all elevations. Report any discrepancies to the Engineer.

D. The Contractor is responsible for fully coordinating all work with other trades prior to fabricating and/or installing any work to ensure proper clearances for installation and maintenance are maintained. Drawings are diagrammatic and indicate general arrangement of systems. Exact location of equipment, material, device, etc. Must be worked out in the field.

E. The Contractor shall turn over to the owner and/or dispose of as directed all existing equipment and materials being removed.

F. All equipment shall be new and shall be equal in quality and type and have all accessories as noted on the drawings and in the specifications. Make equipment selections and provide installations which meet or exceed the energy performance, heating/cooling capacities, and noise levels noted on the floor plans and specifications. Adjustments to construction and accessories on submitted equipment may be required to achieve this equality and shall be included at no extra cost to the owner. Make any changes in ductwork, piping, framing, etc., as required to accommodate substituted equipment.

G. Submit for approval data on proposed equipment and materials. Submittals shall include equipment sizes, capacity, motor locations, performance curves, and other pertinent

data. Each submittal shall include identification tags or symbols to match contract documents.

H. Install all equipment and materials and perform all work in accordance with all national, state, and local codes and regulations including energy efficiency guidelines.

I. Refer to H.V.A.C. sequences of operation (drawings and/or specifications). Provide all equipment, materials, devices, etc. As required to achieve those sequences.

J. Maintain minimum 10’-0” clearance between outdoor air intakes and exhaust, flues, and plumbing vents.

K. Maintain minimum 10’-0” between roof mounted equipment and roof edges.

L. All interactive wall mounted devices (thermostats, sensors, controllers, etc.) Shall be mounted per ADA requirements. Coordinate final location and heights of all devices with the owner.

M. The mechanical contractor shall be responsible for cutting and patching of wall/floors as required to facilitate installation of ductwork, piping, and control cabling.

N. The Mechanical Contractor shall be responsible for all roof penetrations associated with the installation of new work. The roof work shall be performed by a licensed and certified contractor so that all existing roof warranties are maintained.

O. Protect all existing building components including all existing structure, finishes, and materials at all times from damage due to work under this contract or from damage due to exposure to the elements. Any such damage shall be repaired, patched, or replaced to match the original existing condition at no cost to the owner.

P. Install all ductwork and piping as high as possible to roof/floor structure. Coordinate ductwork and piping routing with fire suppression, plumbing, and electrical trades.

Q. Fabricate and install all ductwork in accordance with the latest edition of SMACNA guidelines for duct construction. All rectangular and round rigid ducts shall be of SMACNA gage steel unless otherwise noted on the drawings.

R. Provide test and balance services by a NEBB or AABC certified firm. Water and air quantities shall be balanced to not more than 10% above or 10% below the quantities shown on the drawings. Contractor shall submit a complete balance report indicating at minimum the air delivered for each diffuser, water flow to each coil, and final operating conditions of the systems.

S. The Electrical Contractor shall provide and wire the starters for all motors (where starters are required per electrical drawings). The Mechanical Contractor shall provide the auto control wiring, temperature safeties, and interlocks required by the specifications.

T. The Mechanical Contractor shall be responsible for all control wiring and raceways required for this project including 120 volt interlocks, 120 volt power supply to controllers, and data connections to panels unless indicated by others.

U. Install all cabling and raceways per requirements of electrical drawings and specifications.

V. Provide permanent plastic name plate for all equipment installed indicating the plan designation of the unit (EF-1, AHU-1, etc.) And also, the building area served (classrooms 2-4, conference room, etc.).

## 1.16 MAINTENANCE MANUALS

A. Prepare maintenance manuals. Provide a minimum of four copies with a single copy sent to the Engineer for approval. Include the following information for equipment items:

1. Complete information on project equipment and services as was submitted during the course of the project. This information is solely intended to provide the owner with accurate, usable information on how to care for his facility.
2. Description of function, normal operating characteristics and limitations, performance curves, Engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
3. Manufacturer's printed operating procedures to include start-up, break-in and routing 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 re-assemble; aligning and adjusting instructions.
5. Servicing instructions and lubrication charts and schedules.
6. MSDS for each chemical compound used in mechanical systems.

## 1.17 ELECTRONIC FILES

A. If the contractor chooses, MDA Engineering, Inc. Will provide electronic files for the contractor's convenience and use in preparation of shop drawings related to the project subject to the following terms and conditions:

1. MDA Engineering, Inc. Will furnish the contractor electronic files of drawing sheets specifically requested in writing by the contractor. The reference background files must be obtained from the Engineer.
2. A CADD contract shall be signed by an officer of the contracting company prior to delivery of the electronic files.
3. The contractors shall, to the fullest extent permitted by law, indemnify and hold harmless MDA Engineering, Inc., from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from your use of these electronic files.
4. MDA Engineering, Inc. Reserves the right to remove all indication of ownership and/or involvement from each electronic display because of the potential that the information on the electronic files can be modified.

5. Any other use or reuse by the contractor or by others will be at the contractor's sole risk and without liability or legal exposure to MDA Engineering, Inc. And owner.

## PART 2 - BASIC MATERIALS AND METHODS

### 2.1 DUCT INSULATION

A. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.
   1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

B. Insulation Materials
   1. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, type 1b, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil and vinyl film.

C. Field-Applied Jackets
   1. Foil and paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.

D. Apply insulation materials, accessories and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; and free of voids throughout the length of ducts and fittings.

### 2.2 PIPE AND EQUIPMENT INSULATION

A. Fire-Test-Response Characteristics: As determined by testing materials identical to those specified in this section according to ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and sealer and cement material containers with appropriate markings of applicable testing and inspecting agency.

   1. Insulation Installed Indoors: Flame-spread rating of 25 or less, and smoke-developed rating of 50 or less.

B. Insulation Materials

   1. Mineral-Fiber Insulation: Glass fibers bonded with a thermosetting resin complying with the following:

      a. Pre-Formed Pipe Insulation: Comply with ASTM C 547, Type I, with factory-applied, all purpose, vapor-retarder jacket.

b. Blanket Insulation: Comply with ASTM C 533, Type II, without facing.

2. Mineral-Fiber Board Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, type 1b, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil and vinyl film.

3. Mineral-Fiber Blanket Thermal Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 533, type II, without facing and with all-service jacket manufactured from kraft paper, reinforcing scrim, aluminum foil, and vinyl film.
4. Flexible Elastomeric Thermal Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

   a. Adhesive: As Recommended by insulation material manufacturer.

5. Prefabricated Thermal Insulating Fitting Covers: Comply with ASTM C 450 for dimensions used in pre-forming insulation to cover valves, elbows, tees, and flanges.

C. Field-Applied Jackets

1. General: ASTM C 921, Type I, unless otherwise indicated.
2. Foil and Paper Jacket: Laminated, glass-fiber-reinforced, flame-retardant kraft paper and aluminum foil.
3. PVC Jacket: High-impact, ultraviolet-resistant; 20 mil thick; roll stock ready for shop or field cutting and forming.

D. Apply insulation materials, accessories, and finishes according to the manufacturer's written instructions; with smooth, straight, and even surfaces; free of voids throughout the length of piping and equipment, including fittings, valves and specialties.

E. Hangers and Anchors: Where vapor retarder is required, seal penetrations in insulation at hangers, supports, anchors and other projections with vapor-retarder mastic to prevent condensation on all surfaces.

1. Apply insulation continuously through hangers and around anchor attachments.
2. For insulation application where vapor retarders are indicated, extend insulation of anchor legs at least 12 inches from point of attachment to pipe and taper insulation ends. Seal tapered ends with a compound recommended by the insulation material manufacturer to maintain vapor retarder.
3. Install high density insulation insert materials between pipe and protection shields at hangers and supports and apply insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by the insulation material manufacturer.
4. Cover inserts with jacket material matching adjacent pipe insulation. Install minimum 12 inches long, galvanized steel, shields over jacket, arranged to protect the jacket from tear or puncture by the hanger, support, and shield.

F. Interior Insulation Application Schedule

1. These application schedules are for above ground insulation of piping and equipment systems inside the building.

2. Service: Hot-Water Heating Supply and Return, 100 to 200 deg F.

| Hot-Water Heating Supply and Return (100 to 200 Deg. F.) | | | | |
|---|---|---|---|---|
| Pipe Sizes (NPS) | Materials | Thickness In Inches | Vapor barrier Req'd | Field-Applied Jacket |
| 1/2 to 1-1/4 | Glass Fiber | 1 | No | None |
| 1/2 to 1-1/4 | Flexible Elastomeric | 1/2 | No | None |
| | | | | |
| 1-1/2 to 4 | Glass Fiber | 1 | No | None |
| 1-1/2 to 4 | Flexible Elastomeric | 3/4 | No | None |
| | | | | |
| 5 to 10 | Glass Fiber | 1-1/2 | No | None |

3. Service: Interior Equipment Application Schedule

| Interior Equipment Application Schedule | | | | | |
|---|---|---|---|---|---|
| Equipment | Temp. | Materials | Thickness In Inches | Vapor Barrier Req'd | Field Applied Jacket |
| Thermal Storage Tanks | 32 to 75 Deg F. | Flexible Elastomeric | 1 | Yes | None |
| Heating Hot Water Air Sep. Tanks | 100 to 200 Deg F. | Glass Fiber | 1 | No | None |

## 2.3 VALVES

A. Gate Valves

1. Gate valves, 2 inches and smaller: MSS SP-80; Class 125, 200-psi Cold Working Pressure (CWP), or class 150, 300-psi CWP; ASTM B 62 cast-bronze body and bonnet, solid-bronze wedge, copper-silicon alloy rising stem, teflon-impregnated packing with bronze packing nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.
2. Gate valves, 2-1/2 inches and larger: MSS SP-70, Class 125, 200-psi CWP, ASTM A 126 cast-iron body and bonnet, solid cast-iron wedge, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with 2-piece packing gland assembly, flanged end connections; and with cast-iron handwheel.

B. Ball Valves

1. Ball Valves, 4 inches and smaller: MSS SP-110, class 150, 600-psi CWP, ASTM B 584 bronze body and bonnet, 2-piece construction; chrome-plated brass ball, standard port for plumbing applications; full port for HVAC application; blowout proof; bronze or brass stem; teflon seats and seals; threaded or soldered end connections:

    a. Operator: Vinyl-covered steel lever handle.
    b. Stem Extensions: For valves installed in insulated piping.

C. Globe Valves

1. Globe Valves, 2 Inches and Smaller: MSS SP-80; class 125, 200-psi CWP, or class 150, 300-psi CWP; ASTM B 62 cast-bronze body and screwed bonnet, rubber bronze, or teflon disc, silicon bronze-alloy stem, teflon-impregnated packing with bronze nut, threaded or soldered end connections; and with aluminum or malleable-iron handwheel.
2. Globe Valves, 2-1/2 Inches and Larger: MSS SP-85, class 125, 200-psi CWP, ASTM A 126 cast-iron body and bolted bonnet with bronze fittings, renewable bronze seat and disc, brass-alloy stem, outside screw and yoke, teflon-impregnated packing with cast-iron follower, flanged end connections; and with cast-iron handwheel.

D. Butterfly Valves

1. Butterfly Valves: MSS SP-67, 200-psi CWP, 150-psi maximum pressure differential, ASTM A 126 cast-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals, wafer, lug, or grooved style:

    a. Disc Type: Nickel-plated ductile iron.
    b. Operator for sizes 2 inches to 6 inches: Standard lever handle.
    c. Operator for sizes 2 inches to 6 inches: Standard lever handle with memory stop where used for balance application.

E. Check Valves

1. Swing Check Valves, 2 inches and smaller: MSS SP-80; class 125, 200-psi CWP, or class 150, 300-psi CWP; horizontal swing, y-pattern, ASTM B 62 cast-bronze body and cap, rotating bronze disc with rubber seat or composition seat, threaded or soldered end connections:
2. Swing Check Valves, 2-1/2 inches and larger: MSS SP-71, class 125, 200-psi CWP, ASTM A 126 cast-iron body and bolted cap, horizontal-swing bronze disc, flanged or grooved end connections.
3. Wafer Check Valves: Class 125, 200 psi CWP, ASTM A 126 cast-iron body, bronze disc/plates, stainless-steel pins and springs, Buna N seals, installed between flanges.
4. Lift Check Valves: Class 125, ASTM B 62 bronze body and cap (main components), horizontal or vertical pattern, lift-type, bronze disc or Buna N rubber disc with stainless-steel holder threaded or soldered end connections.

F. Circuit Setters

1. Valves 1/2 inch to 2 inches pipe size, NPT or sweat.

   a. All valves to be of bronze body/brass ball construction with glass and carbon filled TFE seat rings. Valves to have differential pressure read-out ports across valve seat area. Read-out ports to be fitted with internal EPT insert and check valve. Valve bodies to have 1/4 inch NPT tapped drain/purge port. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated nameplate to assure specific valve setting. Valves to be leak-tight at full rated working pressure.
   b. Design Pressure/Temperature: 1 inch – 2 inches NPT connections: 300 psig at 250 deg. F. 1/2 inch and 3/4 inch sweat connections: 200 psig at 250 deg. F.

2. Valves 2-1/2 inches to 8 inches pipe size, flanged.

   a. Valve Design and Construction: Valves shall be of heavy-duty cast iron construction with 125 psi ANSI flanged suitable up to 175 psi working pressure. Valves 2-1/2 inches – 3 inches pipe shall have a brass ball with glass and carbon filled TFE seat rings. Valves 4 inches – 8 inches shall be fitted with a bronze seat, replaceable bronze disc with EPDM seal insert, and stainless steel stem. Valves to have memory stop feature to allow valve to be closed for service and then reopened to set point without disturbing balance position. All valves to have calibrated nameplate to assure specific valves setting. Valves to be leak tight at full rated working pressure.

3. Pre-formed Insulation: All valves to be provided with molded insulation to permit access for balance and read-out.

G. Circuit Sensor:

1. Minimum overall accuracy plus or minus three percent over a range of 70 to 110 percent of design flow. Select devices for not less than 110 percent of design flow rate. Bronze or brass.
2. Venturi Type: Bronze, steel, or cast-iron with bronze throat, with valved pressure sensing taps upstream and at throat.
3. Wafer Type Circuit Sensor: Cast-iron wafer type flow meter equipped with readout valves to facilitate the connecting of a differential pressure meter. Each readout valve shall be fitted with an integral check valve designed to minimize system fluid loss during the monitoring process.
4. Differential pressure meter for each type of flow measuring device. Include flow meter, probe, hoses, flow-charts, and carrying case.

## 2.4 MISCELLANEOUS PIPING COMPONENTS

A. Strainers: Y pattern, except where otherwise indicated, full size of connecting piping. Include type 304 stainless steel screens with 3/64 inch perforations except where other screens are indicated.

1. Pressure Rating: 125-psig minimum steam working pressure except where otherwise indicated.
2. Sizes 2 inches and smaller: Bronze body, with female threaded ends.
3. Sizes 2 1/2 inches and larger: Cast-iron body, with interior FDA-approved epoxy coating and flanged ends.
4. Y-Type Strainers: Screwed screen retainer with centered blowdown.

    a. Drain: Pipe plug.
    b. Drain: Factory-or field installed hose-end drain valve.

