PROJECT MANUAL

Hamilton Town Hall

Preservation Design Project

ISSUED FOR DESIGN DEVELOPMENT

1 MAY 2020

LLB Architects
161 Exchange Street
Pawtucket, RI 02860

LLB
ARCHITECTS

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SECTION 01 10 00
SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

A. Project description.

B. Project's environmental goals.

C. Definitions – Owner and Architect.

D. Work by Owner.

E. Project confidentiality and promotional material.

F. Project Manual formats and conventions.

1.2 PROJECT DESCRIPTION

A. Work covered by Contract Documents: The Project consists of renovations and alterations to the Hamilton Town Hall.

1. Project Address:

   Hamilton Town Hall
   577 Bay Road
   South Hamilton, MA 01982

2. Work included beyond the Contract Limits: Protection and replacement of abutting sidewalks and roadways in public way, and on adjacent properties.

3. Completeness: The Work shall be as shown on the Drawings and be complete in every respect and in conformance with all applicable requirements of the governing laws and codes.

B. Contract time: The Contractor may begin on-site work on, or after receipt of a written Notice to Proceed, or suitable Letter of Intent. After commencement of work, the Contractor shall pursue the Work continuously and with diligence, and bring the Project to Substantial Completion prior to date stipulated in Owner-Contractor Agreement.

1. Substantial completion is the stage in the progress of the Work when the work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so the Owner can occupy or utilize the Work for its intended use. This includes any and all permits required by governmental agencies necessary for occupancy and use.

2. Liquidated Damages stipulated in the Owner-Contractor Agreement are applicable for failure to achieve Substantial Completion by date required.

C. Building Permits: Contractor is responsible to ensure all required permits are obtained, and that the work pertaining to permits is properly inspected and certified. Filed Subcontractors are required to obtain permits relating to their work.

1.3 PROJECT ENVIRONMENTAL GOALS

A. Objectives: Utilize pollution prevention materials, sustainable construction methods, low VOC and none-off-gassing products to maintain of healthy Indoor Air Quality (IAQ) during the construction process:

1. Incorporate green products and sustainable materials into the Project. To the greatest extent possible, the Contractor shall:

a. Use products with low embodied energy (production, manufacturing, and transportation).

b. Use products that maximize recycled content in materials products, and systems.

c. Use products easy to maintain, repair, and that can be cleaned using non-toxic substances.

d. Use products will not negatively affect healthy indoor air quality.

e. Use reusable and recyclable packaging.

f. Avoid use of ozone-depleting compounds, such as HCFCs from refrigerants or foam insulation materials.

B. Water resource protection: Conserve and use water efficiently, limit on-site fresh water usage to the greatest extent possible, control water distribution systems and waste, minimize use of imported or mined water. Utilize water-conserving appliances and equipment.

C. Air Quality is achieved by compliance with the limitation of indoor air concentrations of certain pollutants, at or below the established maximum allowable concentrations. Healthy air quality goals shall be maintained during construction, and through building commissioning.

1. Use construction practices that achieve the most efficient use of resources and materials.

1.4 DEFINITIONS - OWNER AND ARCHITECT

A. Wherever the term "Owner" is used in this specification, it refers to:

Town of Hamilton
577 Bay Road
South Hamilton, MA 01982

1. The terms “Owner” and “Awarding Authority” as used in the Project Manual have the same meaning and are interchangeable in Contract Documents. Both terms refer to the same entity.

2. Important Tax Note: OWNER is a non-profit organization and exempt from certain taxes. It is therefore required that the Contractor and all

Subcontractors purchasing taxable goods or services make known to suppliers that tax-exempt status of the Owner, in order that such taxes will not be applied to the goods under Contract.

a. Fines and Penalties: Contractor and subcontractors are fully responsible for payment of all penalties and fines accessed by authorities having jurisdiction for improper and illegal use of Owner's tax exemption certificate number.

3. All papers required to be delivered to the Owner shall, unless otherwise specified in writing to the contrary, be delivered to the office of the Architect:

B. Wherever the term "Architect", "Designer", or "Architect/Engineer", is used in the Contract Documents, it refers to:

LLB Architects, Inc.
161 Exchange Street
Pawtucket, Rhode Island 02860

1.5 WORK BY OWNER

A. Related work under separate agreements: The Owner will award a separate contract which will commence prior to or during the work of this Contract; which in general includes:

1. Testing Laboratory Services.

B. Owner Furnished and Installed (OFI) Products: The Contractor has coordinating responsibility for the following work, provided by others under separate agreement(s) with the Owner:

1. Furnishings and equipment, artwork, loose casegoods and similar items.

1.6 PRODUCTS REQUIRING LONG LEAD TIME

A. Several products specified in individual specification sections are "long lead time" products and thus require advance ordering. For the following categories of work, affirm early purchase orders under the requirements of Section 01 32 00 – Construction Progress Documentation.

1. Hardware for architectural woodwork.
2. Hardware for doors.
3. Carpet.
4. Elevator.
5. Equipment for heating, ventilating and air conditioning.
6. Linear diffusers.
7. Light fixtures.
8. Light fixtures used in architectural woodwork.

1.7 PROJECT MANUAL FORMATS AND CONVENTIONS

A. Project Manual Format: The Project Manual is organized into Divisions and subdivided into Sections and Documents using Construction Specification Institute (CSI) publication "MasterFormat, 2004 Edition" numbering system.

1. Section Identification: Six/Eight digit Section numbers are utilized and cross-referenced throughout the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because only those Section numbers which are applicable to this Project are used.

2. Division One of the Project Manual governs procedural and administrative requirements of the Work. Division One requirements are applicable to all Sections and Documents in the Project Manual.

B. 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. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular as applicable to the context of the Contract Documents.

2. Imperative mood and streamlined language is generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

a. 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 14 00
WORK RESTRICTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Use of site.

B. Access to Site.

C. Work Sequencing.

D. Hours for on-site operations and restrictions.

E. Coordination with occupants.

F. Worker Identification Badges

G. Worker conduct, appearance and Work Rules.

1.2 USE OF SITE

A. Use of, and access to, site will be subject to special requirements of the Owner, as directed.

1. Prior to beginning the Work of this Contract, the Contractor shall meet with the Owner and the Architect to determine procedures regarding access and use of the site, locations and access to staging and storage areas, tree protection, temporary barriers and fencing, and any special site conditions or restrictions regarding the use of the site areas surrounding the construction.
2. Hours of construction, 7:30 AM to 4:30 PM local time, Monday to Friday. Provisions for working hours other than those specified, must be pre-arranged with the Owner.
3. Security: Owner Staff access must be permitted at all times in all construction areas, for purposes of security.

B. Confine operations to areas within Contract limits indicated on the Drawings. Portions of the site and building beyond areas in which construction operations are indicated are not to be disturbed.

1. Use of on-site areas outside of the contract limits for workers parking or storage of materials must be pre-arranged with Owner. Schedule deliveries to minimize requirements for storage of materials.
2. There shall be no work or construction activity within the wetlands or the buffer areas.

C. Keep all public roads and walks, and access drive to facility clear of debris caused by this Work during building operations.

D. Contractor shall coordinate and permit uninhibited Owner's access to site prior to Substantial Completion as required for installation of equipment and furnishings performed under separate contracts outside of this Work.

1.3 ACCESS TO SITE

A. The Owner intends to occupy parking areas and access roads during construction. Notify the Owner of work which will affect the use of these areas; coordinate work schedule with Owner. The Contractor shall consult with the Owner on the best ways to provide access and on changes to access areas as the work progresses.

B. Keep all public roads and walks, and access drive to facility clear of debris caused by this Work during building operations.

1.4 WORK FORCE REQUIREMENTS

A. Maintained On-Site Operations:

1. The Contractor acknowledges the stringent requirements of the Owner with respect to the dates of Substantial Completion for various Portions of the Work, and recognizes that the construction schedule may require that work proceed on an accelerated basis. The Contractor further acknowledges that requirements related to items such as safety, service to Owner occupied areas, or Contractor access to Owner occupied areas may mandate that some operations be performed only after "normal work hours" or other occupancy hours. The Contractor therefore agrees that the Work of his own forces and of his Subcontractors, including all Filed Subcontractors, shall be performed on an overtime and/or double-shift basis if and to the extent necessary in order that the construction schedule be met.

2. Neither overtime nor double-shift work shall be grounds for any claims for compensation to the Contractor or to any Subcontractor. If the nature of overtime of double-shift work requires that the Owner provide personnel to operate the facility at times when they would not normally be present, such personnel costs shall be borne or reimbursed by the Contractor.

B. Winter Conditions: The Owner and Contractor recognize that time is of the essence for completion of this Contract and agree to continue work throughout the winter months without delay.

C. Municipal Authority: The Contractor shall comply with all local ordinances, including those with respect to work start, finish, and weekend work.

D. None of the requirements herein shall be construed as relieving the Contractor of his responsibility to conduct his operations in conformance with local ordinances or requirements established by authorities having jurisdiction.

1.5 WORKER CONDUCT, APPEARANCE AND WORK RULES

A. General Conduct and Demeanor: All construction workers shall treat all other workers, Owner staff, and the public with respect and courtesy. *[Addendum #2]*

1. The conduct and appearance of each worker at the job site is of paramount importance. The Owner reserves the right to require any worker to be banished from the Site.

B. Privacy: Conduct all work of the Contract with the maximum effort to maintain the privacy of the Owner's operations, staff, and students. Do not permit the workers to peer into other areas of the building visible from the work area. Invasion of privacy is a major infraction of the work rules.

C. Physical Appearance: Require each worker to dress appropriately in a clean, neat, and professional manner.

1. Sleeved shirts and long pants are required minimum clothing. Short sleeved shirts may not be rolled up. Shirts may not be rolled up at the waist. Pants may not be rolled up past the top of the boots or shoes worn. Anyone not in compliance is subject to immediate dismissal.

D. Entertainment Devices (including, but not limited to radios, CD players, MP3 players and televisions): The use of all entertainment devices, including portable listening devices (ipod™ type) with headphones or earphones, is strictly prohibited at all times.

1. Contractor shall control the volume of all communication radios and loudspeakers to avoid creating a nuisance.

E. Medications and Drugs: Do not allow any drugs or mood-altering substances, except for qualified, legal prescriptions; when requested, allow inspection of prescription drugs.

F. Smoking: Smoking is strictly prohibited on-site.

G. Language: Foul and rude language is strictly prohibited.

H. Physical Actions: Running, horseplay, fighting, and other unprofessional conduct is prohibited. Fighting is a major infraction of the work rules.

I. Stealing: Stealing of any materials, objects, furnishings, equipment, fixtures, supplies, clothing, or other items will not be tolerated and is a major infraction of the work rules.

J. Sexual Harassment: All forms of physical and verbal sexual harassment will not be tolerated and is a major infraction of the work rules. Sexual harassment includes, without limitation: touching, whistling, sexually explicit stories, jokes, drawings, photos and similar representations, exhibitionism and all other sexually oriented offensive behavior.

K. Warnings and Dismissal:

1. For minor infractions of the rules, the Owner may issue a warning. Only one warning will be allowed per worker. A second infraction will result in immediate dismissal of the worker from the Site.

2. For major infractions of the rules, the worker shall be dismissed immediately without warning and is subject to possible criminal prosecution.

L. Notification of Workers: Clearly notify and educate each worker about these Work Rules and the requirements for worker conduct and appearance.

1. Recommendation: The Owner recommends that the Contractor notify each worker of the work rules in writing and obtain a signed acknowledgment of the worker's understanding of the work rules as a condition of employment on this project.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 14 00

SECTION 01 25 13
PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Product options.
   1. Product selections.
   2. Additional product selection requirements regarding sustainable and environmental-friendly products.
   3. Visual matching.

B. Product substitution procedures.

1.2 RELATED REQUIREMENTS

A. Section 01 60 00 - PRODUCT REQUIREMENTS: Basic product requirements.

1.3 PRODUCT OPTIONS

A. Product selections: Comply with the following for selection of products:
   1. Products specified by reference standards or by description only: Provide any acceptable product meeting those standards or description.
   2. Products specified by performance requirements only: Provide any acceptable product which has been tested to show compliance with specified requirements, including indicated performances.
   3. Products specified by naming one or more manufacturers: Provide products of manufacturers named, or submit a request for substitution for any manufacturer or product not named in accordance with Massachusetts General Laws, Chapter 30, Section 39M(b).