B. Metal-Case, Liquid-In-Glass Thermometers: 7 inch long die-cast aluminum with red or blue reading, organic liquid filled tube.

1. Stem: Brass for thermowell installation.
2. Accuracy: Plus or minus 1 percent of range.

C. Pressure Gauge: Direct mounting dial type complying with ASTME b 40.100.

1. Case: 4 1/2 inch, liquid filled.
2. Window: Glass.
3. Accuracy: Grade C, plus or minus 3 percent of middle half scale.

D. Copper Unions: ASME B 16.18, cast-copper-alloy body, hexagonal stock, with ball-and-socket joint, metal-to-metal seating surfaces, and solder-joint, threaded, or solder-joint and threaded ends.

E. Manual Air Vent: Bronze Body and nonferrous internal parts; 150 psig working pressure, 225 deg. F operating temperature; manually operated with screwdriver or thumbscrew; and having 1/8 inch discharge connection and 1/2 inch inlet connection.

F. Automatic Air Vent: Designed to vent automatically with float principle; bronze body and nonferrous internal parts; 150 psig working pressure 240 deg. F operating temperature; and having 1/4 inch discharge connection and 1/2 inch inlet connection.

G. Diaphragm-type compression tanks: size and number as indicated; construct of welded carbon steel for 125 psig working pressure, 375 deg. F maximum operating temperature. Separate air charge from system water to maintain design expansion capacity, by means of a flexible diaphragm securely sealed into tank. Provide taps for pressure gage, air charging fitting, and drain fitting. Support vertical tanks with steel legs or base; support horizontal tanks with steel saddles. Tank, with taps and supports, shall be constructed, tested, and labeled in accordance with ASME Pressure Vessel Code, Section VIII, Division 1.

H. Air separator: welded black steel; ASME constructed and labeled for minimum 125 psig water working pressure and 375 F operating temperature; threaded connections for 1 to 3 inch, threaded blowdown connection; sized as indicated for full system flow capacity.

I. Stainless steel bellows: stainless steel bellows with woven, flexible, bronze, wire-reinforced protective jacket; 150 psig working pressure, 250 deg. F. Operating temperature.

J. Bypass Chemical Feeder: Welded steel construction, 125 psig working pressure, 5 gallon capacity, with fill funnel and inlet, outlet, and drain valves.

K. Pressure Reducing Valves: Diaphragm operated, cast-iron or brass body valve, with low inlet pressure check valve, inlet strainer removable without system shut-down, and noncorrosive valve seat and stem. Select valve size, capacity, and operating pressure to suit system. Valve shall be factory-set at operating pressure and have the capability for field adjustment.

## 2.5 PIPING

A. Regulatory requirements: comply with the provisions of the following:

1. ASME B 31.9 “Building Services Piping,” ASME B 31.1 “Power Piping” and ASME B 31.5 “Refrigerant Piping” for materials, products and installation.
2. Safety valves and pressure vessels shall bear the appropriate ASME label.
3. ASME “boiler and pressure vessel code”, section ix, “welding and brazing qualification” for qualifications for welding processes and operators.
4. State and Local Building Codes.

B. Hydronic Pipe Applications

1. Install ASTM B88 Type L, drawn copper tubing with wrought copper fittings and solder joints for 2 inches and smaller, above ground, within building. Pressure seal joint fitting method may be utilized on above ground piping.
2. Install ASTM A 120/53, Schedule 40, continuous weld, black steel pipe with threaded joints and malleable iron fittings for 2 inches and smaller, and with welded joints and flanged fittings for 2-1/2 inches and larger. Grooved steel pipe method may be utilized on hot water on sizes 2 1/2 inches and larger.

C. Boiler Flue

1. Refer to Section 235216 “Condensing Boilers”.

D. Pipe Support

1. Install hangers with the following minimum rod sizes and maximum spacing or where more stringent, comply with local building code requirements:

| Nom. Pipe size | Steel Max. Span-ft. | Copper tube max. Span-ft. | Plastic max. Span-ft. | Min. Rod size-inches |
|---|---|---|---|---|
| 1 | 7 | 5 | 6 | 3/8 |
| 1-1/2 | 9 | 8 | 6 | 3/8 |

| | | | | |
|---|---|---|---|---|
| 2 | 10 | 8 | 7 | 3/8 |
| 3 | 12 | 10 | 8 | 1/2 |
| 3-1/2 | 13 | 10 | 8 | 1/2 |
| 4 | 14 | 12 | 9 | 5/8 |
| 5 | 16 | | 9 | 5/8 |
| 6 | 17 | | 9 | 3/4 |

E. Freeze protection: provide propylene glycol freeze protection compound for piping systems in concentrations as shown on the drawings. Solution percentages are by weight. Solutions shall be pre-mixed with de-ionized water prior to arriving at jobsite.

F. Contractor is responsible for draining of existing systems, disposing of fluid, and refilling system to correct glycol concentration. Test glycol concentration prior to any work and provide written report indicating measured concentration levels to owner.

G. Locations and arrangements: drawings (plans, schematics and diagrams) indicate the general location and arrangement of piping systems. Locations and arrangements of piping take into consideration pipe sizing and friction loss, expansion, pump sizing, and other design considerations. So far as practical, install piping as indicated.

H. Conceal all pipe installations in walls, pipe chases, utility spaces, above ceilings, below grade or floors, unless indicated to be exposed to view.

I. Install drains to low points in mains, risers, and branch lines consisting of a tee fitting, 3/4 inch ball valve and short 3/4 inch, threaded nipple and cap.

J. Install manual air vents at high points in the system, at heat transfer coils, and elsewhere as required for system air venting.

K. Install automatic air vents at high points in the system, heat transfer coils, and elsewhere as required for system air venting.

L. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the design pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve or other component in system under test. Test CPVC systems at maximum 150 psi. Check to verify that stress due to pressure at bottom of vertical runs do not exceed either 90 percent of specified minimum yield strength or 1.7 times “SE” Value in Appendix A of ASME B 31.9, code for pressure piping, “Building Services Piping.” After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components as appropriate, and repeat hydrostatic test until there are not leaks. Prepare written report of testing.

M. HVAC Water Treatment: Provide HVAC water treatment in the boiler system. Thoroughly clean and flush the system. Test the water and install required chemicals including corrosion and scale inhibitors in the completed system. Provide a final report of the water conditions. Provide a twelve month service plan with monthly testing including a report. Services are to be provided by Watcon, Inc. (419) 283-4495.

## 2.6 DUCTWORK AND DUCT ACCESSORIES

A. Construct rectangular ductwork to meet all functional criteria defined in section VII of the SMACNA "HVAC Duct Construction Standards Metal and Flexible", 2005 Edition. All ductwork must comply with all Local, State and Federal Code Requirements.

B. Except as otherwise indicated, fabricate rectangular ducts with galvanized sheet steel, in accordance with SMACNA "HVAC Duct Construction Standards," Tables 1-3 through 1-19, including their associated details. Conform to the requirements in the referenced standard for metal thickness, reinforcing types and intervals, tie rod applications, and joint types and intervals.

C. Static Pressure Classifications: Unless otherwise indicated, construct ducts to the following:

1. Low pressure supply ducts: 2-inches wg.

D. Seal duct joints and seams with duct sealant, tape or mastics.

1. Pressure Classification 2-inches wg: Transverse and longitudinal joints.

E. Provide low-leakage standard galvanized volume control dampers for outside air control, multiple (for dampers 12 inches in height and greater) or single-blade (for dampers under 12 inches in height), opposed blade design, low-leakage rating, with linkage outside of air stream and suitable for horizontal or vertical applications. Furnish with neoprene blade seals and aluminum jamb seals.

## 2.7 BREECHINGS, CHIMNEYS AND STACKS

A. Listed Vents: Double wall metal vents tested according to UL 441 and rated for 480 deg. F. Continuously positive flue pressure complying with NFPA 211 and suitable for gas-fired appliances. Inner shell to be ASTM B 209 aluminum and outer shell to be galvanized steel. Verify requirements with the boiler manufacturer.

# PART 3 - PRODUCTS AND EXECUTION

## 3.1 PUMPS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Amtrol, Inc.; Armstrong Pumps, Inc.; Bell & Gosset; Grundfos; Taco, Inc.

B. Motors: NEMA MG 1, general purpose, continuous duty, design b, except design C where required for high starting torque. Furnish single-, multiple, or variable-speed motors, with type of enclosures and electrical characteristics indicated. Include built-in thermal-overload protection and grease-lubricated ball bearings. Select each motor to be non-overloading over full range of pump performance curve. Comply with the requirements of the energy policy act of 1992.

C. End-Suction: Separately coupled, base-mounted, centrifugal, single-stage, bronze-fitted, radial split case design; rated for 125-psig minimum working pressure and a continuous water temperature of 225 deg F. Include cast iron casing, cast bronze, statically and dynamically balanced impeller, steel shaft, oil-lubricated, bronze journal and thrust type bearings, mechanical type seals and flexible coupling. Pumps are to be controlled with a variable speed drive.

D. Inline Circulators: Horizontal, in-line, centrifugal, single-stage, bronze-fitted, radially split case design; rated for 125-psig minimum working pressure and a continuous water temperature of 225 deg. F. Include cast iron casing, cast bronze, statically and dynamically balance impeller, steel shaft, oil-lubricated, bronze journal and thrust type bearings, mechanical type seals and flexible coupling.

E. Inline Circulators: Horizontal, in-line, centrifugal, variable speed with integrated drive, bronze-fitted, radially split case design; rated for 125-psig minimum working pressure and a continuous water temperature of 225 deg. F. Include cast iron casing, cast bronze, statically and dynamically balance impeller, steel shaft, oil-lubricated, bronze journal and thrust type bearings, mechanical type seals and flexible coupling. Variable speed drive shall have pre-programmed control modes with the following input/output: 2-analog, input, 1- start/stop input, 1-status output.

F. Install pumps according to manufacturer’s written installation and alignment instructions.

## 3.2 CONDENSING BOILERS

A. A. Refer to Section 235216 "Condensing Boilers".

## 3.3 VARIABLE FREQUENCY DRIVES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Allen-Bradley / Rockwell Automation, Danfoss, Honeywell, Siemens, Square D, Toshiba, Yaskawa.

B. General Requirements:

1. The VFD shall convert the input ac main power to an adjustable frequency and voltage as defined in the following sections.
2. The VFD shall be listed and labeled as a complete unit and shall include all accessories and requirements as described in this section.
3. The VFD shall have an internal pad lockable safety disconnect switch and over current protection device.
4. The VFD shall have complete contactor bypass to allow motor to be safely transferred to/from VFD output and ac line.

C. Environmental Ratings

1. Storage Ambient Temperature Range: -40 to 185° F.
2. Ambient Temperature Operating Range: 14 to 113°F.

3. Relative Humidity Range: 5% To 95%, Non-Condensing.
4. Shock: 15G peak for 11 MS duration.
5. Vibration: 0.006 inches displacement, 1G peak.

D. Motor Data

1. The AC drive shall be sized to operate the following ac motor:

   a. Motor horsepower to match fan.
   b. Motor voltage will be 460/3/60 VAC.
   c. Motor service factor will be 1.15.

E. Application Data

1. The AC drive shall be sized to operate a variable torque load.
2. The speed range shall be from a minimum speed of 1.0 Hz to a maximum speed of 60 Hz.

F. Construction

1. The VFD shall be rated NEMA 4X.
2. Conduit knockouts shall be provided for bottom cable entry.
3. All VFDs shall be wall mountable.

G. Ratings

1. The VFD shall be designed to operate from an input voltage of 480v AC$\pm$10%.
2. AC frequency: 60 Hz + 5%.
3. Current overload rating: 110% of rated current for 60 seconds.
4. Starting torque: 150% at 1 Hz.
5. Speed regulation: 2%

H. Protection

1. The VFD shall be protected against short circuits, between output phases and to ground.
2. The VFD shall have under-voltage and over-voltage protection.
3. The VFD shall provide Class 10 Motor Overload Protection Investigated by UL, to comply with N.E.C. Article 430.
4. The VFD shall be able to sense a loss of load and signal a fault.
5. If the input analog reference is lost, this shall cause a warning to be issued and the user shall have the operation of pre-selecting either (1) stopping and displaying the fault, (2) running at programmable present speed, or (3) running at Min or Max frequency.
6. Upon VFD fault, drive shall store the dc bus voltage, out current and output frequency in readable parameters.

I. Integral functions

1. Process PID Control:

a. PID regulator shall be standard in the VFD. This allows a temperature signal to be connected to the VFD for closed loop control.
b. The PID setpoint shall be adjustable from the programming terminal, analog inputs or communication networks.

2. Skip Frequencies / Bands:

a. The VFD shall have at minimum (3) programmable setpoints that lock out continuous operation at frequencies, which may produce mechanical resonance.
b. The setpoints shall have an adjustable bandwidth.

3. Flying Start

a. The VFD shall be capable of determining the speed and direction of a spinning motor and adjust its output to "Pick-Up" the motor at the rotating speed.

4. Start at Power Up:

a. The VFD shall have a programmable restart function to automatically restart the equipment after restoration of power after an outage.
b. A maintained 2-wire start input shall be necessary for this function.

5. Sleep / Wake Mode:

a. The VFD shall have the capability to use an analog input or PID output as a start – stop command. This input can be a separate input or also used as the speed reference. Signal level below the "Sleep" level acts as a stop command and a signal level above the "Wake" level acts as a start command.
b. Sleep / wake time and level shall be programmable.

6. Auto Restart

a. The VFD shall have the capability to attempt (9) restarts following a fault condition before locking out and requiring manual intervention.
b. The time between restarts shall be adjustable.

J. Programming Terminal

1. The VFD shall include an integral programming terminal.
2. The programming terminal shall have at minimum a 2 line by 16 character LCD display with led backlight.
3. Digital speed control buttons shall be provided. Potentiometers are not acceptable.
4. Programmable hand-off-auto buttons shall be provided to toggle both start and frequency control or only the frequency control to and from the programming terminal.

K. Control Interface: Provide BACnet MS/TP communication to BAS.

1. Analog Inputs:

    a. (1) Optically isolated analog input (-10 TO 10V OR 0 TO 20 MA), user selectable.
    b. (1) Non-isolated analog input (0 TO 10V OR 0 TO 20MA), user selectable.
    c. Analog I/O must have 10 bit resolution or better.
    d. Both analog inputs and outputs should be able to be used simultaneously in either voltage or current modes or a combination of each.

2. Analog Outputs:

    a. (2) Analog outputs (0 to 10v or 0 to 20ma), user selectable.
    b. Analog I/O must have 8 bit resolution or better.
    c. Both analog outputs should be able to be used simultaneously in either voltage or current modes or a combination of each.

3. Digital Inputs:

    a. (7) Digital inputs (24v DC), user programmable.
    b. Inputs must be configurable as sink or source.
    c. The VFD shall have a dedicated digital input for a purge function. The purge input shall override all “stop” commands over the network as well as (1) customer interlock.
    d. The VFD shall have (2) dedicated digital inputs for customer interlocks.