B. Additional product selection requirements regarding environmentally friendly products and materials.
   1. Provide products which comply with VOC emission limits required by applicable codes.
   2. Provide products which comply with specified requirements for recycled content.
   3. Provide complete written documentation with all product substitutions that the proposed products are fully compliant to specific environmental and sustainability requirements applicable to the substitution.

C. Visual matching: Where Specifications require matching a sample, the Architect's decision on whether a proposed product matches is final. Where no product matches and complies with other requirements, comply with provisions for "substitutions" for selection of a matching product in another category.

1.4 PRODUCT SUBSTITUTION

A. Products specified by reference standards or by description only: Any product meeting those standards or description.

B. Pursuant to Massachusetts General Laws, Chapter 30, Section 39M(b), where products or materials are prescribed by manufacturer name, trade name or catalog reference, or indicated as proprietary, the word "or approved equal" shall be implied. The Architect will evaluate the proposed "equal" item on the following criteria:

1. The submitted "equal" item is at least equal in quality, durability, appearance, strength and design.
2. The submitted "equal" item is at least equal in function for the purpose intended by the design of the Work.
3. The submitted "equal" item conforms substantially to the detailed requirements for the items as indicated by the specifications.

C. The Architect's evaluation and decision on whether a proposed product is equal to that specified, based on the above evaluation requirements, is final. The Contractor retains the right to appeal the Architect's determination of equality through regulated statutory provisions.

1. The Architect and Owner reserve the right to reject proposed substitutions where data for VOCs is not provided or where emissions of individual VOCs are higher than for specified materials.

D. Owner's proprietary products: Under provisions of Massachusetts General Laws, Chapter 30, Section 39M(b) the Owner has determined that specific products shall be proprietary for 'sound reasons in the public interest'. This determination has been made under vote of the Owner, and has been recorded in writing for public record.

1. Contractor's substitutions for designated proprietary products will require complete and full information for Architect's and Owner's evaluation. Contractor should carefully schedule substitutions for proprietary products to permit the review and evaluation process. Failure to submit complete data will cause delays in approvals of substitutions. No change in Contract Schedule, or increase in Contract Sum will be made to compensate for rejected substitutions and re-submittals.
2. Owner's proprietary products are listed under Section 01 60 00 and in respective individual Specification Sections.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 13

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SECTION 01 26 00
CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Minor Changes in the Work: Owner will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time.

B. Owner Initiated Proposal Requests: Owner 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. Proposal Requests are for information only. They are not to be considered as instructions either to stop work in progress or to execute the proposed change.
2. Within 10 days 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 taxes, delivery charges, equipment rental, and amounts of trade discounts.
   c. 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.

C. Contractor Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change.

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 taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. 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.

5. Comply with requirements in Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.

D. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

E. Submit claims for increased costs because of a change in the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.

1. Contractor's or subcontractor's indirect expense will not e included in the Change Order cost amount unless the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
2. No change to Contractor's indirect expense is permitted for selection of higher or lower priced materials or systems of the same scope and nature as originally indicated.

F. Change Order Procedures: On Owner's approval of a Proposal Request, Owner will issue a Change Order for signatures of Owner and Contractor.

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

1. Construction 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.
2. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
   a. 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 01 26 00

SECTION 01 26 13
REQUESTS FOR INTERPRETATION

PART 1 – GENERAL

1.1 SUMMARY

A. Administrative requirements for Requests For Information (RFI's).

1.2 DEFINITIONS

A. Requests For Information (RFI):

1. A document submitted by the Contractor to the Architect requesting clarification of a portion of the Contract Documents, hereinafter referred to as RFI.
2. A properly prepared RFI shall include a detailed written statement that indicates the specific Drawings or Specification in need of clarification and the nature of the clarification requested.
   a. Drawings shall be identified by drawing number and location on the drawing sheet.
   b. Specifications shall be identified by Section number, page and paragraph.
   c. The Contractor shall provide suggestions or alternate solutions to the RFI if such suggestions are known or should be known.

B. Improper RFI's:

1. RFI's that are not properly prepared, as required above.

   Improper RFI's will be processed by the Architect at the Architect's standard hourly rate and Architect will charge the Contractor, and such costs will be deducted from monies due the Contractor. The Contractor will be notified by the Architect through the Contractor of the "back charge" amounts.

C. Frivolous RFI's:

1. RFI's that request information that is clearly shown on the Contract Documents.
2. Frivolous RFI's will be returned unanswered.

1.3 CONTRACTOR'S REQUESTS FOR INFORMATION

A. When the Contractor is unable to determine from the Contract Documents, the material, process or system to be installed, the General Contractor shall submit an RFI to the Architect requesting a clarification of the indeterminate item.

1. When possible, such clarification shall be requested at the next appropriate project meeting, with the response entered into the meeting minutes. When clarification at the meeting is not possible, either because of the urgency of the need, or the complexity of the item the Contractor shall prepare and submit an RFI to the Architect.

B. Each subcontractor shall endeavor to keep the number of RFI's to a minimum. In the event that the process becomes unwieldy, in the opinion of the Architect, because of the number and frequency of RFI's submitted, the Architect may require the Contractor to abandon the process and submit future requests as submittals, substitutions, or requests for change.

C. RFI's shall be submitted on a form acceptable to the Architect. Forms shall be completely filled in, and if prepared by hand, shall be fully legible after photocopying or electronic transmission in PDF format. Each page of attachments to RFI's shall bear the RFI number in the lower right corner.

D. RFI's shall be originated by the Contractor or subcontractors as appropriate. The General Contractor shall endeavor to address and resolve subcontractor's RFI's to the extent possible for issues which are obviously covered by the Contract Documents, before forwarding to the Architect for processing.

1. RFI's from subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the General Contractor prior to submittal to the Architect.
2. RFI's shall be processed and sent to the Architect from the General Contractor only. RFI's received by the Architect or the Architect's consultants from other parties shall not be accepted and will be returned unanswered.

E. Each subcontractor shall carefully study the Contract Documents to assure that the requested information is not available therein. RFI's which request information available in the Contract Documents will be deemed either "improper" or "frivolous" as noted above.

F. In cases where RFI's are issued to request clarification of coordination issues, for example pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items, the Contractor shall fully lay out a suggested solution using drawings or sketches drawn to scale, and submit same with the RFI. RFI's, which fail to include a suggested solution, will be returned unanswered with a requirement that the Contractor submit a complete request.

G. RFI's used for the following purposes will be returned without review:

1. To request approval of submittals.
2. To request approval of substitutions.
3. To request coordination information already indicated in the Contract Documents.
4. To request changes which entail adjustments in the Contract Time or the Contract Sum (additional cost or credit).
5. To request different methods of performing work than those drawn and specified.
6. To request interpretation of Architect/Engineer's actions on submittals.
7. Incomplete RFI's or RFI's with numerous errors.

H. In the event the Contractor believes that a clarification by the Architect results in additional cost or time, Contractor shall not proceed with the Work indicated by the RFI without a written authorization from the Architect. RFI's shall not automatically justify a cost increase in the Work or a change in the Schedule.

1. Answered RFI's shall not be construed as approval to perform extra work.
2. Unanswered RFI's will be returned with a stamp or notation: Not Reviewed.

I. Contractor will prepare and maintain a log of RFI's and provide updated copies at the weekly Construction Progress Meetings showing outstanding RFI's.

J. RFI Response: The Architect will endeavor to respond in a timely fashion to RFI's, however, the following minimum time periods are required. RFI's which are received by the Architect after 1PM local time shall be considered received on the following working day.

1. RFI's which require only Architect's Response: Contractor shall allow up to Three (3) full work days review and response time,
2. RFI's which require Architect's and an Engineering or Consultant Response: Contractor shall allow up to Four (4) full work days review and response time.

1.4 ARCHITECT'S RESPONSE TO RFI'S

A. Architect will respond to RFI's on one of the following forms:

1. Properly prepared RFI's:
   a. Response on the RFI form.
   b. Architect's Supplemental Instruction.
   c. Request for Proposal

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 13

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SECTION 01 29 00
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Schedule of Values.

B. Applications for payment.
   1. Procedures for application for payment.
   2. Initial application for payment.
   3. Monthly application for payment.
   4. Application for payment at substantial completion.
   5. Final payment application.

C. Payment for stored materials.

D. Change procedures.

1.2 COORDINATION

A. Coordinate the Schedule of Values and Applications for Payment with the Contractor's Construction Schedule, List of Subcontracts, and Submittal Schedule.
   1. Related Requirements:
      a. Section 01 32 00 – CONSTRUCTION PROGRESS DOCUMENTATION: Contractor's Construction Schedule.
      b. Section 01 33 00 - SUBMITTAL PROCEDURES: Contractor's Construction Submittal Schedule.

1.3 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of the Contractor's Construction Schedule.
   1. Schedule of values shall be used only as basis for Contractor's application for payment.

B. Correlate line items in the Schedule of Values with other required administrative schedules and forms, including:
   1. Contractor's construction schedule.
   2. Application for Payment form.
      a. List of subcontractors.
      b. List of products.
      c. List of principal suppliers and fabricators.
      d. Schedule of submittals.

C. Submit typewritten schedule of values to the Architect at least 30 days prior to submitting first application for payment.

D. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

E. Identification: Include the following Project identification on the Schedule of Values:

1. Project name and location.
2. Name of the Architect.
3. Project number.
4. Contractor's name and address.
5. Date of submittal.

F. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed. Each line item shall have a consecutive line number in left column. Provide subtotals by individual section and Filed Subcontract.

1. Generic name.
2. Related Specification Section.
3. Name of subcontractor.
4. Name of manufacturer or fabricator.
5. Name of supplier.
6. Change Orders (numbers) that have affected value.
7. Dollar value.
8. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent.

G. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items. Provide a labor and material breakdown of each item at a minimum.

1. Upon request by Architect, submit data that will substantiate values given.

H. Round amounts off to the nearest whole dollar; the total shall equal the Contract Sum.

I. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

J. Unit Cost Allowances: Show line item value of unit cost allowances as a product of unit cost times measured quantity as estimated from the best indication in the Contract Documents.

K. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

L. At the Contractor's option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

M. Schedule Updating: Update and resubmit the Schedule of Values when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 PROCEDURES FOR APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by the Architect and paid for by the Owner. Provide a draft and final Application for Payment for review and approval by the Architect. *]*

1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the final Application for Payment involve additional requirements.

B. Payment Application Times: Each progress payment date is as indicated in the Agreement. The period of construction Work covered by each Application or Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use AIA Document G 702 and Continuation Sheets G 703 as the form for Application for Payment.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.

2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit 3 executed copies of each Application for Payment to the Architect by means ensuring receipt within 24 hours.

F. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Architect.

1.5 INITIAL APPLICATION FOR PAYMENT

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

1. List of subcontractors.
2. List of principal suppliers and fabricators.
3. Schedule of Values.
4. Contractor's Construction Schedule (preliminary if not final).
5. Schedule of principal products.
6. Schedule of unit prices.
7. Submittal Schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants.
10. Copies of building permits.
11. Copies of authorizations and licenses from governing authorities for performance of the Work.
12. Initial progress report.
13. Report of pre-construction meeting.
14. Data needed to acquire Owner's insurance.
15. Initial settlement survey and damage report, if required.

1.6 MONTHLY APPLICATION FOR PAYMENT

A. Administrative actions and submittals that must precede or coincide with submittal of the period Application for payment, include the following:

1. As-built record documents, required documents and submittal records on site.
2. Contractor’s construction schedule, updated, with corrective action plan as applicable.
3. Weekly up-to-date, accurate, certified submission of payroll records.
4. Pre-installation meeting conducted in accordance with Section 01 31 00, prior to first billing for any activity.
5. Material Status Report.
6. Stored Materials forms.
7. Submittal Schedule and submittal status reports.
8. Monthly Progress report and Notarized Progress report Statement from the Contractor’s project manager stating that the work is on schedule and that the Contractor will meet the Substantial Completion date for the Work and the Substantial Completion dates for every portion thereof as established under Construction Phasing Schedule Section.
9. Construction progress photographs.

10. Quality control reports and procedures in compliance with Section 01 45 00 - QUALITY CONTROL.

1.7 APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION:

A. Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

B. Administrative actions and submittals that shall proceed or coincide with this application include:

1. Occupancy permits and similar approvals.
2. Warranties (guarantees) and maintenance agreements.
3. Test/adjust/balance records.
4. Maintenance instructions.
5. Meter readings.
6. Start-up performance reports.
7. Change-over information related to Owner's occupancy, use, operation and maintenance.
8. Final cleaning.
9. Application for reduction of retainage, and consent of surety.
10. Advice on shifting insurance coverage.
11. Final progress photographs.
12. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

1.8 FINAL PAYMENT APPLICATION

A. Administrative actions and submittals which must precede or coincide with submittal of the final payment Application for Payment include the following:

1. Completion of Project Closeout requirements.
2. Completion of items specified for completion after Substantial Completion.
3. Assurance that unsettled claims will be settled.
   a. Assurance that Work not complete and accepted will be completed without undue delay.
4. Transmittal of required Project construction records to Owner.
5. Certified property survey.
6. Proof that taxes, fees and similar obligations have been paid.
7. Removal of temporary facilities and services.
8. Removal of surplus materials, rubbish and similar elements.

9. Change of door locks to Owner's access.

1.9 PAYMENT FOR STORED MATERIALS

A. Provide supporting documentation for the value of stored materials. Acceptable form of supporting documentation include a certified and notarized invoice from the manufacturer or supplier which indicates the actual amount due, including discounts to which the Contractor may be entitled, and the date which the invoice was paid.

B. Provide notice to Architect 48 hours in advance, and provide transportation for Architect and Owner's Representative to the site where materials are stored to permit inspection of the materials.

C. With Application for Payment, submit notarized certificate of title and evidence of insurance for materials stored off-site. The Town of Foxborough shall be the named certificate older for all approved materials stored off-site. Provide an inventory of all stored materials with photographs and a notarized transfer of title to the Owner.

D. With each subsequent Application for Payment, indicate in the appropriate columns the value of stored material which has been taken from off-site location and brought to the project site. Provide supporting documentation.

1.10 CHANGE PROCEDURES

A. The Architect will advise of minor change in the Work not involving adjustment to Contract Sum/Price or Contract Time as authorized under the General and Supplementary Conditions of Contract, by issuing supplemental instructions on AIA Form G710.

B. The Architect may issue a Proposal Request or Notice of Change which includes a detailed description of a proposed change with supplementary or revised Drawings and Specifications, a change in Contract Time for executing the change with a stipulation of any overtime work required and the period of time during which the request price will be considered valid. The Contractor will prepare and submit an estimate within 10 days.

C. The Contractor may propose changes by submitting a request for change to the Architect describing the proposed change and its full effect on the Work. Include a statement describing the reason for the change, and the effect on the Contract Sum/Price and Contract Time and full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES.

D. Stipulated Sum/Price Change order:

1. Based on Proposal Request or Notice of Change and Contractors price quotation or Contractors request for a Change Order as approved by the Architect.

E. Unit Price Change Order:

1. For a pre-determined unit prices and quantities, the Change Order will be executed on a fixed unit price basis. For unit costs or quantities of units of work which are not pre-determined, execute Work under a Construction Change Directive. Changes in Contract Sum/Price or Contract Time will be computed as specified for Time and Material Change Order.

F. Construction Change Directive:

1. Architect may issue a directive on AIA Form G713 Construction Change Directive signed by the Owner instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order. Document will describe changes in the Work and designate method of determining any change in Contract Sum/Price or Contract Time.
2. Promptly execute the change.

G. Time and Material Change Order:

1. Submit itemized account and supporting data after completion of change, within time limits indicated in the Conditions of the Contract. Architect will determine the change allowable in Contract Sum/Price and Contract Time as provided in the Contract Documents.
2. Maintain detailed records of work done on Time and Material basis. Document each quotation for a change in cost or time with sufficient data to allow evaluation of proposed changes and to substantiate changes in the Work.

H. Documentation of change in Contract Sum/Price and Contract Time:

1. Change order Forms: AIA G701 Change Order or AIA G701CM Change Order (as appropriate to Owner-Contractor Agreement).
2. Maintain detailed records. Document each quotation for a change in cost or time with sufficient data to allow evaluation of the quotation.
3. On request, provide additional data to support computations:
   a. Quantities of products, labor and equipment.
   b. Taxes, insurance and bonds.
   c. Overhead and profit.
   d. Justification for any change in Contract Time.
   e. Credit for deletions from Contract, similarly document.
4. Support each claim for additional costs and for work done on a time and material basis, with additional information:
   a. Origin and date of claim.
   b. Dates and times work was performed, and by whom.
   c. Time records and wage rates paid.
   d. Invoices and receipts for products, equipment , and subcontracts, similarly documented.

l. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00
PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Project coordination.

B. Project meetings.

1.2 RELATED REQUIREMENTS

A. Section 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION.

B. Section 01 33 00 - SUBMITTAL PROCEDURES.

C. Section 01 73 29 - CUTTING AND PATCHING.

D. Section 01 78 00 - CLOSEOUT SUBMITTALS: Requirements for Project Record Drawings (As-built drawings).

E. Section 02 41 19 - SELECTIVE DEMOLITION.

1.3 GENERAL PROJECT COORDINATION

A. Coordination: The General Contractor is fully responsible for coordinating the Work of this Contract including scheduling, submittals, Work and other activities included in various Sections to assure efficient and orderly sequence of installation of interdependent construction elements. The General Contractor is responsible for coordinating actual installed location and interface of work, and to make provisions to accommodate items scheduled for later installation.

B. Where installation of one component depends on installation of other components before or after its own installation, schedule activities in the sequence required to obtain efficient installation with the least amount of alterations, or cutting and patching, to completed Work.

1. The Contractor shall be responsible to uncover work completed in order to install ill-timed work, at no additional cost to the Owner.

C. Where space is limited, coordinate installation of different components to assure maximum accessibility for maintenance, service and repair.

D. Coordinate space requirements and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with line of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. Verify that utility requirement characteristics of operating equipment are compatible with building utilities. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service such equipment.

F. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

G. Coordinate completion and clean up of Work of separate Sections in preparation for Substantial Completion and Owner's occupancy.

H. After Owner occupancy of premises, coordinate access to site for correction of defective Work and Work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

1.4 UTILITIES, MECHANICAL AND ELECTRICAL COORDINATION

A. Coordinate all Work of this Project. Provide full and complete coordination for utilities, mechanical and electrical work in Divisions 11, 13, and 21 through 28, with Work of other Divisions.

1. Each Filed-subcontractor shall compare his drawings and specifications with those of other Trades and report any discrepancies between them to the General Contractor. The General Contractor shall obtain from the Architect written instructions for changes necessary in the mechanical or electrical work, to ensure that all work is installed in coordination and cooperation with other Trades installing interrelated work. Before installation, each Filed-subcontractor shall make proper provisions to avoid interferences in a manner approved by the Architect. All changes required in the work of each Filed-subcontractor caused by his negligence, shall be corrected by him at his own expense, to the Architect's satisfaction.

B. Give all advance notice to public utility companies as required by law, and provide proper disposition, subject to Architect's approval of all existing pipe lines, conduits, sewers, drains, poles, wiring, and other utilities that in any way interfere with the Work, whether or not they are specifically shown on the Drawings.

C. Coordination regarding existing utilities:

1. Notify Owner and appropriate authorities when coming across an unknown utility line(s), and await decision as to how to dispose of same.

2. When an existing utility line must be cut and plugged or capped, moved, or relocated, or has become damaged, notify the Owner and Utility company involved, and assure the protection, support, or moving of utilities to adjust them to the new work.

3. The Contractor shall be responsible for all damage caused to existing, active utilities located within the limits of this Contract, whether or not such utilities

are shown on the Drawings, including resultant damages or injuries to persons or properties.

D. General coordination of piping, ductwork, conduits and equipment:

1. The Contract Drawings are diagrammatic only intending to show general runs and general locations of piping, ductwork, equipment and sprinkler heads. Determine exact routing and location of individual systems prior to fabrication of components or installation.

   a. Piping runs requiring pitch have “right-of-way” over those systems that do not pitch.

   b. System components whose elevations cannot be changed have “right-of-way” over those components whose elevations can be changed.

2. Adjust locations of piping, ductwork, conduits and equipment as required to accommodate new work with interferences anticipated and as encountered during installation.

   a. Locate piping, conduits and ductwork to be clear of swinging doors, access doors, and clear for unimpeded equipment access.

3. Provide all offsets, transitions and changes of direction for all systems, as may be required to maintain proper clearances for headroom, and as may be required for coordination with other “fixed-in-place” building components (such as structural systems).

   a. Furnish all vents, drains and similar accessories as may be required for offsets, transitions and changes of direction.

4. Provide openings in the work for penetration of mechanical and electrical work.

5. Coordinate final locations of ceiling mounted devices (including air distribution devices, thermostats, heaters, control devices, sprinkler heads and similar work) with reflected ceiling plans. Review locations with Architect and obtain approval of all devices prior to installation.

1.5 COORDINATION DOCUMENTS

A. General: Prepare coordination drawings for areas where close coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space necessitates maximum utilization of space for efficient installation of different components.

1. Coordination Drawings include, but are not necessarily limited to:

   a. Structure.

   b. Partition/room layout.

   c. Ceiling layout and heights.

   d. Light fixtures.

   e. Access panels.

   f. Sheet metal, heating coils, boxes, grilles, diffusers, and similar items.

g. All heating piping and valves.

h. Smoke and fire dampers.

i. Soil, waste and vent piping.

j. Major water.

k. Rain water drainage piping.

l. Major electrical conduit runs, panelboards, feeder conduit and racks of branch conduit.

m. Above ceiling miscellaneous metal.

n. Sprinkler piping and heads.

o. All equipment, including items in the Contract as well as OFCI and OFI items.

p. Equipment located above finished ceiling requiring access for maintenance and service. In locations where acoustical lay-in ceilings occur, indicate areas in which the required access area may be greater than the suspended grid system.

q. Seismic Restraints.

B. Timing: Prior to fabricating materials or beginning work, supervise and direct the creation of one complete set of coordination drawings showing complete coordination and integration of work, including, but not limited to, structural, architectural, mechanical, plumbing, fire protection, elevators, and electrical disciplines.

C. Intent: Coordination drawings are for the General Contractor's and Filed-Subcontractor's use during construction and are not to be construed as replacing shop drawings or record drawings. Architect's review of submitted coordination drawings shall not relieve the General Contractor from his overall responsibility for the coordination of the Work of the Contract.

D. Base sheets: Architect will provide CAD files for use by the General Contractor for the development of building coordination drawing "base sheets" upon signed receipt of Architect's disclaimer form. General Contractor is responsible to prepare and provide one accurately scaled set of building coordination drawing "base sheets" showing all architectural and structural work. Base sheets shall be at appropriate scale; congested areas and sections through vertical shafts shall be at larger scale.

1. Highlight all fire rated and smoke partitions.

2. Indicate horizontal and vertical dimensions to avoid interference with structural framing, ceilings, partitions, and other services.

3. Indicate elevations relative to finish floor for bottom of ductwork and piping and conduit (6 inches and greater in diameter).

4. Indicate the main paths for the installationof, equipment from mechanical and electrical rooms.

E. General Contractor shall circulate coordination drawings to the following subcontractors and any other installers whose work might conflict with other work. Each of these subcontractors shall accurately and neatly show actual size and location of respective equipment and work. Each subcontractor shall note apparent conflicts, suggest alternate solutions, and return drawings to General Contractor.

1. Elevator Filed-subcontractor.
2. Plumbing Filed-subcontractor.
3. Fire protection Filed-subcontractor.
4. Heating ventilating and air conditioning Filed-subcontractor(s).
5. Electrical discipline Filed-subcontractor(s).
6. Control system subcontractors.

F. Review and modify and approve coordination drawings in cooperation with individual installers and Filed-subcontractors to assure conflicts are resolved before work in field is begun and to ensure location of work exposed to view is as indicated or as approved by Architect.

1. The General Contractor shall stamp, sign and submit coordination drawing originals to Architect for review.
2. Do not commence work in areas described in the coordination drawings until receipt of Architect's comments.

1.6 GENERAL PROJECT ADMINISTRATION

A. Prepare memoranda for distribution to each party involved outlining required coordination procedures. Include required notices, reports, and attendance at meetings.

B. Prepare similar memoranda for the Owner and separate contractors where coordination of their Work is required.

C. Conduct conferences among Filed-subcontractors, subcontractors and others concerned with the Work, to establish and maintain coordination and schedules, and to resolve coordination matters in dispute.