4. Relay Outputs:

    a. (2) Relay outputs, form C (1 N.O AND 1 N.C.) user programmable.
    b. Both relays must be programmable for a minimum of 16 different combinations including drive ready, at frequency, motor running, motor overload, above frequency, above current and others.

L. Internal Adjustments:

1. Acceleration time shall be adjustable from 0.1 to 600 seconds.
2. Deceleration time shall be adjustable from 0.1 to 600 seconds.
3. (4) Preset speeds shall be provided.
4. VFD shall have an adjustable PWM frequency to allow tuning the VFD to the motor.

M. Start-Up:

1. Certified factory start-up shall be provided for each VFD provided.
2. Service Engineers shall be employed by the manufacturer or be certified by the manufacturer and provide start-up services including a physical inspection of drive and connected wiring and final adjustments to meet specified performance requirements.

N. Warranty:

1. Warranty shall be 24 months from the date of certified start-up.

## 3.4 CONTROL EQUIPMENT AND SYSTEMS

A. Work under this section includes a building automation system which includes, but is not limited to, the following:
   1. **Vistula Manor:** A complete and operating building automation system utilizing both field applied panels and interface with controllers integral to factory manufactured units. Interface new boiler system controls with the existing building automation system. New control equipment shall be Tridium Platform, BACnet open protocol, using Vykon Jace 8000 supervisory controllers. Provide graphics on the system server utilizing Workbench and provide a 5 year service agreement for the Vykon controllers.
   2. **Flory Gardens:** Utilize boiler system controller furnished with boilers for stand alone control of the boiler plant and indirect domestic water heaters. A building automation system or interface with a BAS is not required for these buildings.
   3. Design and installation of control data bases to achieve compliance with sequences of operation.
   4. Design and implementation of graphics as outlined herein and/or on the drawings.
   5. Design and implementation of a future web based interface to allow full utilization by the owner.
   6. Training of the owner's personnel.
   7. Commissioning of the building automation system including interface to factory installed unit controllers.

B. Mechanical contractor shall extend line voltage power from available dedicated circuits and/or identified dedicated branch circuit at appropriate panelboards to the required controllers. All conduit and wiring provided by the mechanical contract shall be in accordance with the Electrical Division 26 Specifications and requirements. The mechanical contractor is responsible for all control power transformers, line safety disconnects, over current protective devices, power supplies, etc., necessary to complete the intent and performance of the project controls system. The mechanical contractor is responsible for all coordination with other trades to accomplish this work.

C. Where field applied building automation panels are used final control elements, interface equipment, other apparatus, and accessories connected to controllers to operate mechanical systems according to sequences of operation indicated or specified.

D. Control system includes all necessary control components and/or wiring interlock for equipment utilizing standalone controls including, but not limited to, the following:

   1. Pumps.
   2. Boilers.
   3. Variable Frequency Drives.

E. All database values (i.e., points, software variables, custom program variables) of all building controllers shall be readable by any controller on the network. The contractor shall set up communication services to perform internetwork value passing and provide the owner with a list of all database addresses.

F. The owner shall be named licensed holder of all software associated with any and all incremental work on the project. In addition, the owner shall receive use of all job specific configuration documentation, data files, and application – level software developed for this project. This shall include all custom, job specific software code and documentation for all configurations and programming that is generated for the project and/or configured for use with LAN/WAN/intranet and internet connected routers and devices. Any and all required ids and passwords for access to any component or software program shall be provided to the owner.

G. The entire temperature control system shall be comprised of interoperable, stand-alone digital controllers communicating via a communication bus interface to building network utilizing Microsoft Explorer. Provide for unlimited users without additional user software. Web browser shall provide full functionality. Provide a touch screen display for interface with owner at central controller location.

H. All controls to utilize BACnet platform with BACnet interface to equipment utilizing non-proprietary standard objects. All BACnet control devices shall be tested and certified through the BACnet Testing Laboratory (BTL). Provide BTL certification documentation and BACnet object list as part of the submittal package.

I. Codes and Standards: Comply with the following: NFPA 90A, National Electric Code, Underwriters Laboratories, NEMA, Federal Communications Commission, Electronics Industries Association Std. RS-232, IEEE, ANSI.

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

1. Control Valves:

    a. Belimo.
    b. Honeywell.
    c. Johnson Controls.

2. Damper Actuators

    a. Barber-Colman.
    b. Belimo.
    c. Honeywell.
    d. Johnson Controls.

3. Direct Digital Control (DDC) and microprocessor-based control units and components.

    a. Automated Logic.
    b. Honeywell.
    c. Johnson Controls.

d. Schneider Electric US

K. Actuators: Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or 2-position action.

1. Permanent split-capacitor or shaded-pole type: Equip spring-return motors with integral spiral-spring mechanism in housing design for easy removal for service or adjustment of limit switches, auxiliary switches or feedback potentiometer.
2. Spring-return motors for valves: Size for running and breakaway torque of 150 inch-pounds.
3. Spring-return motors for dampers: Size for running and breakaway torque of 150 inch-pounds.

L. Control Valves: Factory fabricated, of type, body material, and pressure class indicated. Where type or body material is not indicated, make selection as determined by manufacturer for installation requirements and pressure class, based on maximum pressure and temperature rating of piping system.

1. Globe Valves up to 2 inches: Bronze body, bronze time, rising stem, renewable composition disc, screwed ends with backseating capacity repackable under pressure.
2. Globe Valves over 2 inches: Iron body, bronze trim, rising stem, plug-type disc, flanged ends, renewable seat and disc.
3. Hydronic Systems:

a. Rating: Service at 125 psi WSP and 250 deg. F.
b. Sizing: 3-psi maximum pressure drop at design flow rate.
c. Flow Characteristics: 2-way valves have equal percentage characteristics; 3-way valves have linear characteristics. Select operators to close valves against pump shutoff head.

M. Thermistor Temperature Sensor:

1. Accuracy: Plus or minus 0.36 deg. F.
2. Insertion elements for liquids: Brass socket with minimum insertion length of 2.5 inches.
3. Outside Air Sensor: Watertight inlet fitting, shielded from direct sunlight.

N. Equipment Operation Sensor:

1. Status Inputs for Motors: Current sensing relay with current transformers, adjustable and set to 175 percent of rated motor current.

O. Water-Flow Switches: Pressure-flow switches of bellows-actuated mercury or snap-acting type, with appropriate scale range and differential adjustment, with stainless-steel or bronze paddle. For chilled-water applications, provide vapor proof type.

P. Control Panels: NEMA 1, fully enclosed, steel-rack-type cabinet with locking doors.

Q. Control Relays/Contactors: UL Listed and labeled, heavy duty relay with high power handling capability rated for required control voltage and amperage of controlled devices.

R. Control Wiring Requirements:

1. All conduit and cable to run parallel to building steel.
2. Provide sufficient slack and flexible connections to allow for vibration of equipment.
3. All control and network cable installed above accessible ceilings may be installed with j-hooks or on open cable tray.
4. All control and network cable installed in exposed location or inaccessible location to be installed in conduit. Provide pull line in all conduits for future cable installation.
5. All wires must be plenum rated, even when installing in conduit.
6. All wiring shall be labeled at each end. Indicate what location/device wire is coming from and where it is going.
7. Wiring shall be continuous, without splices.
8. Do not run low voltage wire in the same conduit or bundles as line voltage or power wiring.
9. A true earth ground must be provided at controllers and control panels.
10. Network (BACnet or ModBus) connections to be laid in a daisy chain fashion. Star networks are not acceptable.
11. All conductors installed exposed to view shall be routed in Electrical Metallic Tubing (EMT) and fittings utilizing cast metal boxes.

S. Provide permanent label on each control device including room sensors. Label wiring and cabling with system address and termination number.

T. Temperature control contractor shall provide all required 120 volt power and data drops to control components not indicated by others on drawings. Update electrical panel schedule identifying circuit.

U. Provide graphics for all points monitored or controlled through the bas, provide dynamic color graphic screens at the server. All graphic screens shall be generated through the software operating system of the BAS.

V. Install control equipment and systems as required, in accordance with system manufacturer's written instructions, and with recognized industry practices, and ensure that equipment complies with requirements. Comply with requirements of NEC, and applicable portions of NECA's "Standard of Installation" pertaining to general electrical installation practices.

W. Install all raceway and wiring in accordance with all requirements of the electrical specifications.

X. Provide graphics for all points monitored or controlled through the BAS, provide dynamic color graphic screens at the server. All graphic screens shall be generated through the software operating system of the Building Automation System.

## 3.5 TESTING, ADJUSTING AND BALANCING

A. Employ the services of an independent testing, adjusting and balancing agency certified by the associated air balance council to test and balance the indicated systems. Submit a copy of the report to the Engineer for review.

B. Provide the services of one of the following test and balance contractors:

1. Aerodynamics.
2. Dunbar Mechanical, Inc.
3. Enviro-Aire, Inc.
4. International Test and Balance.
5. VM Systems, Inc.
6. Engineer approved equal.

C. Test, adjust, and balance the following mechanical systems:

1. Hydronic systems
2. Boiler system
3. Verify temperature control system operation.

END OF SECTION 230000

# SECTION 235216 - CONDENSING BOILERS – PHASE 2

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

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

### 1.2 SUMMARY

A. Section includes gas-fired, fire-tube floor-mounted condensing boilers, trim, and accessories for generating hot water.

### 1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for boilers.
2. Include rated capacities, operating characteristics, and furnished specialties and accessories.

B. Shop Drawings: For boilers, boiler trim, and accessories.

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.

### 1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans and sections, drawn to scale and coordinated with each other, using input from installers of the items involved.

B. Source quality-control reports.

C. Field quality-control reports.

D. Sample Warranty: For special warranty.

E. Product Certificates:

1. ASME Stamp Certification and Report: Submit "A," "S," or "PP" stamp certificate of authorization, as required by authorities having jurisdiction, and document hydrostatic testing of piping external to boiler.
2. CSA B51 pressure vessel Canadian Registration Number (CRN).

## 1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For boilers to include in emergency, operation, and maintenance manuals.

## 1.6 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of boilers that fail in materials or workmanship within specified warranty period. Where "prorated" is indicated, the boiler manufacturer will cover the indicated percentage of cost of replacement parts. With "prorated" type, covered cost decreases as age of equipment increases.

1. Warranty Period for Floor-Mounted Fire-Tube Condensing Boilers (**Vistula Manor**)

    a. Heat Exchanger, Pressure Vessel and Condensation Collection Basin shall carry a 10 year limited warranty against defects in materials or workmanship.
    b. Heat exchangers/pressure vessel are warranted against thermal shock for the lifetime of the boiler.
    c. The burner shall carry a five (5) year limited warranty against defective material or workmanship from the date of shipment.
    d. All other components shall carry a one year limited warranty from date of boiler start up or 18 months from shipment if start up cannot be proven.

2. Warranty Period for Floor-Mounted Fire-Tube Condensing Boilers (**Flory Gardens**)

    a. Heat Exchanger, Pressure Vessel and Condensation Collection Basin shall carry a 10 year limited warranty against defects in materials or workmanship and failure due to thermal shock.
    b. All other components shall carry a one year warranty from date of boiler start up.

# PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

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

B. ASME Compliance: Fabricate and label boilers to comply with ASME Boiler and Pressure Vessel Code.

C. ASHRAE/IES 90.1 Compliance: Boilers shall have minimum efficiency in accordance with Table 6.8.1-6 and other requirements in Ch. 6 of ASHRAE/IES 90.1.

D. ASHRAE 90.2 Compliance: Boilers shall have minimum efficiency in accordance with Ch. 6 of ASHRAE 90.2.

E. DOE Compliance: Minimum efficiency shall comply with 10 CFR 431, Subpart E, Appendix N.

2.2 FLOOR-MOUNTED, FORCED-DRAFT, FIRE-TUBE CONDENSING BOILERS (**Vistula Manor**)

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

1. Cleaver-Brooks.
2. Lochinvar, LLC.
3. Weil-McLain.

B. Description: Factory-fabricated, -assembled, and -tested, fire-tube, forced-draft, condensing boiler with heat exchanger sealed pressure tight, built on a steel base, including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls. Units are to be for water-heating service only.

C. Primary Heat Exchanger: Corrosion-resistant Type 316 stainless steel.

D. Secondary Heat Exchanger: Corrosion-resistant Type 316 stainless steel.

E. Combustion Chamber and Flue Pipes: Corrosion-resistant stainless steel.

F. Pressure Vessel: Carbon steel with welded heads and tube connections.

G. Burner: Natural gas, forced draft.

H. Blower: Centrifugal fan to operate during each burner-firing sequence and to prepurge and postpurge the combustion chamber.

I. Gas Train: The boiler shall be supplied with two gas valves designed with negative pressure regulation.

J. Ignition: Direct-spark ignition or silicone carbide hot-surface ignition with 100 percent main-valve shutoff and electronic flame supervision. Boilers using a pilot for ignition and/or UV scanners for flame supervision shall be deemed unacceptable.

K. Casing:

1. Jacket: Sheet metal, with snap-in or interlocking closures.
2. Control Compartment Enclosures: NEMA 250, Type 1A.
3. Finish: Baked-enamel protective finish.

4. Insulation: Minimum 1/2-inch- thick, mineral-fiber insulation surrounding the heat exchanger.
5. Combustion-Air Connections: Inlet and vent duct collars.

L. Capacities and Characteristics:

1. See Boiler Schedule

2.3 FLOOR-MOUNTED, FORCED-DRAFT, FIRE-TUBE CONDENSING BOILERS (**Flory Gardens**)

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

1. Cleaver-Brooks.
2. Lochinvar, LLC.
3. Weil-McLain.

B. Description: Factory-fabricated, -assembled, and -tested, fire-tube, forced-draft, condensing boiler with heat exchanger sealed pressure tight, built on a steel base, including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls. Units are to be for water-heating service only.

C. Primary Heat Exchanger: Corrosion-resistant Type 316 stainless steel.

D. Secondary Heat Exchanger: Corrosion-resistant Type 316 stainless steel.

E. Combustion Chamber and Flue Pipes: Corrosion-resistant stainless steel.

F. Pressure Vessel: Carbon steel with welded heads and tube connections.

G. Burner: Natural gas, forced draft.

H. Blower: Centrifugal fan to operate during each burner-firing sequence and to prepurge and postpurge the combustion chamber.

I. Gas Train: Combination gas valve with manual shutoff and pressure regulator.

J. Ignition: Direct-spark ignition or silicone carbide hot-surface ignition with 100 percent main-valve shutoff and electronic flame supervision.

K. Casing:

1. Jacket: Sheet metal, with snap-in or interlocking closures.
2. Control Compartment Enclosures: NEMA 250, Type 1A.
3. Finish: Baked-enamel protective finish.
4. Insulation: Minimum 1/2-inch- thick, mineral-fiber insulation surrounding the heat exchanger.
5. Combustion-Air Connections: Inlet and vent duct collars.