D. Administrative Procedures: Coordinate scheduling and timing of administrative procedures with other activities to avoid conflicts and ensure orderly progress. Such activities include:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project Closeout activities.

1.7 SITE MOBILIZATION CONFERENCE

A. In addition to the pre-bid conference specified under Section 00 11 16 - INVITATION TO BID, the Architect may, prior to commencement of the Work, schedule a meeting at a meeting room provided by the Owner.

1. Attendance is required by Owner, Architect, Owner's Project Manager, engineering consultants, General Contractors' Project Manager and Superintendent, Filed-subcontractors, and other major subcontractors, applicators, installers and suppliers. Other persons are required to attend as the Architect may direct or the General Contractor may wish to have present.
2. Items of Agenda:
   a. Use of premises by Owner, Contractor, and subcontractor(s).
   b. Owner's requirements and partial occupancy considerations.
   c. Demolition procedures, identity tagging of existing furnishings and equipment for salvage or disposal.
   d. Temporary utilities.
   e. Barricading and protection of the public, dust barriers.
   f. Survey and building layout.
   g. Wetlands protection.
   h. Potentially difficult areas of work.
   i. Project coordination.
   j. Indoor air quality standards and testing requirements.
   k. Security and housekeeping procedures.
   l. Construction schedules.
   m. Work beyond Contract Limit.
   n. Procedures for testing and inspection.
   o. Procedures for maintaining record documents.
   p. Requirements for equipment start-up.
   q. Inspection and acceptance of equipment put into service during construction period.

1.8 PRE-INSTALLATION/PRE-FABRICATION CONFERENCES

A. When required in individual specification sections, prior to commencing the work of that trade, convene a pre-installation conference at work site, if possible, on same day as weekly progress meeting.

B. Notify Architect and Owner's Project Manager a minimum of one week in advance of meeting date.

C. Attendance is required by Contractor's Project Manager and Superintendent, and parties directly affecting, or affected by, work of the Section.

1.9 COORDINATION MEETINGS

A. In addition to other specified meetings and additional meetings as required. General Contractor shall hold project coordination meetings, at least monthly at regularly scheduled times. Hold meetings more frequently when necessary to ensure full coordination of work. Request representation at each meeting by every entity involved in coordination or planning for work of the entire project. Conduct meetings in a similar manner to progress meetings, to resolve coordination problems.

B. Keep minutes of coordination meetings and distribute copies to all attendees, related parties and to Owner, Resident Project Representative(s), Architect and its engineering consultants within 3 business days following meeting. Coordination meetings shall continue on an appropriate schedule, even after completion of coordination drawings by Contractor, to review progress and resolve minor conflicts not identified in the coordination drawings.

C. The following trades shall participate in coordination meetings, preparation of coordination drawings and reviews. Additional trades shall participate as the Contractor deems necessary for proper coordination of the Work.

1. Concrete work.
2. Masonry.
3. Structural steel, light gage metal framing and metal fabrications.
4. Rough carpentry.
5. Air and vapor barrier work.
6. Finish wall and ceiling construction.
7. Elevators.
8. Fire protection systems.
9. Plumbing systems, including roof drainage, waste and vent systems and distribution.
10. Ductwork including appurtenances and equipment.
11. HVAC piping.
12. HVAC equipment and controls.
13. Electrical lighting, power, communications and signaling, fire detection and related systems.
14. Excavation, site utilities and site improvements.

D. All adjustments necessary to achieve full coordination shall be determined in a timely manner, so as not to delay the work. Include time necessary for consideration by the Architect and Resident Project Representative(s) for proposed modifications. No claim for additional compensation for extension of time arising from delays due to failure of Contractor to identify potential conflicts requiring coordination in a timely manner or from additional work made necessary by such failure will be valid.

1.10 PROGRESS MEETINGS

A. The General Contractor shall schedule and administer meetings throughout the progress of the Work at regular intervals; make arrangements for meetings, prepare agenda with copies for participants, preside at meetings and record minutes.

1. Distribute copies within 24 hours to Architect, Owner and participants, and to those affected by decisions made. Architect will review and send comments within 2 working days from receipt of minutes.

B. The Architect or its representative will schedule and administer meetings throughout the progress of the Work; make arrangements for meetings, prepare agenda with copies for participants, preside at meetings, record minutes and distribute copies within one week to Contractor, Owner and participants of meeting only. Contractor is responsible for distribution to subcontractors, vendors, suppliers and others who are affected by decisions made.

1. Scheduled Frequency of Meetings: Weekly.

C. Attendance: Required are Contractor's Project Manager and Project Superintendent, and each Filed-Subcontractor, applicator, installer, and supplier whose work is on-going or scheduled. Owner, Architect, engineering consultants, and other persons are required to attend as the Architect may direct. Subcontractors, vendors, suppliers shall be present at meetings upon request of Contractor.

1. Attendee Authority: Subcontractors and supplier representatives present at meetings shall have authority to act for and make commitments for, the entity which they represent.
2. Restricted Attendance: Owner and Architect reserve the right to expel or exclude from any Progress Meeting any person(s) or company representative(s) without statement of reason or excuse.
3. Attendance of Architect’s Consultants: Contractor shall make an attendance request for specific Architect’s consultants and engineers at least 72 hours in advance of the meeting. Clearly identify In the request all consultant related issues and topics to be discussed at the meeting. The Architect will decide if its consultant or engineer will attend.
4. Attendance of Owner’s Independent Consultants: Contractor shall make an attendance request for specific Owner’s consultants at least 72 hours in advance of the meeting. Clearly identify In the request all consultant related issues and topics to be discussed at the meeting. The Owner will decide if its consultant(s) will attend.

D. Items of Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identifications of problems which impede planned progress.

5. Review of submittals schedule and status of submittals.
6. Review of off-site fabrication and delivery schedules.
7. Maintenance of progress schedule.
8. Corrective measures to regain projected schedules.
9. Coordination of projected progress.
10. Maintenance of quality and work standards.
11. Progress of Work to be adjusted under coordination requirements, and effect of proposed changes on progress schedule and coordination.
12. Other business relating to Work.

1.11 SPECIAL PROJECT MEETINGS AND BUILDING COMMITTEE MEETINGS

A. Special project meetings: The Contractor shall conduct special project meetings as required throughout the course of the Work. Special Project Meetings are those held in addition to the regularly scheduled progress meetings. The Architect and Owner are not required to attend these meetings. Special meeting issues include, but are not limited to:
   1. Safety issues.
   2. Labor issues.
   3. Special scheduling issues.

B. Building Committee Meetings: Contractor is advised of obligation to attend Building Committee Meetings (held in evenings) as requested by Owner or Architect, at no additional cost to the Contract.

C. Additional Special Meetings requested by the Architect or Owner: The Contractor along with any requested or necessary Filed subcontractors, subcontractors, applicators, vendors or material suppliers shall attend additional meetings when requested by the Architect or Owner as they deem necessary. Such meetings may be convened on short notice if conditions at the project site so require and attendance is mandatory. The Architect and Owner are not limited as to the number of additional meetings that may be requested, or the agenda for such meetings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

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SECTION 01 32 00
CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

A. Survey and layout data.

B. Critical Path Method (CPM) scheduling of the Work.

C. Contract progress reporting.
   1. Construction schedule updates.
   2. Daily construction reports.
   3. "Look Ahead" activity reports.
   4. Special Reports - Unusual Event Reporting.

D. Work Documentation:
   1. Affirmation of purchase orders for long-lead products.
   2. Periodic site observations.
   3. Verification of built tolerances.
   4. Construction progress photographs.

1.2 SURVEY AND LAYOUT DATA

A. Prior to starting any construction work, stake out all limits of cut and fill, the limits of proposed walkways and site improvements. Promptly upon completion of layout work and before any construction work is begun on the site, notify the Architect and Owner's Project Manager, who shall conduct a field inspection of the stake-out. The Architect reserves the right to adjust the location of such layouts as it deems necessary to comply with the intent of the Contract Documents.

1.3 CRITICAL PATH METHOD (CPM) SCHEDULING OF THE WORK

A. Definitions:
   1. 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.
      a. Critical activities are activities on the critical path. They must start and finish on the planned early start and finish times.
      b. Predecessor activity is an activity that must be completed before a given activity can be started.
   2. 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 when activities can be performed and the critical path of Project.

3. Critical Path: The longest continuous chain of activities through the network schedule that establishes the minimum overall Project duration and contains no float.
4. Event: The starting or ending point of an activity.
5. Float: The measure of leeway in starting and completing an activity.
   a. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Date of Substantial Completion.
   b. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the following activity.
   c. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
6. Fragnet: An amplified portion of the CPM schedule, to study a special sequence or establish a difficult time estimate, showing its predecessors, successors and impacts.
7. Major Area: A story of construction, a separate building, or a similar significant construction element.
8. Milestone: A key or critical point in time for reference or measurement.
9. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

B. General CPM Requirement: The Contractor shall develop and maintain a Network Diagram to demonstrate fulfillment of the contract requirements and shall utilize the plan for scheduling, coordinating and monitoring the Work (including all activities of subcontractors, equipment vendors and suppliers). A conventional Critical Path Method (CPM) Precedence Diagramming Method (PDM) technique will be utilized to satisfy both time and cost applications.

C. Preliminary CPM Schedule: Submit for Architect's and Owner's review Critical Path Method (CPM) construction schedule in triplicate within 45 calendar days after date of commencement stated on Notice to Proceed. Revise and resubmit as required.
   1. Before the first progress payment can be approved, the Contractor must have an approved CPM Schedule as described herein. It is the Contractor's responsibility to submit the CPM schedule with sufficient time for review by the Owner and Architect and any re-submittals and corresponding reviews that may be necessary prior to approval of the first requisition.
   2. Software: Provide to the Architect one complete and legal copy of all software used to prepare the CPM Progress Schedule. Include documentation and user manuals. Software and CPM provided by the Contractor shall be fully compatible and useable with Microsoft's "Windows" operating system. Software provided to the Architect will be used solely for "this project only".

3. Supporting data: Submit the following supporting data in addition to the CPM Network Plots:
    a. The proposed number of working days per week.
    b. The holidays to be observed during the life of the contract (by day, month, and year).
    c. The planned number of shifts per day.
    d. The number of hours per shift.
    e. List the major construction equipment to be used on the site, describing how each piece relates to and will be used in support of the submitted network diagram work activities/events.

D. CPM Progress Schedule shall be as described below:

1. Network Diagram Plots, General: The network diagram shall be an activity or arrow diagram. The diagram shall show relationships between the various activities. Exercise sufficient care to produce a clear, legible and accurate network diagram. Group activities related to specific physical areas of the project, on the network diagram for ease of understanding and simplification. Provide a key plan on each network diagram sheet showing the project area associated with the work activities/events shown on that sheet.
2. Work Activities (not less than 200 lines), as a minimum include:
    a. All major, and critical minor portions of the work.
        1) Break up the work into activities/events of a duration no longer than 20 work days each, except as to non-construction activities/events (for example: procurement of materials, delivery of equipment, curing times) and any other activities/events for which the Architect may approve the showing of a longer duration.
    b. Fabrication and delivery time for each item requiring off site fabrication.
    c. Each mock-up and in-place sample.
    d. Temporary facilities and controls.
3. Show not only the activities/events for actual construction work for each trade category of the project, but also trade relationships to indicate the movement of trades from one area, floor, or building, to another area, floor, or building, for at least five trades who are performing major work under this contract.
4. Identify all events on which the work is dependent on actions of Architect and Owner, including:
    a. Submittal of shop drawings, equipment schedules, samples, color submission, coordination drawings, templates, fabrication and material delivery times.
    b. Architect/Engineer's review of shop drawings, equipment schedules, samples and templates as defined under Section 01 33 00. Contractor shall additionally schedule and allow for in the CPM Progress Schedule time for Architect's response to Contractor' s request for clarifications

and interpretations of the Contract Documents. Time required for such activity, up to 10 or more days, is part of the normal construction process and is not a valid reason for extension of Contract Time, nor increase in the Contract Amount.

c. Delivery times of equipment furnished under separate Contracts with Owner, where the Contractor has responsibility for installation or coordination.

d. Interruption of Owner's existing utilities, delivery of Owner furnished products (OFI and OFCI), rough-in drawings for OFI and OFCI products, project phasing and Owner's scheduling and use of site requirements.

e. Test, balance and adjust various systems and pieces of equipment, maintenance and operation manuals, instructions and preventive maintenance tasks.

5. Activity Descriptive Information: identify the following for each work activity/event:

a. Activity/Event ID number. (Uniquely number each activity/event.. The network diagram should be generally numbered in sequence; left to right; top to bottom, and omitting numbers ending in 3, 6, and 9).

b. Concise description of activity (35 characters or less including spaces preferred).

c. Work location code, coordinated with key plan.

d. Performance responsibility or trade code using defined and approved abbreviations.

e. Nodes that correspond to the activities on the network diagram.

f. Duration (in work days).

g. Early Start (calendar day).

h. Late Start (calendar day).

i. Early Finish (calendar day).

j. Late Finish (calendar day).

k. Total float time.

l. Manpower required (average number of men per day).

m. Work Activity/Event Cost Data (as described below).

E. CPM Submittal Requirements: Submit three copies of Network Plots, and have approved an updated CPM prior to the approval of each progress payment.

1. Plot format (each submittal): Colored plots (minimum 30 by 40 inches) and a CD-ROM disc.

a. Electronic info shall be in compressed Primavera, (PDM) format.

2. Plots and reports required:

a. Network diagram plots.

1) Bar chart plot.

2) Time logic plot.
3) Critical Path items of work only plot.
4) Early start and finish plot.
5) Late start and finish plot.
6) Individual monthly activity plots for each month for the duration of the entire Contract.

b. Activity List.

c. Shop drawing and sample submittal schedule.

3. Updates: Update and reissue the CPM Progress Schedule in coordination with each application for progress payment. Submission of complete and accurate monthly CPM Progress Schedules is a pre-requisite to the Architect's Certificate of Payment. The updated CPM; shall include the items specified herein above, in addition the updated CPM shall show the following:

a. Changes to the Contract and their effect on the schedule and Activity/event costs.

b. Delays in submittals, or deliveries, or work stoppage are encountered which make rescheduling of the work necessary.

c. Revisions to schedule as required to reflect actual prosecution and progress of the Project. Show current status of activities completed or partially completed. Identify actual start dates and finish dates for each activity.

d. Modifications to the Contractor's plan of action for future activities.

F. Work Activity/Event Cost Data:

1. Provide cost loading for all work activities/events except procurement activities. The cumulative amount of all cost loaded work activities/events (including alternates) shall equal the total contract price. Prorate overhead, profit and general conditions on all work activities/events for the entire project length. The contractor shall generate from this information cash flow curves indicating graphically the total percentage of work activity/event dollar value scheduled to be in place on early finish, late finish. These cash flow curves will be used by the Architect to assist him in determining approval or disapproval of the cost loading.

a. In the event of disapproval, the Contractor shall revise and resubmit.

b. Negative work activity/event cost data will not be acceptable.

2. Provide cost loading for work activities/events related to guarantee period services, and system testing, balancing and adjustment.

G. Special CPM Progress Schedule Meetings: The Owner may require additional special CPM review meetings at any time during the Contract to review the CPM Progress Schedule updates.

H. Responsibility for Project Completion:

1. Whenever it becomes apparent from the current progress review meeting or the updated CPM progress schedule that phasing or contract completion dates will not be met, the Contractor shall execute some or all of the following remedial actions:
    a. Increase construction manpower in such quantities and trades as necessary to eliminate the backlog of work.
    b. Increase the number of working hours per shift, shifts per working day, working days per week (pending approval of Owner), the amount of construction equipment, or any combination of the foregoing to eliminate the backlog of work.
    c. Reschedule the work in conformance with the specification requirements.
2. Prior to proceeding with any of the above actions, the Contractor shall notify and obtain approval from the Owner's Representative for the proposed schedule changes. If such actions are approved, the CPM revisions shall be incorporated by the Contractor into the network diagram before the next update, at no additional cost to the Owner.

I. Extension of Contract Time: Each time an extension of Contract Time is requested, submit the request with justification and evidence supporting the request and submit a completely revised and updated CPM Project Schedule showing the impact of the proposed extension of Contract Time on the Progress Schedule. Contractor Time may only be adjusted by Change Order issued by the Owner.

1.4 CONTRACT PROGRESS REPORTING

A. Daily construction reports: Prepare a daily construction report, submit duplicate copies to the Architect at weekly intervals. Record the following information concerning events at the site:
    1. List of subcontractors at the site, and approximate count of personnel.
    2. Accidents, unusual events, and emergency procedures.
    3. High and low temperatures, general weather conditions (when exterior work is in progress).
    4. Meetings and significant decisions.
    5. Stoppages, delays, shortages, losses.
    6. Emergency procedures.
    7. Orders and requests of governing authorities.
    8. Change Orders received, and implemented.
    9. Services connected, disconnected.
    10. Meter readings and similar recordings.
    11. Equipment or system tests and start-ups.
    12. Partial Completions/occupancies.
    13. Substantial completions authorized.

B. Look ahead activity reports: Prepare each week throughout the term of construction a listing of upcoming construction activities. Each weekly report shall include a listing of planned construction activities for the upcoming 2 weeks (14 calendar days). Submit a Look Ahead Activity Report at each job meeting to all participants. If no meeting is planned on a given week, mail the reports directly to both Architect/Engineer and Owner's Project Representative.

1. Maintain a record of all Look Ahead Activity Reports in a 3-ring binder in the Contractor's field office and make available for review by Architect/Engineer and Owner's Project Representative.

C. Special Reports:

1. Unusual Event Reporting: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information.

1.5 WORK DOCUMENTATION - AFFIRMATION OF PURCHASE ORDERS

A. Several items specified in individual specification sections are products requiring long lead time. To ensure smooth progress of the Project without unwarranted delays, and to confirm compliance with the Contract Documents, the Contractor shall furnish affirmation of purchase orders for those items indicated in the individual specification sections as being long lead items.

B. Affirmation of purchase orders made by the Contractor or subcontractors shall be submitted to the Architect within 7 calendar days from date of' Notice to Proceed, or Date of Agreement whichever is earlier.

C. Affirmation shall include cover letter to Architect naming the purchased products, anticipated dale of delivery, and referencing applicable specification section. Attach to letter, copy of Bill of Sale, or other term of receipt, indicating payment or downpayment for each of the indicated products. Bill of Sale shall clearly show date of purchase, product identification, quantities ordered and amount paid.

1. In lieu of Bill of Sale, Contractor may obtain from vendor a notarized letter, on the vendor's letterhead. Vendor's, letter shall certify placement of order and identify date of purchases products and quantity purchased.

1.6 WORK DOCUMENTATION - PERIODIC SITE OBSERVATIONS

A. Observe and maintain a record of tests. Record the following:

1. Specification section number, product(s), and name of subcontractor or installer.
2. Name of testing agency and name of inspector.
3. Name of manufacturer's representative present.
4. Date, time and duration of tests.

5. Type of test and results.
6. Retesting required.

B. Observe startup and adjustments; record time and date of equipment start-up and results.

C. Observe equipment demonstrations to Owner; record times and additional information required for operation and maintenance manuals.

D. Assist Architect/Engineer with final inspections. Prepare list of items to be completed and corrected.

1.7 WORK DOCUMENTATION - VERIFICATION OF BUILT TOLERANCES

A. Verification of as-built tolerances: Frequently review work to ensure compliance with Contract Document requirements and verify built construction is plumb, level, and in proper alignment within specified tolerances.

1. Milestone certification: Inspect and verify the Work is installed is complete and complies with the Contract Documents and is within the specified tolerances. Submit certification to both Architect and Owner's Representative for the following milestones:

a. Completion of foundation systems and slabs on grade.
b. Completion of structural steel.
c. Completion of secondary supporting steel elements and decking.
d. Completion of light gage steel framing.
e. Completion of suspended concrete slabs.
f. Completion of exterior masonry walls.
g. Completion of interior masonry walls.
h. Completion of interior metal framing systems.

2. Improper work: Comply with requirements of Contract Documents. Correct all non-conforming and improper Work which deviates from the requirements of the Contract Documents or which exceed specified tolerances. Built work over non-conforming work is not acceptable and will require complete removal and reinstallation.

1.8 WORK DOCUMENTATION - CONSTRUCTION PROGRESS PHOTOGRAPHS

A. Furnish digital photographs of site and construction through-out the progress of Work, produced photographer acceptable to Architect.

1. Submit photographic submittals on Discs: 2 copies, per submission.

a. Progress photographs, submit monthly and at final project completion.

B. Views: Take photographs from differing directions indicating the relative progress of the Work. Take photographs monthly on date for Application of Payment, and at final completion.

1. Prior to start of site clearing take one set of exterior photographs showing existing conditions.
2. As a minimum each month during the Work, furnish the following number of views (as appropriate to Work being performed):
   a. Views of site construction: 4.
   b. Exterior views of building: 4.
   c. Interior views: 6, each floor.
3. Take additional photographs for the following major portions of work:
   a. Start and completion of site preparation.
   b. Completion of hazardous material abatement.
   c. Completion of excavations, prior to formwork or footings.
   d. Completion of demolition.
   e. Completion of foundations.
   f. Each stage of completion of structural framing.
   g. Enclosure of building.
   h. Provide 3 roof top photographs each month during roofing work, plus another 3 at completion of roofing and flashing work.

C. Submission of Discs: Identify each disc on the back with the following information:
   1. Project identification.
   2. Date and time of exposure, and orientation(s) of view.
   3. Photographer's name, address and phone number.

D. Submission of Prints: if requested shall be furnished a prevailing commercial rates.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 00

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SECTION 01 33 00
SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Submittal coordination.

B. Submittal procedures and grading.

C. Shop drawings, product data and samples.

D. Manufacturer's instructions.

E. Manufacturer's certificates.

F. Emergency addresses.

G. Erosion and sediment control program.

1.2 SUBMITTAL COORDINATION

A. General: The Contractor is fully responsible for delay in the delivery of materials, progress of the Work and damages incurred due to Contractor's failure to submit, revise and resubmit submissions in accordance with the requirements herein, and in a coordinated and timely manner.

B. Make submittals in a proper and timely fashion, allowing for administrative procedures, Architect's review, corrections to submissions and resubmittal, if necessary, and fabrication of products without delaying the project. Minimum processing times required by the Architect are as follows:

1. Review for Architect's Office only: Allow a minimum of 10 working days for review and processing. Some submittals may require additional time.
   a. Simultaneous submission of a large number of shop drawings and product data may require longer than 10 working days for review. (In particular submittals for Divisions 3, 5, 6, 21, 22, 23, 25 and 26).
   b. Complex Systems (structural, mechanical, electrical) may require longer than 10 working days for review each time shop drawings, layout drawings, and product data are submitted or resubmitted.
2. Review by Architect and its consultant(s): Allow 10 working days for review and processing of submittals by Architect plus an additional 5 working days for review by each consultant as applicable.
3. Reprocessing of submittals: For submittals requiring resubmittal, re-processing time required shall be the same as first submittal.
4. No extension of Contract Time will be authorized due to failure to transmit submittals sufficiently in advance of scheduled performance of Work.

C. Make submittals of similar items, systems, or those specified in a single specification section together.

D. Make submittals for products which other products are contingent upon, first.

E. The Contractor is fully responsible for delay in the delivery of materials or progress of work caused by late review of shop drawings due to failure of the Contractor to submit, revise, or resubmit shop drawings in adequate time to allow the Architect checking and processing of each submission or resubmission.

1.3 SUBMITTAL PROCEDURES AND GRADING

A. Prepare and submit to the Architect, all specified and requested submittals.

B. Provide space for Contractor, Architect and engineering consultant review stamps, on the front page of each item's submittal copy. Apply Contractor's stamp, signed or initialed certifying that review, verification of products required, field dimensions, adjacent construction Work, and coordination of information, is in accordance with the requirements of the Work and the Contract Documents. The Architect's stamp shall contain the following data (Engineering consultant review stamps may vary in language, but intent of language is similar):

_____ REVIEWED
_____ FURNISH AS CORRECTED
_____ FURNISH AS NOTED
_____ REVISE AND RESUBMIT
_____ REJECTED

1. The Architect will insert the date of action taken and an identification of the person taking the action.
2. Submittal grading:
   a. REVIEWED - No corrections, no marks.
   b. FURNISH AS CORRECTED - Minor corrections required are as noted; all items can be fabricated as noted, without further correction and resubmission of original submission; checking is complete and all corrections are deemed obvious without ambiguity.
   c. REVISE AND RESUBMIT - Resubmission is required; checking may be incomplete; details of items noted by checker are to be clarified further before full review can be given. Correct and resubmit, do not fabricate noted items requiring correction.
   d. REJECTED - Submittal is rejected as not in accord with the Contract Documents, too many corrections, or other justifiable reasons. When returning submission, Architect will state reasons for rejection. Correct and resubmit, do not fabricate.
3. Review/approval neither extends nor alters any contractual obligations of the Architect, Engineer or Contractor.