L. Capacities and Characteristics:

1. See Boiler Schedule

## 2.4 TRIM - FOR HOT-WATER BOILERS

A. Aquastat Controllers: Operating and high limit with automatic reset.

B. Safety Relief Valve: ASME rated.

C. Pressure and Temperature Gauge: Minimum 3-1/2-inch- diameter, combination water-pressure and -temperature gauge. Gauges shall have operating-pressure and -temperature ranges, so normal operating range is about 50 percent of full range.

D. High and low gas-pressure switches.

E. Alarm bell with silence switch.

F. Boiler Air Vent: Automatic

G. Drain Valve: Minimum NPS 3/4 hose-end gate valve.

H. Circulation Pump: Non overloading, in-line variable speed pump with split-capacitor motor having thermal-overload protection and lubricated bearings; designed to operate at specified boiler pressures and temperatures.

## 2.5 CONTROLS

A. Boiler operating controls shall include the following devices and features:

1. Control transformer.
2. Set-Point Adjust: All set points shall be adjustable.
3. Electric, factory-fabricated and factory-installed panel to modulate burner and control burner-firing rate to maintain space temperature in response to thermostat with heat anticipator located in heated space.

    a. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

4. Electric, factory-fabricated and factory-installed panel to control burner-firing rate, to reset supply-water temperature inversely with outside-air temperature. At -10 deg F outside-air temperature, set supply-water temperature at 180 deg F; at 60 deg F outside-air temperature, set supply-water temperature at 120 deg F.

    a. Include automatic, alternating-firing sequence for multiple boilers to ensure maximum system efficiency throughout the load range and to provide equal runtime for boilers.

B. Burner Operating Controls: To maintain safe operating conditions, burner safety controls limit burner operation.

1. High Cutoff: Manual reset stops burner if operating conditions rise above maximum boiler design temperature.
2. Low-Water Cutoff Switch: Electronic probe shall prevent burner operation on low water. Cutoff switch shall be manual reset type.
3. Blocked Inlet Safety Switch: Manual-reset pressure switch factory mounted on boiler combustion-air inlet.
4. Audible Alarm: Factory mounted on control panel with silence switch; shall sound alarm for above conditions.

C. Building Automation System Interface: Factory install hardware and software to enable building automation system to monitor, control, and display boiler status and alarms.

1. (**Vistula Manor**) A BACnet communication interface with building automation system shall enable building automation system operator to remotely control and monitor the boiler from an operator workstation. All monitoring and control features, which are available at the local boiler control panel, shall also be available at the remote operator workstation through the building automation system.

2. (**Flory Gardens**) A BACnet communication system capable of interfacing with future building automation system shall be readily expandable. All monitoring and control features, which are available at the local boiler control panel, shall also be available at the remote operator workstation through the future building automation system.

## 2.6 ELECTRICAL POWER

A. Controllers, Electrical Devices, and Wiring: Electrical devices and connections are shown on Drawings and specified in electrical Sections.

B. Single-Point Field Power Connection: Factory-installed and -wired switches, motor controllers, transformers, and other electrical devices necessary shall provide a single-point field power connection to boiler.

1. House in NEMA 250, Type 1A enclosure.
2. Wiring shall be numbered and color coded to match wiring diagram.
3. Install factory wiring outside of an enclosure in a raceway.
4. Field power interface shall be to wire lugs.
5. Provide branch power circuit to each motor and to controls.
6. Provide each motor with overcurrent protection.

## 2.7 VENTING KITS

A. Kit: Complete system, ASTM A959, Type 29-4C stainless steel pipe, vent terminal, thimble, indoor plate, vent adapter, condensate trap and dilution tank, and sealant.

B. Combustion-Air Intake: Complete system, stainless steel pipe, vent terminal with screen, inlet air coupling, and sealant.

## 2.8 CONDENSATE-NEUTRALIZATION UNITS

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

1. Neutra-Safe Corporation.
2. SFA Saniflo USA.
3. Skidmore Pump.
4. Wessels Company.

B. Description: Factory-fabricated and -assembled condensate-neutralizing capsule assembly of corrosion-resistant plastic material with threaded or flanged inlet and outlet pipe connections. Device functions to prevent acidic condensate from damaging grain system. It is to be piped to receive acidic condensate discharged from condensing boiler and neutralize it by chemical reaction with replaceable neutralizing agent. Neutralized condensate is then piped to suitable drain.

C. Capsule features:

1. All corrosion-resistant material.
2. Suitable for use on all natural gas and propane boilers.
3. Includes initial charge of neutralizing agent.
4. Neutralizing agent to be easily replaceable when exhausted.
5. Inlet and outlet pipe connections.

D. Capsule Configuration:

1. Low-profile design for applications where boiler condensate drain is close to the floor.
2. Easily removed and opened for neutralizing agent replacement.
3. Multiple units may be used for larger capacity.

## 2.9 SOURCE QUALITY CONTROL

A. UL Compliance: Test gas-fired boilers having input of more than 400,000 Btu/h for compliance with UL 795. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

B. UL Compliance, Gas-Fired: Test gas-fired boilers for compliance with UL 2764. Boilers shall be listed and labeled by a testing agency acceptable to authorities having jurisdiction.

C. CSA Compliance: Test boilers for compliance with ANSI Z21.13-2017/CSA 4.9.

D. Performance Testing: Test and label boilers for efficiency to comply with AHRI 1500.

E. Burner and Hydrostatic Test: Factory adjust burner to eliminate excess oxygen, carbon dioxide, oxides of nitrogen emissions, and carbon monoxide in flue gas and to achieve combustion efficiency; perform hydrostatic test.

F. Test and inspect factory-assembled boilers, before shipping, in accordance with 2017 ASME Boiler and Pressure Vessel Code. Factory test boilers for safety and functionality; fill boiler with water, and fire throughout firing range, to prove operation of all safety components.

G. Allow Owner access to source quality-control testing of boilers. Notify Owner 14 days in advance of testing.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

A. Examine roughing-in for concrete equipment bases, anchor-bolt sizes and locations, and piping and electrical connections to verify actual locations, sizes, and other conditions affecting performance of the Work.

1. Final boiler locations indicated on Drawings are approximate. Determine exact locations before roughing-in for piping and electrical connections.

B. Examine mechanical spaces for suitable conditions where boilers will be installed.

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

### 3.2 BOILER INSTALLATION

A. Equipment Mounting:

1. Install floor-mounted boilers on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."

B. Install gas-fired boilers according to NFPA 54.

C. Assemble and install boiler trim.

D. Install electrical devices furnished with boiler but not specified to be factory mounted.

E. Install control wiring to field-mounted electrical devices.

### 3.3 PIPING CONNECTIONS

A. Comply with requirements for hydronic piping specified in Section 230000.

B. Connect piping to boilers, except safety relief valve connections, with flexible connectors of materials suitable for service.

C. Drawings indicate general arrangement of piping, fittings, and specialties.

D. When installing piping adjacent to boiler, allow space for service and maintenance of condensing boilers. Arrange piping for easy removal of condensing boilers.

E. Install condensate drain piping to condensate-neutralization unit and from neutralization unit to nearest floor drain. Piping shall be at least full size of connection. Install piping with a minimum of 2 percent downward slope in direction of flow.

F. Connect gas piping to boiler gas-train inlet with union. Piping shall be at least full size of gas-train connection. Provide a reducer if required.

G. Connect hot-water piping to supply- and return-boiler tappings with shutoff valve, and union or flange at each connection.

H. Install piping from safety relief valves to nearest floor drain.

## 3.4 DUCT CONNECTIONS

A. Boiler Venting:

1. Install flue-venting kit and combustion-air intake.
2. Comply with all boiler manufacturer's installation instructions.
3. Field fabricate and install boiler vent and combustion-air intake.
4. Utilize vent and intake duct material, size, and configuration as indicated in boiler manufacturer's instructions and to comply with UL 1738.
5. Connect boiler vent full size to boiler connections.
6. Comply with requirements in Section 235123 "Gas Vents."
7. Comply with all boiler manufacturer's installation instructions.

## 3.5 ELECTRICAL CONNECTIONS

A. Connect wiring in accordance with Section 260000.

B. Ground equipment according to Section 260000.

C. Install electrical devices furnished by manufacturer, but not factory mounted, according to NFPA 70 and NECA 1.

D. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.

1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260000.

2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

## 3.6 CONTROL CONNECTIONS

A. Install control and electrical power wiring to field-mounted control devices.

B. Connect control wiring in accordance with Section 260000.

C. Install nameplate for each control connection, indicating field control panel designation and I/O control designation feeding connection.

1. Nameplate shall be laminated acrylic or melamine plastic signs, as specified in Section 260553 "Identification for Electrical Systems."
2. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch high.

## 3.7 FIELD QUALITY CONTROL

A. Testing Agency, Owner: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Agency, Contractor: Engage a qualified testing agency to perform tests and inspections.

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

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

E. Tests and Inspections:

1. Perform installation and startup checks in accordance with manufacturer's written instructions.
2. Leak Test: Hydrostatic test. Repair leaks and retest until no leaks exist.
3. Operational Test: Start units to confirm proper motor rotation and unit operation. Adjust air-fuel ratio and combustion.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

    a. Check and adjust initial operating set points and high- and low-limit safety set points of fuel supply, water level, and water temperature.
    b. Set field-adjustable switches and circuit-breaker trip ranges as indicated.

F. Boiler will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

## 3.8 DEMONSTRATION

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

1. Instructor shall be factory trained and certified.
2. Provide not less than two hours of training.
3. Train personnel in operation and maintenance and to obtain maximum efficiency in plant operation.
4. Provide instructional videos showing general operation and maintenance that are coordinated with operation and maintenance manuals.
5. Obtain Owner sign-off that training is complete.
6. Owner training shall be held at Project site.

END OF SECTION 235216

# SECTION 260000 - ELECTRICAL SPECIFICATIONS

## PART 1 - GENERAL

### 1.1 GENERAL SCOPE

A. The work required under this specification shall include all labor, materials, tools, equipment, power, transportation, hoisting implements, etc., necessary for the completion of the electrical work of the contract: All as specified herein, shown on the drawings or reasonably implied by either, complete in every respect unless specified otherwise herein. The work included in this contract shall consist of the installation, test and guarantee of all work described on the plans and specifications.

### 1.2 RELATED DOCUMENTS

A. Drawings and general provisions of contract, including general and supplementary conditions and Division 1 specification sections, apply to this and the other sections of Division 26. This work shall be conducted as a prime contract.

### 1.3 PRE-BID QUESTION PROCEDURE

A. If a Contractor, Subcontractor or Supplier needs an interpretation of the contract documents prior to bid date, he or she must do so in writing by the following procedure:

1. Clearly identify the part of the contract documents in question (reference specification section and page, drawing number and plan or section, etc.).
2. Clearly state the question and/or discrepancy.
3. Send via e-mail to the Project Manager at MDA Engineering, Inc., rgardner@mdaengr.com.
4. A response will be issued to all questions:

    a. In writing,
    b. In a timely fashion,
    c. To all appropriate parties.

5. Response worthy of issuing in the form of addendum will be issued as such.
6. Requests for contract document interpretation may also be made via:

    a. Pre-bid meeting (if applicable)
    b. Electronic mail
    c. Personal delivery to MDA Engineering, Inc.

7. Requests for contract document interpretation may not be made verbally (in person, by telephone, etc.).

## 1.4 DRAWINGS AND SPECIFICATIONS

A. Drawings indicate general arrangement of system and are to be followed insofar as possible. Deviations from drawings may be necessitated by field conditions. Detailed layouts of proposed departures to be submitted to Engineer for approval.

B. Drawings and specifications to be considered cooperative and anything appearing in specifications, but not on drawings, or vice versa, to be considered part of the contract and to be executed.

C. Drawings indicate size and approximate location of various parts of work and are to be used as a general guide for installation. However, drawings are, to a considerable extent, diagrammatic and exact locations of piping, ductwork, etc., may appear on the drawings or must be worked out on job. However, no changes in sizes to be made without written approval of Engineer. Errors or omissions discovered by bidding Contractors prior to bid openings, to be called to attention of Engineer without delay.

D. If a specific item is specified or on drawings for multiple trades, this Contractor shall include all items in the bid regardless of other trades. Resolution will be by addendum or change order.

## 1.5 ALTERNATES

A. Refer to front end specifications for lists of alternates and work associated with such alternates.

## 1.6 PROJECT CLOSEOUT

A. In order to achieve a complete and commissioned project, each Contractor is responsible for the following items:

1. Building inspection certificates.
2. As-built drawings.
3. Final payment request.
4. Waiver of liens.
5. Demonstration certificates signed by Owner.
6. Delivery of extra materials.
7. Return of borrowed keys and working permits.
8. Letter declaring punch list items completed.
9. Operation and maintenance manuals.
10. Final guarantee and execution of warranties.
11. Other requirements specified in Division 1 specifications.

## 1.7 RECORD DOCUMENTS

A. Prepare record documents in accordance with the requirements in Division 1.

## 1.8 EQUIPMENT AND SYSTEMS DEMONSTRATION

A. Each Contractor is responsible for verifying the complete operation of the equipment and systems installed as a part of the work. After the Contractor is satisfied the work meets the specified intents and sequences of operation, the Contractor shall schedule, through the Engineer, a session during which all aspects of the work are explained to the Owner's personnel and/or representatives.

B. Provide LMHA staff with system training regarding basic operations, adjustments, maintenance and troubleshooting methods. This shall include distribution of maintenance manuals along with actual system demonstrations.

## 1.9 INSPECTION OF EXISTING AND GENERAL CONDITIONS

A. The Contractor will be held to have personally inspected the site of the proposed work to arrive at a clear understanding of the conditions under which the work is to be performed. The extent of other Contractor's activities in the area, and to become fully acquainted with the receiving and storage spaces available. The Contractor shall compare the premises and site with the drawings and specifications, and shall be satisfied as to the conditions of the premises, the actual elevations, and any other conditions affecting the scope or completion performance of the work, before the delivery of this proposal.

B. No allowances or extra consideration on behalf of the Contractor will be allowed by reason of the Contractor's failure to become familiar with site conditions: Error or oversight on the part of the Contractor or due to interference's by the Owner's or other Contractor's activities.

C. Items specified on electrical equipment schedules and plans are the basis of design. Equality of other equipment shall be determined by the Owner and Engineer. Any modification to these documented methods that is made necessary by alternate equipment is the responsibility of the supplier of the alternate equipment.

D. Contractor is directed to include all necessary overtime and premium time (Saturday, Sunday, Holidays) required for the completion of the intended work to meet specified schedules.

E. Do not scale electrical drawings. For exact dimensions, use dimensioned drawings or actual field conditions.

## 1.10 CODES, PERMITS, AND COMPLIANCE

A. Contractor shall obtain and pay for all permits, licenses and inspections required by laws of governing bodies. Comply with all applicable codes, ordinances and all legal requirements. No extra compensation will be allowed for any changes necessary for code compliance regardless of the method of installation shown on the drawings or specified.

B. All electrical work shall comply with current adopted editions of National Electrical Code, NFPA, the Life Safety Code and all applicable state and local codes and ordinances.