C. Identify all variations from Contract Documents, and product or system limitations which may be detrimental to successful performance of the completed work.

D. Contractor's review: Review all shop drawings, product data and samples. Include, without limitation, verification of the following:

1. Proper title, original date, drawing number (which shall be changed if resubmitted), revision numbers and dates, designation of project contractor, subcontractor and/or supplier.
2. Identification of Shop Drawings, Product Data or Samples by Specification Section and subsection or paragraph where appropriate and identification of Contract Drawings by number and detail.
3. On each submittal, as a minimum, Contractor shall identify the following:
   a. Errors, inconsistencies, and omissions discovered in the contract documents and field conditions must be reported at once to the Architect.
   b. Any variations from code requirements contained in the contract documents must be reported promptly in writing to both the Architect and Owner.
   c. Promptly report to the Architect information that any design, process, or product infringes on a patent.
   d. Names of subcontractor(s) and supplier(s). Include name(s) of contact person(s), address, telephone and fax number(s).

E. Revise and resubmit submittals as required, identify all changes made since previous submittal. Distribute copies of reviewed submittals to concerned parties; instruct parties to promptly report any inability to comply with provisions.

1.4 SUBMISSION REQUIREMENTS AND QUANTITIES

A. Furnish Architect with electronic files through the Adobe Acrobat Portable Document Format (PDF) files for each of the following submittal types:

1. Schedules, including, but not limited to:
   a. Construction Schedule.
   b. Schedule of Values.
   c. Schedule of shop drawings, product data, and samples.
   d. Schedule of Environmental Submissions.
2. Shop drawings.
3. Product data, manufacturer’s instructions and certificates and similar submissions.
4. Erosion control program.
5. Emergency addresses: 1 file to Architect, and 1 file direct to Owner.

B. Furnish Architect with the following quantities of the following physical submittals:

1. Samples: Sets of 3 identical samples of each submission required.

C. General submission of physical submittals.; deliver to Architect at the following address:

LLB Architects, Inc.
161 Exchange Street
Pawtucket, Rhode Island 02860

D. Transmit submittals to Architect at the above address, with individual transmittal forms, Document 00 62 12 – PRODUCT SUBMITTAL FORM for each submission. Document 00 62 12 is bound into the Project Manual; unbound copies are available from the Architect.

1. On transmittal form, identify Project, Contractor, subcontractor, installer, or supplier, pertinent Drawing sheet and detail number(s), and specification Section number, as appropriate. Transmittals received by the Architect from sources other than the Contractor will be returned without any action taken.
2. Contractor shall number submittals sequentially by Specifications Section prior to submittal. Resubmitted items shall retain number and be noted as resubmitted (example 260000-1 R1).

1.5 SHOP DRAWINGS

A. General: Provide accurately prepared, large scale and detailed shop drawings prepared specifically for this Project. Shop drawings shall include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Standard information prepared without specific reference to Project are not considered shop drawings.

1. Show adjacent conditions and related work. Show accurate field dimensions where appropriate.
2. Identify materials and products shown. Note all conditions where require coordination with other trades and special installation procedures.
3. Show gage and thickness of materials.
4. Indicate welding details and joint types.
5. Show every component of fabricated items, notes regarding manufacturing process coatings and finishes, identifying numbers conforming to the Contract Documents (i.e. stair numbers, door numbers and similar items), dimensions, and appropriate trade names.
6. Show anchorage and fastening details, including type, size and spacing.
7. Review each submittal for conformity with the Contract requirements prior to submittal, certify such review on each shop drawing with Contractor's stamp, signature and date. Reference on shop drawings to other sections, installers, suppliers, or trade(s) shall designate the appropriate specification sections, and the term "by others" shall not be used.

B. Size of Format: Not less than 8-1/2 by 11 inches, and no larger than 30 by 42 inches, except for templates, patterns and similar full-size drawings.

C. The Architect's comments and corrections will be made on the electronic submission (PDF) and returned to the Contractor. If necessary, the Contractor then shall make the necessary corrections on the original drawings and resubmit the corrected drawings in electronic format (PDF) as specified. Prints of any submittals required for the Architect's own use, and those of engineering consultants, will be made without cost to the Contractor. The Contractor is responsible to distribute and furnish (at no additional cost to Owner) all shop documents needed for use by the Contractor, subcontractors, installers, vendors and suppliers.

D. Drawing submittals returned "REVIEWED" or "FURNISH AS CORRECTED" Obtain and distribute adequate prints for construction, including one print of each for designated Owner's and Architect's Project Representative(s), and then return the reproducibles to the subcontractor or supplier from whom he originally received them.

E. Drawing submittals returned "REJECTED" or "REVISE AND RESUBMIT", Obtain a record print, and then forward originals to source for correction; resubmit new reproducibles and prints as specified herein above.

F. Shop Drawings returned "NOT REVIEWED": Obtain a record print, and return originals to source; do not resubmit.

G. Each drawing shall have a title block on the right hand side containing the following data:

Name of project -	FOXBOROUGH TOWN HALL
Architect -	LLB Architects, Inc.
Contractor -	
Subcontractor/supplier -	
Date of submission -	

H. Each drawing shall have a clear space on the right hand side for review stamps of both the Architect and Contractor.

1. The Contractor's Review and Action Stamp: Provide suitable space on label or title block for Contractor's review and action stamp. Stamp and sign each submittal to show Contractor's review and approval prior to transmittal Architect. Submittals not signed and stamped by Contractor will be returned without action.

   a. Only submittals received from the General Contractor will be considered for review by the Architect. Contractor shall review each submittal for accuracy and conformance with the requirements of the Contract Documents, and particularly for field measurements and proper fit with adjoining work. Modify submittals as required to show interface with adjacent work and attachment to Building.

b. The Contractor's Review and Action Stamp shall contain the following language or similar:

> APPROVED FOR CONFORMANCE
> WITH THE CONTRACT DOCUMENTS.
>
> All dimensions and quantities have been reviewed and are accepted by _____
>
> ***General Contractor's Name***
>
> All dimensions and field conditions have been or will be verified prior to fabrication of the items described herein.

c. Submittals received from the Contractor shall be signed and comply with review requirements. Submittals not certified or improperly certified (stamped but not reviewed) will be returned to the Contractor without Architect's review. Claims due to the return of uncertified, improperly prepared or inadequately reviewed submittals will be rejected.

1.6 PRODUCT DATA

A. Submit Product data as specified, and as the Architect may additionally prescribe. Product data includes, but is not limited to:

1. Catalog cuts.
2. Complete specifications.
3. Standard color charts.
4. Performance data.
   a. Compliance with recognized trade association standards.
   b. Compliance with recognized testing agency standards, labels and seals.
5. Environmental data including, but not limited to:
   a. Chemical composition.
   b. VOC content.
   c. Material certifications as applicable to product.
6. Certified laboratory test report data.
7. Health and safety precautions.
8. Illustrated capacities, characteristics, wiring diagrams, controls, and other pertinent information for complete product and product use description.

B. If more than one size or type is shown on any printed sheet, indicate clearly intended item(s).

1.7 SAMPLES

A. Submit samples clearly labeled as to its material, type or make, manufacturer, size or gauge, and other pertinent data, accompanied by an appropriate transmittal form. Samples shall show full range of color and texture variation that can be expected.

1. When accepted or not accepted, the Architect will retain one set of samples and return the other to the Contractor. Samples will not be permitted for use in the project.

1.8 MANUFACTURER'S INSTRUCTIONS

A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, handling, storage, assembly, installation, start-up, adjusting, and finishing.

B. Identify conflicts between manufacturer's instructions and Contract Documents.

1.9 MANUFACTURER'S CERTIFICATES

A. When specified in individual specification Sections, submit manufacturer's certificates and installer certificates to Architect for review.

B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference date, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or product, but must be acceptable to Architect.

1.10 EMERGENCY ADDRESSES

A. Within 15 days of Notice to Proceed, submit in writing, the name, addresses and telephone numbers of key members of their organization including Contractor's Superintendent and personnel at the site, to be contacted in the event of emergencies at the building site, which may occur during non-working hours.

1.11 EROSION AND SEDIMENT CONTROL PROGRAM

A. Submit erosion and sediment control program within 30 days after date of Owner-Contractor Agreement for Architect's review. Revise and resubmit as required.

B. Erosion and sediment program shall indicate proposed methods, materials to be employed, and schedule for effecting erosion and siltation control and preventing erosion damage. Provide sufficient information to fully explain the program; the following are the minimum requirements:

1. Proposed methods for actuating erosion and siltation control including 1 inch equals 40 feet (1"=40') scale plans indicating location of erosion control devices and siltation basins.
2. List of proposed materials including manufacturer's product data, in accordance with Division 31 - EARTHWORK and Division 33 - EXTERIOR IMPROVEMENTS.
3. Schedule of and sediment control program indicating specific dates from implementing programs in each major area of Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

SECTION 01 41 00
REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of:

1. Applicable codes and regulations.
2. Trade union jurisdictions.
3. Wage rate compliance.

1.2 DEFINITIONS

A. Regulations include laws, ordinances, statutes and lawful orders issued by authorities having jurisdiction, and rules, conventions and agreements within the construction industry that control performance of the Work, whether lawfully imposed by authorities having jurisdiction or not.

1.3 APPLICABLE CODES AND REGULATIONS

A. All work shall be performed in accordance with the latest version, by DATE OF ISSUE for Contract Documents, current on date of Owner-Contractor Agreement, except as indicated otherwise, of all applicable codes including the following:

1. 2015 International Building Code (IBC) with Massachusetts Building Code, Ninth Edition amendments (780 CMR).
2. 2015 International Energy Conservation Code with Massachusetts Building Code amendments, (Effective August 12, 2016 under the 780 CMR, Eighth Edition).
3. 2015 International Existing Building Code (IEBC) with Massachusetts Building Code, Eighth Edition amendments (780 CMR).
4. 2015 International Mechanical Code (IMC).
5. Massachusetts Electrical Code (2017 National Electrical Code [NFPA 70, 2017 edition], with Massachusetts modifications from 527 CMR 12.00).
6. Massachusetts Fuel, Gas, and Plumbing Code (2002 National Fuel Gas Code [ANSI Z223.1-NFPA 54], with Massachusetts modifications from 248 CMR 5.00).
7. Massachusetts Comprehensive Fire Safety Code (527 CMR) [2012 NFPA 1 as amended], effective January 1, 2015, as amended through November 4, 2016 and MGL Chapter 148.
8. Commonwealth of Massachusetts Regulation 521 CMR: *Architectural Access Board*.
9. Massachusetts Board of Elevator Regulations (524 CMR).
10. Commonwealth of Massachusetts, Department of Public Works. “STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES CONSTRUCTION”.

11. Commonwealth of Massachusetts Wetlands Protection Act.
12. Town of Hamilton Zoning Bylaws, as amended.
13. United States Occupational Safety and Health Administration (OSHA): Standard Nº. 29-CFR-1926.59 - HAZARD COMMUNICATION STANDARD.

B. Publication Dates: Where the date of issue of a code or regulation is not specified, comply with the standard in effect as of date of Contract Documents, or as otherwise required by authorities having jurisdiction.

1.4 TRADE UNION JURISDICTIONS

A. Maintain current information on jurisdictional matters, regulations, actions and pending actions; and administer/supervise performance of Work in a manner which will minimize possibility of disputes, conflicts, delays, claims or losses.

1.5 WAGE RATE COMPLIANCE

A. The General Contractor is responsible to ensure that the rate per hour to be paid to mechanics, apprentices, teamsters, laborers and other workers employed on the Work shall not be less than the approved wage rates applicable to this project. A legible copy of the approved rates, along with equal opportunity requirements, shall be posted on a weatherproof bulletin board outside the field office and be clearly visible for review by all workers.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 41 00

SECTION 01 41 17
UTILITIES NOTIFICATION

PART 1 – GENERAL

1.1 GENERAL PROVISIONS

A. Comply with all regulations and laws concerning excavation, demolition, or explosive work and be advised of utility notification requirements under Chapter 82, Section 40 of the Massachusetts General Laws.