C. All electrical equipment shall be new and shall be labeled or listed by U.L. or a qualified testing organization.

D. All equipment, devices, and materials shall be the latest products of manufacturer and shall conform to the requirements noted on plans.

1.11 WORKMANSHIP

A. Workmanship shall be of the highest quality conforming to the best electrical installation practice. Any work or material, which is rejected, must be removed immediately and replaced. No sub-standard work will be accepted.

B. The brevity of this specification shall not be construed as relieving the Contractor of his responsibility to perform all work in a first class workmanlike manner.

1.12 SUBMITTALS AND RECORD DRAWINGS

A. Submit shop drawings and catalog data for approval for all new equipment and materials specified for this project prior to ordering or manufacture of such. Shop drawings not stamped with Contractors approval will not be reviewed.

B. The Contractor shall keep an accurate record of all deviations from the approved design and specifications which may occur in the work as actually constructed, and shall submit same to the Engineer or Owner’s representative at completion of the job.

C. Submittals shall be coordinated through the Engineer.

1.13 TESTS AND GUARANTEE

A. All tests for various systems shall be performed as required, consistent with good general practice and in compliance with codes and authorities.

B. As a condition precedent to final payment, the Contractor shall execute to the Owner a guarantee in a form approved by the Owner. Guarantee shall warrant that all work included in this specification will remain in serviceable condition (ordinary wear, abuse and causes beyond the control of the Contractor excluded) for a period of one year from date of final completion and acceptance of work. The Contractor agrees to correct, without cost to the Owner, any imperfections in whole or in part which may develop in this work, including any damage to other work caused by such imperfections or repairing of same.

C. Electrical Contractor is responsible for proper direction of motor rotation. Damage to motors, equipment, or systems due to improper rotation shall be corrected at this Contractor's expense.

D. All electrical systems, devices and related items shall be tested. Replace any and all defective device items or systems before completion of the project.

1.14 COORDINATION

A. Field verify exact location of all new equipment with existing conditions and coordinate with the General and other Contractors prior to rough-in and/or installing any of this work.

B. Field verify all clearances and conditions prior to the installation of any conduit, cable tray, raceway, etc.; Verify locations of all outlet boxes, surface mounted devices, panelboard enclosures, fixture locations, etc., with Civil, Structural and Mechanical drawings prior to rough-in. Report any discrepancies to the Engineer prior to proceeding with work.

C. All power outages to existing or operable facilities shall be scheduled with the Owner a minimum two (2) weeks in advance. The Contractor shall not interrupt or restore power without prior consent to the Owner. Any interruption shall be only for the specific scheduled time. The Owner or Mechanical Contractor will be responsible for shutdown and start-up of Mechanical Systems.

D. Coordinate all power wiring, safety disconnect means, motor control and control wiring for mechanical equipment with the Mechanical Contractor. Electrical Contractor shall furnish and install all wiring to motor or equipment through starters and safety switch.

E. The Mechanical Contractor, Mechanical Equipment Supplier or Temperature Control Contractor will be responsible for all low voltage temperature control wiring required for the project. This Electrical Contractor shall install, terminate and label all power, control and interlock wiring detailed on these plans.

F. Locate and install all new devices and fixtures in accordance with American Disability Act Guidelines.

1.15 IDENTIFICATION

A. Furnish and install self-adhesive vinyl labels with ½ inch letters indicating panel name and voltage on all panels and cabinets. Starters, pushbuttons and disconnect switches shall have phenolic labels with 3/8 inch high letters indicating name or item controlled. All labels shall be white surface with black letters and be UV, water and abrasion resistant.

B. Install clear adhesive tape with black lettering on wiring device outlets defining source (panel) and circuit number identification.

C. Provide an arc flash hazard label for all electrical equipment including but not limited to switchboards, panelboards, industrial control panels, meter socket enclosures, disconnects and motor control centers. Labeling to be in accordance with NEC 110.16 (flash protection). Labels to be Brady #99452 or equal.

D. Provide new typed panel directories for all new and existing panelboards affected by this work.

## 1.16 DEMOLITION, REMOVALS, CLEAN-UP, PROTECTION AND TOUCH-UP

A. Remove all existing raceway, wiring, fixtures, devices, controllers, etc., scheduled for removal or not required to remain in service. Contractor shall coordinate removal with Owner and all other trades on the project. All raceway and wire shall be removed back to the point of service. Provide additional make-up raceway, junction boxes, wiring, etc., to maintain raceway and circuit continuity for functional circuits.

B. This Contractor shall dispose of all materials generated from removal and installation of this work. Debris shall be removed from the project site weekly. This Contractor shall provide to the Owner any salvageable materials as directed by the Owner or Engineer.

C. Deposit all PCB or other hazardous classified materials (including fluorescent lamps and ballasts) from removals in approved containers at a location directed by the Owner. The Contractor shall be responsible for disposing of all PCB or other hazardous classified material.

D. All equipment, items, devices and appurtenances shall be protected from debris and damage while stored at the site and during and after installation.

E. Upon completion of work this Contractor shall thoroughly clean all apparatus furnished by this contract.

F. Scarred factory-finished electrical equipment shall be touched up with factory furnished paint. Rusted or marred surfaces of electrical equipment shall be cleaned and primed before painting.

G. Patch finished surfaces and building components using new materials matching existing materials and experienced installers.

H. All cutting and patching of roofs, walls, floors, and slabs, etc. is the responsibility of this contractor unless specifically stated otherwise on the drawings.

I. This Contractor shall be responsible for all roof penetrations associated with installation of work on existing roof systems. All roof work shall be performed by a licensed and certified contractor so that all existing roof warranties are maintained.

## 1.17 UTILITY COMPANY BACKCHARGES

A. Contractor shall be aware that all utility company backcharges for the "electrical service," service as indicated on the plans will be paid directly by the Owner.

B. Contractor shall, as part of his project scope, assist with utility company contact, coordination of service location, timing of service energization, etc., without additional cost to the Owner.

C. Contractor to verify and perform work in accordance with all utility company installation standards. The contractor is responsible for contacting the utility company and establishing service planning engineering work orders.

## 1.18 MAINTENANCE MANUALS

A. Prepare maintenance manuals. Provide a minimum of three copies with a single copy sent to the Engineer for approval. Include the following information for equipment items:

1. Complete information on project equipment and services as was submitted during the course of the project. This information is solely intended to provide the Owner with accurate, usable information on how to care for the facility.
2. Description of function, normal operating characteristics and limitations, performance curves, Engineering data and tests, and complete nomenclature and commercial numbers of replacement parts.
3. Manufacturer's printed operating procedures.
4. Maintenance procedures for routine preventative maintenance and troubleshooting.

## 1.19 ELECTRONIC FILES

A. If the Contractor requests, MDA Engineering, Inc. will provide electronic files for the Contractors sole convenience and use in preparation of shop drawings related to the project subject to the following terms and conditions:

1. MDA Engineering, Inc. will provide electronic files of drawing sheets specifically requested in writing by the Contractor.
2. A CADD contract provided by MDA Engineering, Inc. shall be signed by an officer of the contracting company prior to delivery of the electronic files.
3. The Contractors' shall, to the fullest extent permitted by law, indemnify and hold harmless MDA Engineering, Inc., from all claims, damages, losses and expenses, including attorney's fees arising out of or resulting from the use of these electronic files.
4. MDA Engineering, Inc. reserves the right to remove all indications of Ownership and/or involvement from each electronic display.
5. Any other use or re-use by the Contractor or by others will be at the Contractor's sole risk and without liability or legal exposure to MDA ENGINEERING, INC. AND OWNER.

## PART 2 - BASIC MATERIALS AND METHODS

### 2.1 FASTENING AND SUPPORTS

A. All conduits and equipment shall be adequately supported, either suspended from the construction above or by means of struts to the construction below. Conduit, tray, fixtures, etc., shall not span flexible connections of air handling equipment, piping, etc., and shall not be supported from ductwork or other trades' supports.

### 2.2 RACEWAYS

A. All conductors shall be installed in raceway.

B. Unless otherwise noted, conduit shall be Electrical Metallic Tubing (EMT) with steel compression or set screw fittings 3/4 inch trade size minimum. Cast metal fittings are not acceptable.

C. Rigid Galvanized Steel (RGS) conduit shall be used in exposed, exterior applications with threaded and cast fittings, minimum 3/4 inch trade size.

D. Conduit below grade shall be Schedule 40 PVC with rigid steel elbows (greater than 30 degrees) and risers, concrete encased where indicated. Bury the greater of 18 inches below grade or per NEC minimum depth and install red marker warning tape 6" below finished grade.

E. All conduit and wiring in finished areas shall be concealed in the construction where practicable. All raceways shall be routed within structural and furred spaces utilizing factory made elbows as good practice and workmanship allows. Install sleeves through structural concrete where penetrating structural floor decks.

F. Raceways 1 ½ inch trade size and smaller shall be secured with one hole malleable straps or wall brackets. Trapeze supports shall be used for groups of parallel raceways with each secured to trapeze with proper clamps. Individual runs of raceway 2 inches and larger shall be supported with malleable iron hangers. Use of "Minerallacs" for supports are prohibited.

G. All feeder and branch circuit raceways shall include an insulated equipment grounding conductor. Refer to GROUNDING section.

H. Install fire stopping where required by the building construction.

I. Final connections to vibrating equipment (motors, transformers, etc.), process machinery and instrumentation devices shall be via flexible, "seal tite" conduit, minimum 24 inches and a maximum of 42 inches in length. Outdoor connections shall create a drip loop to prevent rainwater from entering the building and equipment enclosures.

## 2.3 OUTLET AND JUNCTION BOXES

A. Surface mounted outlet device boxes and junction boxes in utility rooms and service areas shall be rounded edge press formed galvanized steel with knock-outs and matching galvanized stamped steel cover plates.

B. Surface type boxes for special systems such as fire alarm, shall be properly sized backboxes for the device as provided by the system vendor.

## 2.4 SURFACE METAL WIREWAY/RACEWAY

A. Furnish and install surface mounted, metal wireways and raceways where noted on the plans.

B. Surface metal wireway installed per NEC Article 376 may be used with proper covers, tees, elbows, etc., for feeder taps, extensions, etc. Wireways shall be Square D Square duct or equal.

C. Provide single or multi-cell surface metal raceways for branch circuit extensions, telecommunication wiring and plug mold type service where shown on the plans.

D. Surface metal raceway for necessary circuit extensions, where concealed wiring is not practical, shall be nominal 5/8 inches deep by ¾ inches wide, Wiremold 700 series or equal.

E. Mount all raceway straight, true and level and route as inconspicuously as possible. Where runs are horizontal, mount to clear countertops, backsplash, base moldings, etc.

## 2.5 FEEDER AND BRANCH CIRCUIT CONDUCTORS

A. Feeder and branch circuit conductors shall be stranded copper with 600V insulation type THHN/THWN.

B. Minimum wire size for branch circuit conductors shall be #12 AWG, stranded, copper.

C. All conductors shall be protected in accordance with NEC ART 240.4 and Ampacity shall be in accordance with NEC 310.15 based on 60 degrees C rating for sizes #2 and smaller and 75 degrees C for sizes #1 AWG and larger.

D. All single-pole and multi-pole branch circuits with neutral wire requirement shall have individual neutral conductors to comply with NEC 210.4. Each neutral shall be identified at all junction boxes and terminals the same as its corresponding branch circuit number.

## 2.6 GROUNDING

A. Grounding electrode conductors shall be bare, stranded 7-strand copper, sized per NEC table 250.66. Route in Schedule 40 P.V.C. for sleeving through concrete and masonry walls and floors. Ground rods shall be 3/4" dia. X 10'-0" copper clad steel. All connections to building steel and underground/exterior connection shall be exothermically welded.

B. Bond mechanical metal piping systems per NEC Article 250.104.

C. Bond and ground all non-current carrying metal parts of the building and electrical system as required.

D. Install insulated equipment grounding conductor in all raceways with conductors for all feeder and branch circuits sized in accordance with NEC Article 250.122.

E. Provide ground resistance test utilizing fall-of-potential method according to IEEE 81. Minimum ohm values for equipment rated 500 KVA to 1000KVA: 5 ohms, 1000 KVA and greater: 3 ohms.

## 2.7 WIRING DEVICES

A. All wiring devices shall be specification grade, heavy duty for side and back wiring convenience.

B. Convenience receptacles shall be 20 Ampere, 125 volt, NEMA 5-20R, Heavy duty, specification grade, Hubbell #HBL 5362 or equal.

C. Wall switches shall be toggle type, 20 Ampere, 125/277 A.C., quiet type, Hubbell #HBL 1221 series or equal.

D. All wiring devices shall match color of existing device body in that space unless otherwise specified.

E. Device plates in unfinished areas shall be stamped, galvanized, sheet metal.

## 2.8 DISCONNECTS AND STARTERS

A. Provide disconnects for all equipment as shown on the plans and starters for all equipment not provided with built-in control panels.

B. Disconnects shall be heavy duty, multiple pole, quick-make, quick-break, H.P. rated, 250 volt or 600 volt in NEMA 1 enclosure (indoors) or NEMA 3R enclosures (outdoors).

C. Disconnects shall be fusible or non-fused as noted and shall include class R rejection style fuse holders.

D. Starters for motors ½ HP and less shall be manual starters, 120 volts, with built-in overloads and pilot light. Install flush in finished areas. Square D. Co., Class 2510 or equal by Allen Bradley. Contractor to determine final O.L. thermal element sized based upon final motor F.L.A.

E. Starters for motors larger than ½ HP shall be combination fusible switch/magnetic motor starter, NEMA rated, 250 volt three-phase with 3 overloads, 120 volt C.P.T., cover mounted H-O-A selector switch, transformer type pilot light in cover and additional form contacts for auxiliary control functions.

F. Coordinate all starters, disconnects, overloads, etc., with final motor and equipment items. Locate to maintain proper clearances.

## 2.9 FUSES

A. All low voltage fuses shall be time delay, dual element, RK-1 rejection style 250 V or 600 V as appropriate and arranged in a coordinated selective system for overcurrent protection.

B. All fuses shall hold a 500 percent overload for 10 seconds and be rated 200K A.I.C. minimum. Fuse sizes for individual motor loads shall be properly sized to actual motor label for motor branch circuit and short circuit protection per NEC 430.52.

C. Fuses shall be rejection style, dual element Bussman Fusetron, 200K or equal by Little Fuse or Mersen.

# PART 3 - PRODUCTS AND EXECUTION

## 3.1 PANELBOARDS

A. Submittal – Special Requirements

1. Include dimensioned plans, elevations, sections, and details.
2. Show tabulations of installed devices with nameplates, conductor termination sizes, equipment features, and ratings.
3. Detail enclosure types including mounting and anchorage, environmental protection, knockouts, corner treatments, covers and doors, gaskets, hinges, and locks.
4. Detail bus configuration, current, and voltage ratings.
5. Short-circuit current rating of panelboards and overcurrent protective devices.
6. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices and auxiliary components.
7. Include evidence of UL listing for SPD as installed in panelboard.