1.2 ADMINISTRATIVE AUTHORITY

A. Notification of utilities within the Commonwealth is performed through the Utilities Underground Plant Damage Prevention System, commonly referred to as "Dig Safe".

1.3 REGULATORY REQUIREMENTS

A. Contractors must notify "Dig Safe" by telephone before performing any earth moving operations including: digging, trenching, boring, site demolition, excavation, backfilling, grading, or explosive work in all public ways and private property.

B. This notification must be made at least 72 hours (excluding weekends and holidays) prior to the Work described above, but not more than 30 calendar days before commencement of the contemplated Work. Notification shall occur between 6:00 AM to 6:00 PM local time from Monday to Friday, except in cases of emergency.

1. The toll free phone number is: **811**.
2. Provide the following information:
   a. Municipality.
   b. Location of work.
   c. Intersecting street.
   d. Type of work.
   e. Starting date and time of work.
   f. Name and title of caller.
   g. Phone number of caller.
   h. Best time for "Dig Safe" to return calls.
   i. Company name of General Contractor or Construction Manager.
   j. Company name of sub-contractor performing subgrade work.

C. Member utilities of the Utilities Underground Plant Damage Prevention System are required to respond to the notice within 72 hours from the time said notice is received by designating at the locus the location of pipes, mains, wires, or conduits.

1. Locations of underground utilities will be marked by spray paint or stakes. Marks will be color coded with additional descriptions of letters and arrows as required.

D. Do not commence work until "Dig Safe" has been properly notified and has responded as described above.

E. Subsequently notify "Dig Safe" of unanticipated additional blasting required after the initial notification to "Dig Safe" has been made. Do not perform the additional blasting work in less than 4 hours following the subsequent notification.

1.4 PROTECTION

A. The Contractor is fully responsible for protection of the utility location markings, wherever these occur, on or off-site.

B. Perform Work in such a manner, and with reasonable precautions taken to avoid damage to utilities under the surface in said areas of work. Immediately notify any known or suspected damage to underground utilities to the owner of such utilities.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION (not used)

END OF SECTION 01 41 17

SECTION 01 42 00
REFERENCES

PART 1 - GENERAL

1.1 SUMMARY

A. Abbreviations and Acronyms.

B. Definitions

C. Reference Standards.

1.2 ABBREVIATIONS AND ACRONYMS

A. The following list of common abbreviations are referenced in individual specification sections. This list is provided for convenience to the Contractor and is not intended to define all abbreviations use in the Contract Documents.

1. Abbreviations for contract and specifications.

DCAMM	Massachusetts Division of Capital Asset Management and Maintenance
DCR	Massachusetts Department of Conservation and Recreation
EPA	United States Environmental Protection Agency
HVAC	Heating, ventilating, and air conditioning
IAQ	Indoor Air Quality
IEQ	Indoor Environmental Quality
MEPA	Massachusetts Environmental Protection Agency
MGL	Massachusetts General Laws
MSDS	Material Safety Data Sheet
NIC	Not in Contract
OFCI	Owner Furnished, Contractor Installed
OFI or OFOI	Owner Furnished and Installed (Owner Furnished, Owner Installed)
VOC	Volatile Organic Compounds

2. Abbreviations for measurements and quantities.

C	Celsius
cm	Centimeter
F	Fahrenheit
Hrs	Hours
Kg	Kilogram
L	Liter
M	meter

m^2 or SM	square meter
m^3 or CM	cubic meter
mm	Millimeter
Mths	Months
psi	Pounds per square inch
t	ton

1.3 DEFINITIONS

A. Definitions of contracting parties (Owner, Owner's Project Manager, Construction Manager, and Architect): Refer to Section 01 10 00 – PROJECT SUMMARY.

B. Definitions for terms utilized in the Contract Documents:

1. "As necessary," "as directed," "when directed," "satisfactory," "good and sufficient," "approved," or other general qualifying terms are used on the Drawings: These terms are deemed to be followed by the words, "in the opinion of the Architect," or "by the Architect," as the case may be."
2. "Addenda": written or graphic instruments issued prior to the execution of the Contract which modify or interpret the Bidding Documents, including the Drawings and Specifications, by additions, deletions, clarifications or corrections.
3. "Approval," "approved, "approved equal," "or equal," or "other approved" means as approved by the Architect."
4. The term "Day": is defined as the following:
   a. The term "calendar day" is a full 24 hour period, starting from 12 AM (midnight), and includes all weekends and legal holidays.
   b. The term "working day" shall mean any calendar day except Saturdays, Sundays, and legal holidays at the place of the building.
   c. Where the term "day" is used without the adjective of "calendar" or "working", it shall mean "calendar day".
5. Furnish and Install" or "Provide": items identified shall be furnished and installed under this Contract. The term "Furnish", when used separately, shall mean that the items referred to shall be furnished, only. Similarly the term "install", when used separately, shall mean that the items referred to shall be installed, only.
6. "Knowledge," "recognize" and "discover," their respective derivatives and similar terms in the Contract Documents, as used in reference to the Contractor, shall be interpreted to mean that which the Contractor knows (or should know), recognizes (or should recognize) and discovers (or should discover) in exercising the care, skill and diligence required by the Contract Documents. Analogously, the expression "reasonably inferable" and similar terms in the Contract Documents shall be interpreted to mean reasonably

inferable by a Contractor familiar with the Project and exercising the care, skill and diligence required of the contractor by the Contract Documents.

7. "Not in Contract" or "N.I.C.": equipment, furnishings, or other materials not included as a part of this Contract.
8. "Product": materials, systems and equipment.

1.4 REFERENCE STANDARDS

A. For products or workmanship specified by association, trade, or Federal Standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard by DATE OF ISSUE for Contract Documents, current on date of Owner-Contractor Agreement.

C. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

D. The contractual relationship to the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

E. Schedule of References

1. Listed below are abbreviations for the names and titles of trade association names, federal government agencies and similar organizations which are referenced in the individual specification sections. The addresses and URL's (Uniform Resource Locators) provided are for the Contractor's convenience and are believed to be current and accurate, however addresses and URL's frequently change, and no assurance is made on their accuracy:

AA	Aluminum Association 900 19th Street N.W., Suite 300 Washington, DC 20006 www.aluminum.com
ABAA	Air Barrier Association of America 1600 Boston-Providence Highway Walpole, MA 02081 www.airbarrier.org
AAMA	American Architectural Manufacturer's Association 1827 Walden Office Sq., Suite 104 Schaumburg, IL 60173-4268 www.aamanet.org
ACI	American Concrete Institute, International 38800 Country Club Drive, Farmington Hills, Michigan 48331 www.aci-int.org
ACPA	American Concrete Pipe Association 222 West Las Colinas Boulevard, Suite 641, Irving TX www.concrete-pipe.org

ADC	Air Diffusion Council 104 S. Michigan Ave, Suite 1500, Chicago, IL 60603 www.flexibleduct.org
AFPA	American Forest & Paper Association (Formerly NFPA National Forest Products Association) 1111 19th St. N.W., Suite 800, Washington, DC 20036 www.afandpa.org
AGA	American Gas Association Inc. 1515 Wilson Blvd. Arlington, VA 22209-2469 www.agagas.com
AGAI	American Galvanizers Association Inc. 12200 E.Lliff Ave, Suite 204, Aurora, CO 80014-1252 www.galvanizeit.org
AIA	American Institute of Architects 1735 New York Avenue, N.W., Washington, DC 20006-5292 www.aia.org
AIHA	American Industrial Hygiene Association 2700 Prosperity Ave, Suite 250, Fairfax VA 22031 www.aiha.org
AISC	American Institute of Steel Construction 1 E. Wacher Dr., Suite 3100, Chicago,IL 60601-2001 www.aisc.org
AMCA	Air Movement and Control Association 30 W. University Drive, Arlington Heights, IL 60004-1893 www.amca.org
ANSI	American National Standards Institute 11 W. 42nd Street, 13 Floor, New York, NY 10036 www.ansi.org
APA	APA - The Engineered Wood Association (formerly APA - American Plywood Association) P.O. Box 11700, Tacoma, WA 98411-0070 www.apawood.org
ARI	Air-Conditioning and Refrigeration Institute 4301 N. Fairfax Dr., Suite 425, Arlington, VA 22203 www.ari.org
ASCA	Architectural Spray Coaters Association 230 West Wells Street, Suite 311, Milwaukee WI 53203 www.aecinfo.com
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers 1791 Tullie Circle NE, Atlanta GA.30329 www.ashrae.org

ASME	American Society of Mechanical Engineers 345 East 47th Street, New York, NY 10017-2392 www.asme.org
ASTM	American Society for Testing and Materials 100 Barr Harbor Drive, West Conshohocken, PA 19428 www.astm.org
AWC	American Wood Council 222 Catoctin Cir. SE, Leesburg, VA 20175 www.awc.org
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120, Potomac Falls, VA 20165 www.awinet.org
AWMAC	Architectural Woodwork Manufacturers Association of Canada Unit 02A 4803 Centre St. NW, Calgary, Alberta, Canada www.awmac.com
AWPA	American Wood Preservers' Association P.O. Box 286, Woodstock, MD 21163-0286 www.awpa.com
AWPI	American Wood Preservers' Institution 1945 Old Gallows Rd., Suite 150, Vienna, VA 22182 www.oas.org
AWS	American Welding Society 550 LeJeune Road, N.W., Miami, FL 33126 www.aws.org
BHMA	Builders Hardware Manufacturers Association, Inc. 355 Lexington Ave., 17 Floor New York, NY 10017 www.buildershardware.com
BIA	Brick Industry Association 11490 Commerce Park Drive, Reston, VA 22091-1525 www.bia.org
CDA	Copper Development Association 260 Madison Ave., 16th Floor, New York, NY 10016 www.copper.org
CISCA	Ceilings & Interior Systems Construction Association 579 W. North Ave., Suite 301, Elmhurst, IL 60126 www.cisca.org
CRI	Carpet and Rug Institute 310 Holiday Ave, Dalton, GA 30720 ww.carpet-rug.com
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road, Schaumburg, IL 60173-4758 www.crsi.org

CPSC	Consumer Product Safety Commission 5401 Westbard Ave., Bethesda, MD 20816-1469 www.cpsc.gov
CSSB	Cedar Shake and Shingle Bureau P.O. Box 1178, Sumas, WA 98295-1178 www.cedarbureau.org
CTIOA	Ceramic Tile Institute of America 12061 W.Jefferson BLVD, Culver City, CA 90230-6219 www.ctioa.org
DHI	Door and Hardware Institute 14170 Newbrook Dr., Chantilly, VA 22021-2223 www.dhi.org
FM	Factory Mutual Engineering & Research Corp. 1151 Boston-Providence Turnpike Norwood, MA 02062 www.fmglobal.com
FSC	Forest Stewardship Council (United States Chapter) 1155 30th Street NW, Suite 300, Washington, DC 20007 www.c-f-c.com
GA	Gypsum Association 6525 Belcrest Road, Suite 480, Hyattsville, MD 20782 www.gypsum.org
GANA	Glass Association of North America 2945 S.W. Wanamaker Dr., Suite A, Topeka, KS 66612-5321 www.glass.org
GICC	Glazing Industry Code Committee 3310 Harrison St., Topeka, KS 66611-2279 www.glazingcodes.net
IGCC	Insulating Glass Certification Council 3933 US Route 11, PO Box 2040, Cortland, NY 13045 www.igcc.org
KCMA	Kitchen Cabinet Manufacturers Association 1899 Preston White Drive, Reston VA 20191 www.kcma.org
LSGA	Laminators Safety Glass Association 3310 Harrison Street, Topeka KS 66611-2279 www.glass.org
MCAA	Mason Contractors Association of America 1910 S. Highland Ave. Suite 101, Lombard, IL 60148 www.masoncontractors.org
MFMA	Maple Flooring Manufacturers Association 60 Revere Drive, Suite 500, Northbrook, IL 60062 www.maplefloor.org