B. Panelboard Common Requirements

1. Product selection for restricted space: drawings indicate maximum dimensions for panelboards including clearances between panelboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.
2. Electrical components, devices, and accessories: listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. Comply with NEMA PB 1, NFPA 70 and NFPA 70E.
4. Enclosures: Flush or surface-mounted as noted on the schedules, dead-front cabinets. Rated for environmental conditions at installed location. 84 inches maximum height.

    a. Front: secured to box with concealed trim clamps. For surface-mounted fronts, match box dimensions; for flush-mounted fronts, overlap box. Trims shall cover all live parts and shall have no exposed hardware.
    b. Hinged Front Cover: Entire front trim hinged to box and with standard door within hinged trim cover. Trims shall cover all live parts and shall have no exposed hardware.
    c. Finishes:

        1) Panels and Trim: Steel, factory finished immediately after cleaning and pretreating with manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat; ANSI-61 grey.
        2) Back boxes: Un-painted bare galvanized steel.

5. Incoming Mains:

    a. Location: Top or bottom as determined by the Contractor. Convertible between top and bottom for panelboards up to and including 400 ampere.
    b. Main Breaker: Main lug interiors up to 400 amperes shall be field convertible to main breaker.

6. Phase, Neutral, and Ground Buses:

    a. Material: Tin-plated aluminum. Bus shall be fully rated the entire length.
    b. Interiors shall be factory assembled into a unit. Replacing switching and protective devices shall not disturb adjacent units or require removing the main bus connectors.
    c. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment grounding conductors; bonded to box.
    d. Full-Sized Neutral: Equipped with full-capacity bonding strap for service entrance applications. Mount electrically isolated from enclosure. Do not mount neutral bus in gutter.

7. Conductor Connectors: Suitable for use with conductor material and sizes.

    a. Terminations shall allow use of 75 deg C rated conductors without derating.

b. Main and Neutral Lugs: Mechanical type, with a lug on the neutral bar for each pole in the panelboard.
c. Ground Lugs and Bus-Configured Terminators: Mechanical type, with a lug on the bar for each pole in the panelboard.

8. Future Devices: Panelboards or load centers shall have mounting brackets, bus connections, filler plates, and necessary appurtenances required for future installation of devices.

a. Percentage of Future Space Capacity: 20 percent.

9. Panelboard Short-Circuit Current Rating: Fully rated to interrupt symmetrical short-circuit current available at terminals. Assembly listed by UL for 100 percent interrupting capacity. Select circuit breakers with individual ratings equal to or greater than the available fault current as shown on the drawings.

a. Panelboards and overcurrent protective devices rated 240 V or less shall have short-circuit ratings as shown on drawings, but not less than 20,000 A rms symmetrical.

C. Lighting and Appliance Branch-Circuit Panelboards (LOADCENTER)

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

a. Eaton; Type PRL1A, PRL2A and PRL3A.
b. General Electric Company; A-Series.
c. Siemens; Type P1 and P2.
d. Square D by Schneider Electric; NQ and NF.

2. Panelboards: NEMA PB 1, lighting and appliance branch-circuit type.
3. Doors:

a. Doors: Door-in-door construction with concealed hinges; secured with multipoint latch with tumbler lock; keyed alike. Outer door shall permit full access to the panel interior. Inner door shall permit access to breaker operating handles and labeling, but current carrying terminals and bus shall remain concealed. Concealed hinge door secured with multipoint latch with tumbler lock; keyed alike.

4. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
5. Subfeed Circuit Breakers: Individually vertically mounted.

D. Disconnecting and Overcurrent Protective Devices

1. Molded Case Circuit Breaker (MCCB): comply with UL 489, with interrupting capacity to meet available fault currents.

a. Thermal-Magnetic Circuit Breakers:

1) Inverse time-current element for low-level overloads.
2) Instantaneous magnetic trip element for short circuits.
3) Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger. Magnetic trip element with front-mounted, field-adjustable trip setting.

b. GFCI circuit Breakers: Single- and double-pole configurations with Class A ground-fault protection (6-mA trip).
c. Arc-Fault Circuit Interrupter Circuit Breakers: Comply with UL 1699; 120/240-V, single-pole configuration.
d. MCCB features and standard accessories:

1) Standard frame sizes, trip ratings, and number of poles.
2) Breaker handle indicates tripped status.
3) UL listed for reverse connection without restrictive line or load ratings.
4) Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor materials.
5) Application Listing: Appropriate for application; type SWD for switching fluorescent lighting loads; type HID for feeding fluorescent and hid lighting circuits.
6) Ground-Fault Protection: Integrally mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
7) Rating Plugs: Three-pole breakers with ampere ratings greater than 100 amperes shall have interchangeable rating plugs or electronic adjustable trip units.
8) Multipole units enclosed in a single housing with a single handle or factory assembled to operate as a single unit.
9) Handle Padlocking Device: Fixed attachment, for locking circuit-breaker handle in on or off position.
10) Handle Clamp: Loose attachment, for holding circuit-breaker handle in on position.

E. Identification

1. Panelboard Label: Manufacturer's name and trademark, voltage, amperage, number of phases, and number of poles shall be located on the interior of the panelboard door.
2. Breaker Labels: Faceplate shall list current rating, UL and IEC certification standards, and AIC rating with voltage application.
3. Circuit Directory: Typed directory card inside panelboard door, mounted in metal frame with transparent protective cover. Circuit directory shall identify specific purpose with detail sufficient to distinguish it from all other circuits.
4. Warning Labels: NFPA 70E arc flash warning hazard and shock hazard warnings.

F. Installation

1. Mount top of trim 72 inches; above finished floor unless otherwise indicated. Panelboards greater than 60 inches in height shall be mounted at 90 inches above the finished floor.
2. Mount panelboard cabinet plumb and rigid without distortion of box.
3. Mount recessed panelboards with fronts uniformly flush with wall finish and mating with back box.
4. Mount surface-mounted panelboards to steel slotted supports 5/8 inch in depth. Orient steel slotted supports vertically.
5. Make grounding connections and bond neutral for services and separately derived systems to ground. Make connections to grounding electrodes, separate grounds for isolated ground bars, and connections to separate ground bars.
6. Install filler plates in unused spaces.
7. Arrange conductors in gutters into groups and bundle and wrap with wire ties.
8. Label each branch circuit device in distribution panelboards with a label specifically identifying the load and complying with other requirements for identification.
9. Furnish handle clamp locking devices on all night light (NL), emergency (EM) and all fire alarm and other life safety systems control power circuits (with red identification on breaker).
10. For branch-circuit panelboards, install typed, descriptive, panel circuit directories to designate area and type of loads served by each circuit. Branch breaker numbering shall be as listed on the panelboard schedules and/or plan drawing circuit numbers.
11. Test and Inspection

    a. Test insulation resistance for each panelboard bus, component, control circuit and connecting supply feeder.
    b. Test continuity of each load circuit.

END OF SECTION 260000

# ASBESTOS NESHAP SURVEY REPORT
## (PRE-RENOVATION)

**PROJECT:**

## BOILER REPLACEMENT AT FIVE LMHA PROPERTIES

## LOCATIONS:

1. **DORRELL MANOR: 5836 SOUTHWYCK BLVD., TOLEDO, OH**
2. **HARRY HANSEN: 3240 NORTH ERIE ST., TOLEDO, OH**
3. **OAK GROVE ESTATES: 342 OAK VIEW CT., HOLLAND, OH**
4. **FLORY GARDENS: 3425 NEBRASKA AVE., TOLEDO, OH**
5. **VISTULA MANOR: 615 CHERRY STREET, TOLEDO, OH**

## CLIENT:

**MDA ENGINEERING, INC.**
**1415 HOLLAND ROAD, SUITE B**
**MAUMEE, OH 43537**
**CONTACT: KEVIN P. LAFFERTY, P.E.**
**PHONE: 419.893.3141**

**INSPECTION DATES:**

## JUNE 3-4, 2020

**CONDUCTED BY:**

**BRUMBAUGH-HERRICK, INC.**
**7920 N. WOODBRIDGE RD.**
**MONCLOVA, OH 43542**
**419-382-9574**

*BHI*
*Brumbaugh-Herrick, Inc.*

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3. LABORATORY ANALYSIS RESULTS APPENDICES

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## INSPECTION SUMMARY

On June 3-4, 2020, Brett Brumbaugh performed a limited asbestos NESHAP inspection and sampling with the purpose of the inspection to identify the asbestos containing materials in the boiler/mechanical rooms at 5 LMHA properties. The specific scope of work and areas are as follows:

1. Dorrell Manor –Replace existing natural gas boilers for domestic hot water and 2 storage tanks.
2. Harry Hansen – Replace existing natural gas hot water boilers for central heating in 3 boiler rooms.
3. Oak Grove Estates – Replace existing natural gas hot water boilers for central heating located in 4 mechanical rooms.
4. Flory Gardens – Replace existing natural gas hot water boilers for domestic hot water and hydronic heating located 2 each in 10 boiler rooms.
5. Vistula Manor – Replace 3 existing central natural gas hot water boilers located in the boiler room.

The asbestos inspections were conducted for compliance with the current US EPA NESHAP and Ohio EPA regulations regarding the identification of suspect asbestos materials in buildings prior to renovation.

A total of 35 asbestos bulk samples were collected and analyzed as part of this project. All bulk sampling of suspected asbestos was based upon the appearance, texture, and location of the material. All bulk samples were analyzed utilizing current EPA methods for PLM (Polarized Light Microscopy) by EMSL Analytical in Plymouth, MI. The laboratory is accredited by the NIST, NVLAP program (National Institute of Standards and Technology, National Voluntary Laboratory Accreditation Program) and also an American Industrial Hygiene Association (AIHA) accredited laboratory.

The inspection was conducted and the report was prepared by Brett Brumbaugh who is accredited by the Ohio EPA as an Asbestos Hazard Evaluation Specialist and an Asbestos Hazard Abatement Project Designer. Mr. Brumbaugh has been conducting asbestos surveys since 1987, and is also a registered environmental property assessor (REPA) and certified environmental and safety officer (CESCO) through the NREP (National Registry of Environmental Professionals).

## ASBESTOS INSPECTION FINDINGS

As a result of the bulk sampling and lab analyses, the following asbestos materials were identified in the mechanical rooms inspected at each facility:

### DORRELL MANOR

**Non-asbestos materials:** Drywall joint compound on walls, fiberglass pipe insulation, PVC elbows on fiberglass, fiberglass boiler insulation, fiberglass tank insulation.

### FLORY GARDENS

| ASBESTOS MATERIALS | LOCATIONS | ASBESTOS QUANTITIES |
|---|---|---|
| Textured ceiling coating | Mechanical Rooms 1-10 | 2,160 SF |

**Non-asbestos materials:** Fiberglass pipe insulation, PVC elbows on fiberglass, fiberglass boiler insulation.

### HARRY HANSEN

| ASBESTOS MATERIALS | LOCATIONS | ASBESTOS QUANTITIES |
|---|---|---|
| Drywall joint compound/mud | Mechanical Rooms 1, 2, & 3 | 660 sf |
| Hot water tank insulation | Mechanical Room 3 | 110 sf |
| Mud fitting insulation on fiberglass insulated pipe | Mechanical Room 3 | 22 fittings |
| Tar duct covering on fiberglass insulated duct at chimney wall | Mechanical Room 1 and 2 | 60 sf |

**Non-asbestos materials:** Fiberglass pipe insulation, PVC elbows on fiberglass, fiberglass boiler insulation, fiberglass tank insulation.

### OAK GROVE ESTATES

**Non-asbestos materials:** Drywall joint compound, fiberglass pipe insulation, PVC elbows on fiberglass, fiberglass boiler insulation, fiberglass tank insulation.

### VISTULA MANOR

**Non-asbestos materials:** Fiberglass pipe insulation, PVC elbows on fiberglass, fiberglass boiler insulation, fiberglass tank insulation.

## CONCLUSIONS/RECOMMENDATIONS

The asbestos containing materials identified must be removed and disposed of by a state licensed asbestos abatement contractor prior to any disturbance as part of the renovation project. Those materials which will not be disturbed can be left in-place and managed until removal is required as part of future renovation projects.

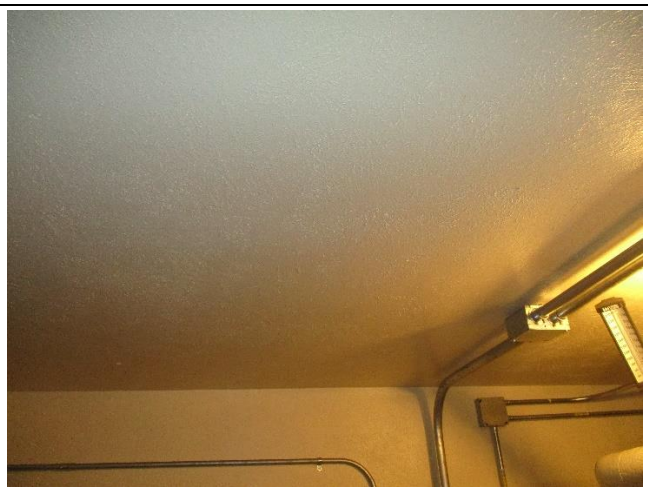
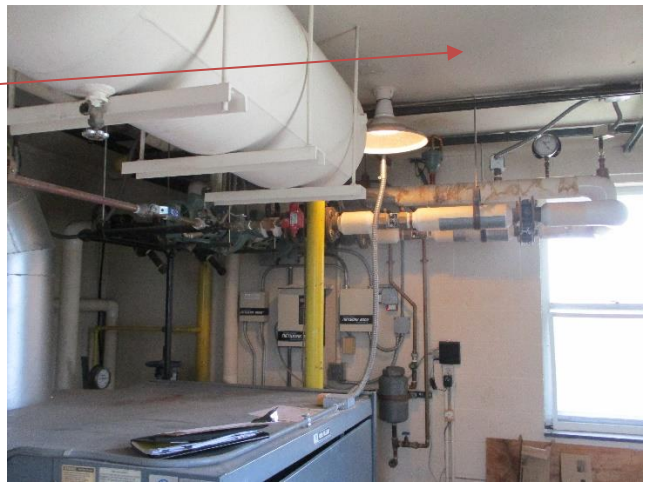
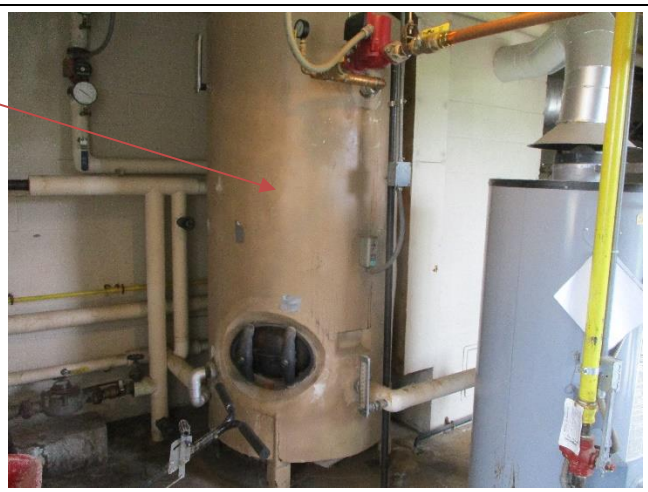
## REMEDIATION COST ESTIMATES

| ASBESTOS MATERIALS | LOCATIONS | QUANTITY | COST ESTIMATE |
|---|---|---|---|
| Textured ceiling coating | Flory Gardens | 3,060 SF | $ 21,400 |
| Drywall joint compound/mud | Harry Hansen #1, 2, 3 | 660 sf | $ 4,600 |
| Hot water tank insulation | Harry Hansen #3 | 110 sf | $ 3,800 |
| Mud fitting insulation on fiberglass insulated pipe | Harry Hansen #3 | 22 fittings | $ 1,100 |
| Tar duct covering on fiberglass insulated duct at chimney wall | Harry Hansen #2 & 3 | 60 sf | $ 1,200 |
| **TOTAL** | | | **$ 32,100** |

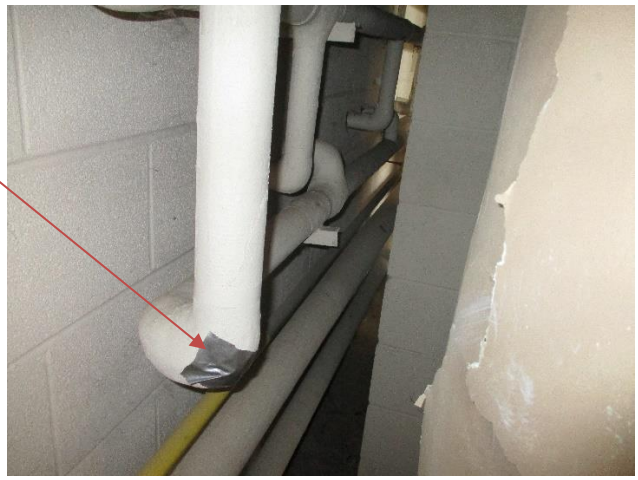
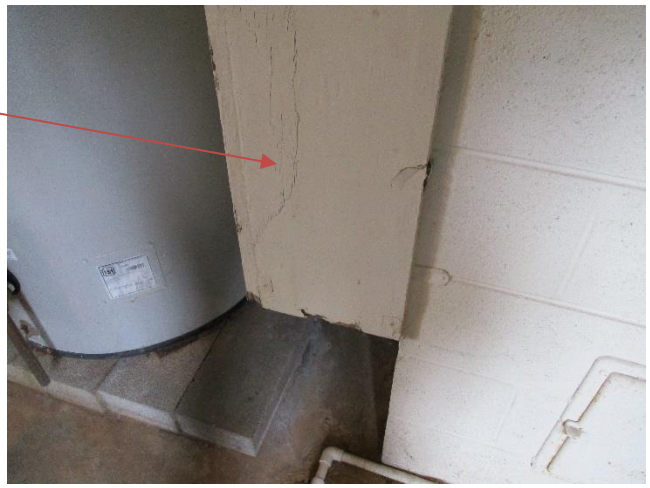
Inspector,

Brett L. Brumbaugh, REPA, CESCO
Certified Asbestos Hazard Evaluation Specialist
Ohio EPA License #ES3488

# PHOTOGRAPHS OF ASBESTOS MATERIALS

| | |
|---|---|
| **Photo 1**<br>Textured ceiling coating |  |
| **Photo 2**<br>Drywall joint compound/mud on ceiling |  |
| **Photo 3**<br>Hot water tank insulation |  |

# PHOTOGRAPHS OF ASBESTOS MATERIALS

| | |
|---|---|
| **Photo 4**<br>Mud fitting insulation on fiberglass insulated pipe |  |
| **Photo 5**<br>Tar duct covering on fiberglass insulated duct at chimney wall |  |

# ASBESTOS INSPECTION SAMPLING PROTOCOL & GLOSSARY

## SAMPLING PROTOCOL

The bulk samples were collected in accordance with AHERA regulations (Title II of the "Federal Toxic Substances Control Act" found in 40 CFR Part 763.86) from locations that were selected to be representative of the building materials. Sampling was accomplished using the simplified sampling scheme referenced in the AHERA regulations and found in the “Pink Book”. Locations of individual samples are referenced on this report.

The samples were either collected with a coring tool designed for asbestos sampling or placed into a plastic bag for laboratory analysis. The samples were analyzed via polarized light microscopy with dispersion staining, using the “Interim method for the Determination of Asbestos in Bulk Insulation Samples” found in Appendix A to Subpart F in 40 CFR Part 763.

The regulations require specific numbers of samples be obtained per homogeneous area. For example, when sampling for joint compound or asbestos in hard plaster (sprayed-on or troweled-on surfacing materials) samples are to be taken based on the following increments: 0 to 1000 square feet of material, 3 samples are necessary. From 1001 to 5000 square feet, 5 samples are necessary, over 5000 square feet 7 samples are required. If during analysis any samples are found to contain asbestos, the entire homogeneous area is delineated as asbestos containing material. In the case of pipe insulation or other types of manufactured materials, the regulations require only enough samples to ascertain whether asbestos is present. In this case, the minimum number of samples to collect and analyze is usually three. The sampling performed in this inspection followed these sampling guidelines.

## ASBESTOS GLOSSARY OF TERMS

***Friable asbestos material:*** means any material containing more than 1 percent asbestos as determined using the method specified in appendix E, subpart E, 40 CFR part 763 section 1, Polarized Light Microscopy, that, when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

***Category I Non-friable Asbestos Containing Material (ACM)*** means asbestos containing packings, gaskets, resilient floor coverings, and asphalt roofing products containing more that 1 percent asbestos as determined using the method specified in appendix E, subpart E, 40 CFR part 763, Section 1, Polarized Light Microscopy.

***Category II Non-friable ACM*** means any material, excluding Category I non-friable ACM, containing more than 1 percent asbestos as determined using the method specified in appendix E, subpart E, 40 CFR part 763, section 1, Polarized Light Microscopy that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure.

***Regulated Asbestos Containing Material (RACM):*** means (a) Friable asbestos material, (b) Category I non-friable ACM that has become friable, (c) category I non-friable ACM that will be or has been subjected to sanding, grinding, cutting, or abrading, or (d) Category II non-friable ACM that has a high probability of becoming or has become crumbled, pulverized, or reduced to powder by the forces expected to act on the material expected in the course of demolition or renovation operations regulated by this subpart.

# ASBESTOS BULK SAMPLE DESCRIPTIONS & RESULTS

Location: **Flory Gardens - 3425 Nebraska, Toledo, OH 43607**
Areas: **10 Mechanical/Boiler Rooms**
Sampling Date: **June 3, 2020**
Inspector: **Brett L. Brumbaugh**
Certification: **Asbestos Hazard Evaluation Specialist**
**Ohio EPA License #ES3488**
Analysis Date: **June 5-8, 2020**
Laboratory: **EMSL Analytical, Inc. – Plymouth, MI**
Accreditation: **NVLAP Asbestos Bulk Accredited Laboratory**

| SAMPLE NUMBER | SAMPLE LOCATION | MATERIAL | LABORATORY RESULTS |
|---|---|---|---|
| 1 | Mech. Room #1 ceiling | Drywall joint compound/mud | No asbestos detected |
| 2 | Mech. Room #1 ceiling | **Textured ceiling coating** | **4% Chrysotile Asbestos** |
| 3a | Mech. Room #2 ceiling | **Textured ceiling coating** | **2% Chrysotile Asbestos** |
| 3b | Mech. Room #2 ceiling | Drywall joint compound/mud | No asbestos detected |
| 4a | Mech. Room #3 ceiling | **Textured ceiling coating** | **3% Chrysotile Asbestos** |
| 4b | Mech. Room #3 ceiling | Drywall joint compound/mud | No asbestos detected |
| 5a | Mech. Room #10 ceiling | **Textured ceiling coating** | **2% Chrysotile Asbestos** |
| 5b | Mech. Room #10 ceiling | Drywall joint compound/mud | No asbestos detected |
| 6a | Mech. Room #8 ceiling | **Textured ceiling coating** | **3% Chrysotile Asbestos** |
| 6b | Mech. Room #8 ceiling | Drywall joint compound/mud | No asbestos detected |
| 7a | Mech. Room #6 ceiling | **Textured ceiling coating** | **2% Chrysotile Asbestos** |
| 7b | Mech. Room #6 ceiling | Drywall joint compound/mud | No asbestos detected |

**Note: Asbestos containing materials are defined by containing greater than 1% asbestos.**

# ASBESTOS BULK SAMPLE DESCRIPTIONS & RESULTS

| | |
|---|---|
| Location: | **Dorrell Manor - 5836 Southwyck Blvd., Toledo, OH 43614** |
| Areas: | **1st Floor Mechanical/Boiler Room** |
| Sampling Date: | **June 4, 2020** |
| Inspector: | **Brett L. Brumbaugh** |
| Certification: | **Asbestos Hazard Evaluation Specialist**<br>**Ohio EPA License #ES3488** |
| Analysis Date: | **June 5-8, 2020** |
| Laboratory: | **EMSL Analytical, Inc. – Plymouth, MI** |
| Accreditation: | **NVLAP Asbestos Bulk Accredited Laboratory** |

| SAMPLE NUMBER | SAMPLE LOCATION | MATERIAL | LABORATORY RESULTS |
|---|---|---|---|
| 8 | Mech. Room wall | Drywall joint compound/mud | No asbestos detected |
| 9 | Mech. Room wall | Drywall joint compound/mud | No asbestos detected |

**Note: Asbestos containing materials are defined by containing greater than 1% asbestos.**

# ASBESTOS BULK SAMPLE DESCRIPTIONS & RESULTS

| | |
|---|---|
| Location: | **Oak Grove Estates - 342 Oak View Ct., Holland, OH 43528** |
| Areas: | **4 Mechanical/Boiler Rooms in 345, 350, 9842, and 9845 buildings** |
| Sampling Date: | **June 4, 2020** |
| Inspector: | **Brett L. Brumbaugh** |
| Certification: | **Asbestos Hazard Evaluation Specialist**<br>**Ohio EPA License #ES3488** |
| Analysis Date: | **June 5-8, 2020** |
| Laboratory: | **EMSL Analytical, Inc. – Plymouth, MI** |
| Accreditation: | **NVLAP Asbestos Bulk Accredited Laboratory** |

| SAMPLE NUMBER | SAMPLE LOCATION | MATERIAL | LABORATORY RESULTS |
|---|---|---|---|
| 10 | Mech. Room ceiling (Bldg. 350) | Drywall joint compound/mud | No asbestos detected |
| 11 | Mech. Room wall (Bldg. 345) | Drywall joint compound/mud | No asbestos detected |
| 12 | Mech. Room ceiling (Bldg. 9842) | Drywall joint compound/mud | No asbestos detected |
| 13 | Mech. Room wall (Bldg. 9845) | Drywall joint compound/mud | No asbestos detected |

**Note: Asbestos containing materials are defined by containing greater than 1% asbestos.**

# ASBESTOS BULK SAMPLE DESCRIPTIONS & RESULTS

Location: **Harry Hansen - 3240 North Erie St., Toledo, OH 43605**
Areas: **3 Mechanical/Boiler Rooms**
Sampling Date: **June 4, 2020**
Inspector: **Brett L. Brumbaugh**
Certification: **Asbestos Hazard Evaluation Specialist**
**Ohio EPA License #ES3488**
Analysis Date: **June 5-8, 2020**
Laboratory: **EMSL Analytical, Inc. – Plymouth, MI**
Accreditation: **NVLAP Asbestos Bulk Accredited Laboratory**

| SAMPLE NUMBER | SAMPLE LOCATION | MATERIAL | LABORATORY RESULTS |
|---|---|---|---|
| 14 | Mech. Room #2 ceiling | Drywall joint compound/mud | **6% Chrysotile Asbestos** |
| 15 | Mech. Room #2 ceiling | Drywall joint compound/mud | **7% Chrysotile Asbestos** |
| 16 | Mech. Room #1 ceiling | Drywall joint compound/mud | **6% Chrysotile Asbestos** |
| 17 | Mech. Room #3 ceiling | Drywall joint compound/mud | **5% Chrysotile Asbestos** |
| 18 | Mech. Room #3 | Hot water tank insulation | **3% Chrysotile Asbestos** |
| 19 | Mech. Room #3 | Hot water tank insulation | **15% Chrysotile Asbestos** |
| 20 | Mech. Room #3 | Hot water tank insulation | **18% Chrysotile Asbestos** |
| 21 | Mech. Room #3 | Mud fitting insulation on fiberglass insulated pipe | **6% Chrysotile Asbestos** |
| 22 | Mech. Room #3 | Mud fitting insulation on fiberglass insulated pipe | **4% Chrysotile Asbestos** |
| 23 | Mech. Room #3 | Mud fitting insulation on fiberglass insulated pipe | **6% Chrysotile Asbestos** |
| 24 | Mech. Room #3 | Tar duct covering on fiberglass insulation | **20% Chrysotile Asbestos** |

**Note: Asbestos containing materials are defined by containing greater than 1% asbestos.**

# APPENDIX A

# ASBESTOS LABORATORY ANALYTICAL REPORT

# EMSL Analytical, Inc.

**15111 Northville Rd Plymouth, MI 48170**

Tel/Fax: (734) 668-6810 / (734) 668-8532

http://www.EMSL.com / annarborlab@emsl.com


| | |
|---|---|
| **EMSL Order:** | 082001128 |
| **Customer ID:** | BRUM50 |
| **Customer PO:** | LMHA |
| **Project ID:** | |

| | | | |
|---|---|---|---|
| **Attention:** | Brett Brumbaugh<br>Brumbaugh-Herrick, Inc.<br>7920 North Woodbridge Road<br>Monclova, OH 43542 | **Phone:** | (419) 382-9574 |
| | | **Fax:** | (419) 382-9584 |
| | | **Received Date:** | 06/05/2020 10:30 AM |
| | | **Analysis Date:** | 06/05/2020 - 06/08/2020 |
| | | **Collected Date:** | |
| **Project:** | LMHA Boiler Project | | |

## *Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy*

| | | | Non-Asbestos | | Asbestos |
|---|---|---|---|---|---|
| **Sample** | **Description** | **Appearance** | **% Fibrous** | **% Non-Fibrous** | **% Type** |
| 1<br>*082001128-0001* | | Brown/Gray<br>Fibrous<br>Heterogeneous | 15% Cellulose<br><1% Glass | 85% Non-fibrous (Other) | None Detected |
| 2<br>*082001128-0002* | | Beige<br>Non-Fibrous<br>Homogeneous | 3% Cellulose | 2% Mica<br>91% Non-fibrous (Other) | 4% Chrysotile |
| 3<br>*082001128-0003* | Texture | White<br>Non-Fibrous<br>Homogeneous | 2% Cellulose | 2% Mica<br>94% Non-fibrous (Other) | 2% Chrysotile |
| 3<br>*082001128-0003A* | Drywall | Brown/Gray<br>Fibrous<br>Heterogeneous | 6% Cellulose<br><1% Glass | 94% Non-fibrous (Other) | None Detected |
| 4<br>*082001128-0004* | Texture | Beige<br>Non-Fibrous<br>Homogeneous | <1% Cellulose | <1% Mica<br>97% Non-fibrous (Other) | 3% Chrysotile |
| 4<br>*082001128-0004A* | Drywall | Brown/Gray<br>Fibrous<br>Heterogeneous | 5% Cellulose | 95% Non-fibrous (Other) | None Detected |
| 5<br>*082001128-0005* | Texture | Gray/White<br>Non-Fibrous<br>Homogeneous | | 2% Mica<br>96% Non-fibrous (Other) | 2% Chrysotile |
| 5<br>*082001128-0005A* | Drywall | Brown/Gray<br>Fibrous<br>Heterogeneous | 4% Cellulose | 96% Non-fibrous (Other) | None Detected |
| 6<br>*082001128-0006* | Texture | Gray/White<br>Non-Fibrous<br>Homogeneous | | <1% Mica<br>97% Non-fibrous (Other) | 3% Chrysotile |
| 6<br>*082001128-0006A* | Drywall | Brown/Gray<br>Fibrous<br>Heterogeneous | 3% Cellulose | 97% Non-fibrous (Other) | None Detected |
| 7<br>*082001128-0007* | Texture | Gray/White<br>Non-Fibrous<br>Homogeneous | | <1% Mica<br>98% Non-fibrous (Other) | 2% Chrysotile |
| 7<br>*082001128-0007A* | Drywall | Brown/Gray<br>Fibrous<br>Heterogeneous | 3% Cellulose | 97% Non-fibrous (Other) | None Detected |
| 8<br>*082001128-0008* | Joint Compound | Beige<br>Non-Fibrous<br>Homogeneous | | 100% Non-fibrous (Other) | None Detected |
| 8<br>*082001128-0008A* | Tape | Beige<br>Fibrous<br>Homogeneous | 95% Cellulose | 5% Non-fibrous (Other) | None Detected |
| 9<br>*082001128-0009* | | Beige<br>Non-Fibrous<br>Homogeneous | | <1% Mica<br>100% Non-fibrous (Other) | None Detected |
| 10<br>*082001128-0010* | | White<br>Non-Fibrous<br>Homogeneous | | 3% Mica<br>97% Non-fibrous (Other) | None Detected |

Initial report from: 06/08/2020 14:39:48

**EMSL Analytical, Inc.**
**15111 Northville Rd Plymouth, MI 48170**
Tel/Fax: (734) 668-6810 / (734) 668-8532
http://www.EMSL.com / annarborlab@emsl.com

**EMSL Order:** 082001128
**Customer ID:** BRUM50
**Customer PO:** LMHA
**Project ID:**

## *Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy*

| | | | Non-Asbestos | | Asbestos |
|---|---|---|---|---|---|
| **Sample** | **Description** | **Appearance** | **% Fibrous** | **% Non-Fibrous** | **% Type** |
| 11<br>*082001128-0011* | | White<br>Non-Fibrous<br>Homogeneous | | 2% Mica<br>98% Non-fibrous (Other) | None Detected |
| 12<br>*082001128-0012* | | White<br>Non-Fibrous<br>Homogeneous | | 2% Mica<br>98% Non-fibrous (Other) | None Detected |
| 13<br>*082001128-0013* | | Gray/White<br>Non-Fibrous<br>Homogeneous | | 3% Mica<br>97% Non-fibrous (Other) | None Detected |
| 14<br>*082001128-0014* | Joint Compound A | White<br>Non-Fibrous<br>Homogeneous | | 3% Mica<br>91% Non-fibrous (Other) | 6% Chrysotile |
| 14<br>*082001128-0014A* | Tape | Beige<br>Fibrous<br>Homogeneous | 95% Cellulose | 5% Non-fibrous (Other) | None Detected |
| 14<br>*082001128-0014B* | Joint Compound B | Beige<br>Non-Fibrous<br>Homogeneous | | 4% Mica<br>89% Non-fibrous (Other) | 7% Chrysotile |
| 15<br>*082001128-0015* | Joint Compound | White<br>Non-Fibrous<br>Homogeneous | | 3% Mica<br>91% Non-fibrous (Other) | 6% Chrysotile |
| 15<br>*082001128-0015A* | Tape | Beige<br>Fibrous<br>Homogeneous | 95% Cellulose | 5% Non-fibrous (Other) | None Detected |
| 16<br>*082001128-0016* | Joint Compound | White<br>Non-Fibrous<br>Homogeneous | | 3% Mica<br>92% Non-fibrous (Other) | 5% Chrysotile |
| 16<br>*082001128-0016A* | Tape | Beige<br>Fibrous<br>Homogeneous | 95% Cellulose | 5% Non-fibrous (Other) | None Detected |
| 17<br>*082001128-0017* | Joint Compound | Gray/Beige<br>Non-Fibrous<br>Homogeneous | | <1% Mica<br>97% Non-fibrous (Other) | 3% Chrysotile |
| 17<br>*082001128-0017A* | Tape | Beige<br>Fibrous<br>Homogeneous | 95% Cellulose | 5% Non-fibrous (Other) | None Detected |
| 18<br>*082001128-0018* | | Gray<br>Fibrous<br>Heterogeneous | 30% Min. Wool | 55% Non-fibrous (Other) | 15% Chrysotile |
| 19<br>*082001128-0019* | | Gray<br>Fibrous<br>Heterogeneous | 20% Min. Wool | 62% Non-fibrous (Other) | 18% Chrysotile |
| 20<br>*082001128-0020* | | Gray<br>Fibrous<br>Heterogeneous | 2% Cellulose<br>18% Min. Wool | 74% Non-fibrous (Other) | 6% Chrysotile |
| 21<br>*082001128-0021* | | Gray<br>Fibrous<br>Homogeneous | 30% Min. Wool | 66% Non-fibrous (Other) | 4% Chrysotile |
| 22<br>*082001128-0022* | | Gray<br>Fibrous<br>Homogeneous | 35% Min. Wool | 59% Non-fibrous (Other) | 6% Chrysotile |
| 23<br>*082001128-0023* | | Gray<br>Fibrous<br>Homogeneous | 20% Min. Wool | 76% Non-fibrous (Other) | 4% Chrysotile |
| 24<br>*082001128-0024* | | Black<br>Fibrous<br>Homogeneous | 4% Glass | 76% Non-fibrous (Other) | 20% Chrysotile |

Initial report from: 06/08/2020 14:39:48

# EMSL Analytical, Inc.

**15111 Northville Rd Plymouth, MI 48170**

Tel/Fax: (734) 668-6810 / (734) 668-8532

http://www.EMSL.com / annarborlab@emsl.com


| | |
|---|---|
| **EMSL Order:** | 082001128 |
| **Customer ID:** | BRUM50 |
| **Customer PO:** | LMHA |
| **Project ID:** | |

Analyst(s)

*Rebecca D'Angelo (11)*

*Waverly Ferguson (24)*

Ryan Shannon, Laboratory Manager
or Other Approved Signatory



Initial report from: 06/08/2020 14:39:48

OrderID: 082001128

EMSL Analytical, Inc.
15111 Northville Rd

Plymouth, MI 48170
PHONE: (734) 668-6810
FAX: (734) 668-8532

EMSL ANALYTICAL, INC.
LABORATORY · PRODUCTS · TRAINING

# Asbestos Chain of Custody

**EMSL Order Number** (*Lab Use Only*): 082001128

| | | | |
|---|---|---|---|
| **Company Name :** Brumbaugh-Herrick, Inc. | | **EMSL Customer ID:** BRUM50 | |
| **Street:** 7920 N Woodbridge Rd | | **City:** Monclova | **State/Province:** OH |
| **Zip/Postal Code:** 43542 | **Country:** US | **Telephone #:** 4193829574 | **Fax #:** 419-382-9584 |
| **Report To (Name):** Brett Brumbaugh | | **Please Provide Results:** ☐ Fax ☑ Email | |
| **Email Address:** bhi@bex.net | | **Purchase Order:** LMHA | |
| **Project Name/Number:** LMHA Boiler Project | | **EMSL Project ID** (*Internal Use Only*): | |
| **U.S. State Samples Taken:** OH | | **CT Samples:** ☐ Commercial/Taxable ☐ Residential/Tax Exempt | |

**EMSL-Bill to:** ☐ Same ☑ Different - If Bill to is Different note instructions in Comments**
*Third Party Billing requires written authorization from third party*

**Turnaround Time (TAT) Options* – Please Check**

☐ 3 Hour | ☐ 6 Hour | ☐ 24 Hour | ☑ 48 Hour | ☐ 72 Hour | ☐ 96 Hour | ☐ 1 Week | ☐ 2 Week

*For TEM Air 3 hr through 6 hr, please call ahead to schedule.*There is a premium charge for 3 Hour TEM AHERA or EPA Level II TAT. You will be asked to sign an authorization form for this service. Analysis completed in accordance with EMSL's Terms and Conditions located in the Analytical Price Guide.

**PCM - Air** ☐ Check if samples are from NY
☐ NIOSH 7400
☐ w/ OSHA 8hr. TWA

**PLM - Bulk (reporting limit)**
☑ PLM EPA 600/R-93/116 (<1%)
☐ PLM EPA NOB (<1%)
Point Count
☐ 400 (<0.25%) ☐ 1000 (<0.1%)
Point Count w/Gravimetric
☐ 400 (<0.25%) ☐ 1000 (<0.1%)
☐ NYS 198.1 (friable in NY)
☐ NYS 198.6 NOB (non-friable-NY)
☐ NYS 198.8 SOF-V
☐ NIOSH 9002 (<1%)

**TEM – Air** ☐ 4-4.5hr TAT (AHERA only)
☐ AHERA 40 CFR, Part 763
☐ NIOSH 7402
☐ EPA Level II
☐ ISO 10312

**TEM - Bulk**
☐ TEM EPA NOB
☐ NYS NOB 198.4 (non-friable-NY)
☐ Chatfield SOP
☐ TEM Mass Analysis-EPA 600 sec. 2.5

**TEM – Water:** EPA 100.2
Fibers >10µm ☐ Waste ☐ Drinking
All Fiber Sizes ☐ Waste ☐ Drinking

**TEM- Dust**
☐ Microvac - ASTM D 5755
☐ Wipe - ASTM *D6480*
☐ Carpet Sonication (EPA 600/J-93/167)

**Soil/Rock/Vermiculite**
☐ PLM EPA 600/R-93/116 with milling prep (<1%)
☐ PLM EPA 600/R-93/116 with milling prep (<0.25%)
☐ TEM EPA 600/R-93/116 with milling prep (<0.1%)
☐ TEM Qualitative via Filtration Prep
☐ TEM Qualitative via Drop Mount Prep
☐ Cincinnati Method EPA 600/R-04/004 – PLM/TEM (BC only)

**Other:**
☐

☐ **Check For Positive Stop – Clearly Identify Homogenous Group**

**Filter Pore Size (Air Samples):** ☐ 0.8µm ☐ 0.45µm

**Samplers Name:** Brett Brumbaugh **Samplers Signature:**

| Sample # | Sample Description | Volume/Area (Air) HA # (Bulk) | Date/Time Sampled |
|---|---|---|---|
| 1-7 | Flory Gardens | | 6-3-20 |
| 8-9 | Worrell Manor | | 6-4-20 |
| 10-13 | Oak Grove Estates | | 11 |
| 14-24 | Harry Hanson | | 11 |
| | | | |

**Client Sample # (s):** 1 - 24 **Total # of Samples:** 24

**Relinquished (Client):** RD Fed Ex 782468336 5 **Date:** 6-4-20 **Time:** 16:20

**Received (Lab):** **Date:** 6/5/2020 **Time:** 10:30

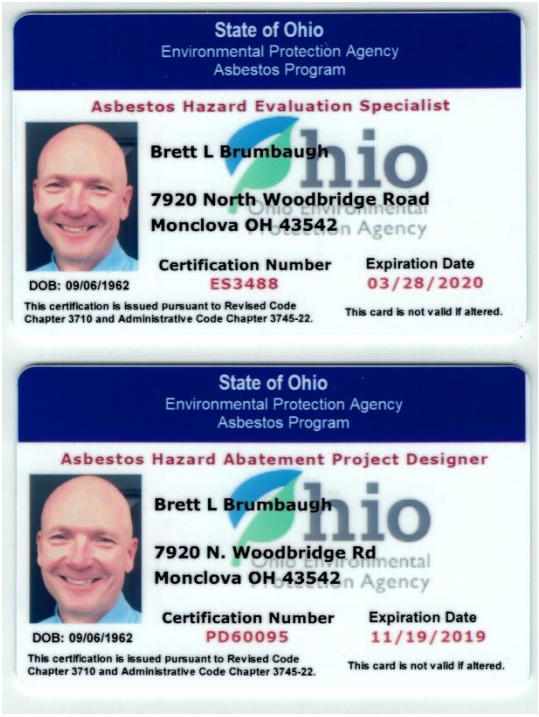
***Comments/Special Instructions:***
Bill To. Brumbaugh-Herrick, Inc., 7920 North Woodbridge Road, Monclova, OH, 43542, US
Attention: Brett Brumbaugh Phone. 419-382-9574 Email: bhi@bex.net Purchase Order

Page 1 of 1 pages

Controlled Document – Asbestos COC – R10 – 05/09/2016

# APPENDIX B

# INSPECTOR CERTIFICATIONS



# LABORATORY CERTIFICATIONS

**United States Department of Commerce**
**National Institute of Standards and Technology**

NVLAP®

# Certificate of Accreditation to ISO/IEC 17025:2017

**NVLAP LAB CODE: 101048-4**

## EMSL Analytical, Inc.

Plymouth, MI

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:*

## Asbestos Fiber Analysis

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2019-06-20 through 2020-06-30

*Effective Dates*

DEPARTMENT OF COMMERCE * UNITED STATES OF AMERICA *

*For the National Voluntary Laboratory Accreditation Program*

NVLAP® National Voluntary Laboratory Accreditation Program

# SCOPE OF ACCREDITATION TO ISO/IEC 17025:2017

**EMSL Analytical, Inc.**
15111 Northville Road
Plymouth, MI 48170
Mr. Ryan Shannon
Phone: 734-668-6810 Fax: (734) 668-8532
Email: rshannon@emsl.com
http://www.emsl.com

## ASBESTOS FIBER ANALYSIS — NVLAP LAB CODE 101048-4

### Bulk Asbestos Analysis

| *Code* | *Description* |
|---|---|
| 18/A01 | EPA -- 40 CFR Appendix E to Subpart E of Part 763, Interim Method of the Determination of Asbestos in Bulk Insulation Samples |
| 18/A03 | EPA 600/R-93/116: Method for the Determination of Asbestos in Bulk Building Materials |

### Airborne Asbestos Analysis

| *Code* | *Description* |
|---|---|
| 18/A02 | U.S. EPA's "Interim Transmission Electron Microscopy Analytical Methods-Mandatory and Nonmandatory-and Mandatory Section to Determine Completion of Response Actions" as found in 40 CFR, Part 763, Subpart E, Appendix A. |

*For the National Voluntary Laboratory Accreditation Program*