MIL	Military Specifications and Standards Naval Publications and Forms Center 5801 Tabor Avenue, Philadelphia, PA 19120 www.milspec.com
NAAMM	National Association of Architectural Metal Manufacturers 8 South Michigan Avenue, Suite 1000, Chicago, IL 60603 www.naamm.org
NCMA	National Concrete Masonry Association 2302 Horse Pen Road, Herndon, VA 20171-3499 www.ncma.org
NEBB	National Environmental Balancing Bureau 8575 Government Circle, Gaithersburg, MD 20877-4121 www.nebb.org
NEMA	National Electrical Manufacturers' Association 1300 N. 17th St., Suite 1846, Rosslyn, VA 22209 www.nema.org
NFPA	National Fire Protection Association 1 Battery March Park, PO Box 9101, Quincy, MA 02269 www.nfpa.org
NFRC	National Fenestration Rating Council 6305 Ivy Lane, Greenbelt MD 20770 www.nfrc.org
NOFMA	National Oak Flooring Manufacturers Association, Inc. PO Box 3009, Memphis, TN 38173-0009 www.nofma.org
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018-5607 www.nrca.net
PCA	Portland Cement Association 5420 Old Orchard Road, Skokie, IL 60077-1083 www.cement.org
PEI	Porcelain Enamel Institute 4004 Hillsboro Pike, Suite 224B, Nashville, TN 37215 www.porcelainenamel.com
PS	Product Standard U. S. Department of Commerce www.omg.org
SDI	Steel Deck Institute P.O. Box 25, Fox River Grove, IL 60021-0025 www.sdi.org
SDI	Steel Door Institute 30200 Detroit Road, Cleveland, OH 44145-1967 www.steeldoor.org

SEI	Structural Engineering Institute of the American Society of Civil Engineers 1801 Alexander Bell Drive Reston VA 20191 www.seinstitute.org
SGCC	Safety Glass Certification Council RMS, P.O. Box 9 Henderson Harbor, NY 13651 www.sgcc.org
SIGMA	Sealed Insulating Glass Manufacturers Association 401 N. Michigan Ave., Suite 2400, Chicago, IL 60611 www.glasschange.com
SJI	Steel Joist Institute 3127 10th Ave. N., Myrtle Beach, SC 29577 www.steeljoist.org
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Dr., Chantilly, VA 22022-1209 www.smacnapa.org
SPIB	Southern Pine Inspection Bureau 4709 Scenic Highway, Pensacola, FL 32504-9094 www.spib.org
SSMA	Steel Stud Manufacturer's Association 8 South Michigan Avenue, Chicago IL 60603 www.ssma.com
SSPC	The Society for Protective Coatings 40 24th Street, 6th Floor, Pittsburgh PA 15222-4623 www.sspc.org
SWRI	Sealant, Waterproofing & Restoration Institute 2841 Main Street, Suite 585, Kansas City, MO 64108 www.swrionline.org
TCNA	Tile Council of North America, Inc. 100 Clemson Research Blvd., Anderson, SC 29625 www.tileusa.com *(formerly TCA, Tile Council of America)*
TMS	The Masonry Society 3970 Broadway, Suite 201D, Boulder CO 80304 www.masonrysociety.org
TPI	Truss Plate Institute 583 D'Onofrio Dr., Suite 200Madison WI www.tpinst.org
UL	Underwriters' Laboratories, Inc. 333 Pfingston Road, Northbrook, IL 60602 www.ul.com

WCLIB	West Coast Lumber Inspection Bureau 6980 S.W. Varns Road, Box 23145, Portland, OR 97223 www.wclib.org
WDMA	Window & Door Manufacturers Association (formerly National Wood Window & Door Association, NWWDA) 205 E. Touhy Avenue, Suite G-54, Des Plaines, IL 60018 www.nwwda.org
WI	Woodwork Institute PO Box 980247 West Sacramento, CA 95798 www.woodworkinstitute.com
WRCA	Western Red Cedar Association 1200-555 Burrard St., New Brighton, MN 55122 www.wrcla.org
WWPA	Western Wood Products Association 522 SW Fifth Avenue, Yeon Building, Portland, OR 97204 www.wwpa.org

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

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SECTION 01 43 39
MOCK-UPS

PART 1 - GENERAL

1.1 SUMMARY

A. Mockup requirements. Mock-ups are required for, but not limited to the following:

1. On-site exterior wall section sample panel.

B. All mock-ups specified herein, under other Sections of the Specifications, and shown on drawings will be reviewed and approved by the Architect and Owner. Unaccepted mock-ups shall be replaced or reconstructed in part or in total and the extent of the replacement or reconstruction shall be at the discretion of the Architect and Owner. The Contractor shall carry forth mock-up replacement or reconstruction until Architect's acceptance is obtained. Mock-up costs, including as many replacements or reconstruction as necessary to gain Architect's acceptance, shall be included in the Contract Cost and Schedule.

1.2 RELATED REQUIREMENTS

A. Section 01 45 00 - Quality Control.

B. Section 03 30 00 - Cast-in-Place Concrete.

C. Section 03 45 00 - Precast Architectural Concrete.

D. Section 04 20 00 - Unit Masonry.

E. Section 04 73 00 – Manufactured Stone Masonry.

F. Section 05 12 00 - Structural Steel Framing.

G. Section 05 40 00 - Cold-Formed Metal Framing.

H. Section 05 50 00 – Metal Fabrications.

I. Section 06 10 00 - Rough Carpentry.

J. Section 06 16 00 - Sheathing.

K. Section 07 21 00 - Thermal Insulation.

L. Section 07 27 13 - Modified Bituminous Sheet Air Barriers.

M. Section 07 46 46 - Mineral Fiber Cement Siding.

N. Section 07 62 00 - Sheet Metal Flashing and Trim.

O. Section 07 92 00 - Joint Sealers.

P. Section 08 52 00 – WOOD WINDOWS AND DOORS.

1.3 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Submit shop drawing of mockup indicating sizes, finishes and method of construction and installation of each component

1.4 GENERAL

A. As indicated on the Drawings or where requested by Architect, or as specified in individual specification sections, assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes. Remove mock-up assemblies prior to date of Final Inspection, or as directed.

B. Mock-ups, when approved by the Architect, will be used as datum for comparison with the remainder of the Work for the purposes of acceptance or rejection. Maintain mockup throughout construction period until Substantial Completion or as otherwise directed by Architect.

1. Finishes, colors and textures of components shall be as specified for each component and shall be selected by the Architect.

C. Demolish and remove from site prior to requesting inspection for certification of Substantial Completion, all Mock-ups which are not permitted to remain as part of the finished work.

1.5 COORDINATION

A. Coordinate work of trades and schedule elements to expedite the fabricating, furnishing, and installation of multiple component mock-ups specified herein, in other Sections of the Specifications, and as shown in the Contract Documents.

PART 2 - PRODUCTS

2.1 EXTERIOR WALL SECTION MOCK-UP

A. Mockup Unit: Shall consist of one full size facsimile exterior wall section, using specified products as noted below and indicated on the Drawings.

1. General description: Mockup unit shall include exterior masonry construction, with structural steel, light gage steel stud framing backup and sheathing assembly as well as concrete masonry unit backup. Mockup shall include all components specified and indicated which are typical to the exterior wall construction and additional components specified herein.

a. Fabricate mockup unit with brick and manufactured stone masonry as specified, with selected mortar and backup consisting of 8 inch metal studs, exterior sheathing board on both sides of studs and masonry backup both with specified anchors.

1) Provide additional metal stud framing and cross-bracing required for construction of various components of the mockup panel.
2) Provide concealed various wood blocking, edgings, nailers, curbs, and cants required for receipt of various finishes and surfacing materials.

b. Fabricate wood window unit with glazing.

c. Include into mockup assembly all flashing, joint sealers, and all finish trim and accessories necessary to show typical completed construction.

2. Finishes, colors and textures of components shall be as specified for each component and shall be selected by the Architect.

a. Provide window unit with specified insulated glazing.

B. Components to be included in the mockup include, but are not limited to:

1. Section 03 30 00 - CAST-IN-PLACE CONCRETE.

a. Provide a concrete foundation wall to a depth required to support wall mockup.

2. Section 04 20 00 - UNIT MASONRY.

a. Install manufactured stone masonry specified under Section 04 40 00 – STONE ASSEMBLIES.

3. Section 05 12 00 - STRUCTURAL STEEL FRAMING.

a. Provide structural steel support for mockup.

4. Section 05 40 00 - COLD-FORMED METAL FRAMING:

a. Provide cold formed metal stud framing with bracing for construction and support of the mockup panel.

5. Section 05 50 00 – METAL FABRICATIONS.

a. Provide galvanized steel lintels for openings in the mockup panel.

6. Section 06 10 00 – ROUGH CARPENTRY:

a. Provide wood framing and blocking at typical locations as part of mockup.

7. Section 06 16 00 - SHEATHING:

a. Install sheathing board, on both sides of metal stud framing, with taped joints and metal and membrane flashing.

8. Section 07 21 00 - THERMAL INSULATION:

a. Provide insulation over sheathing and stud cavities.

9. Section 07 27 26 – FLUID APPLIED MEMBRANE AIR BARRIERS:

a. Provide air barrier over sheathing and masonry backup including typical flashing conditions and transitional tie-ins to windows, storefront and curtain wall.

10. Section 07 46 46 - MINERAL FIBER CEMENT SIDING:

a. Provide typical mineral fiber cement siding and trim elements as part of mock up panel showing interface with adjacent materials.

11. Section 07 62 00 - SHEET METAL FLASHING AND TRIM:
    a. Provide typical metal flashing built into masonry construction.
12. Section 07 92 00 - JOINT SEALERS:
    a. Provide joint sealant at perimeter of all components. Colors shall be selected by the Architect.
13. Section 08 52 00 – ALUMINUM-CLAD WOOD WINDOWS: Provide fixed glass type windows, matching indicated window unit profiles and dimensions exactly.
    a. Fabricate with removable stop for installation of glass.
    b. Window to be enamel shop finished to match selected PVDF finish specified for aluminum windows, matching color and sheen.

PART 3 - EXECUTION

3.1 PREPARATION

A. Construct mock-ups at locations indicated or, if not indicated, at locations directed by the Architect.

B. Construct mockup in time to make product and/or assembly modifications without delaying production work.

3.2 INSTALLATION

A. Construct mockup to duplicate actual job conditions.
    1. Locate at an area on site as directed by the Architect.
    2. Provide foundations, bases, supports and braces adequate to make mockup stable and safe.

B. Provide weather protection for materials in mockups that are not exposed to weather in intended service.

3.3 REMOVAL

A. Retain mock-ups during construction as a standard for judging completed work until time designated by the Architect and the Owner,
    1. Completely demolish and remove mockups from the job site at time designated by Architect.
    2. Accepted mock-ups (which are specifically identified by the Architect to become part of the work) may be incorporated into the work provided they are not damaged during subsequent construction.

END OF SECTION 01 43 39

SECTION 01 45 00
QUALITY CONTROL

PART 1 - GENERAL

1.1 SUMMARY

A. General quality assurance and control of installation.

B. Site safety, worker safety and training.

C. Contractor's quality control (QC) program.

D. Source quality control.

E. Field samples and mock-ups.

F. Manufacturer's field services and reports.

G. Field quality control, Owner's right for confirmation.

1.2 RELATED REQUIREMENTS

A. Section 01 43 39 - MOCK-UPS.

B. Section 01 45 29 - TESTING LABORATORY SERVICES.

1.3 GENERAL QUALITY ASSURANCE AND CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including performance of each step in sequence. Notify Architect when manufacturers' instructions conflict with the provisions and requirements of the Contract Documents; obtain clarification before proceeding with the work affected by the conflict.

C. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate high standards or more precise workmanship.

D. Perform work by persons qualified to produce workmanship of specified quality.

E. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

1.4 SITE SAFETY, WORKER SAFETY AND TRAINING

A. General: The Contractor (and his Filed-Subcontractors) shall, at all times, exercise reasonable precautions for the safety of all persons. All rules, regulations, and laws concerning safety that are in effect at the work site, and in particular, all applicable

regulations of the Occupational Safety and Health Administration (OSHA) of the U.S. Government, in addition to specified requirements shall be complied with in all respects.

1. Contractor's responsibility for safety shall apply continuously twenty four (24) hours per Day during the term of this Contract and is not limited to normal working hours.

B. Contractor's safety program: Prior to commencement of the Work, the Contractor shall develop and implement a Safety and Health Plan to comply with the Occupational Safety and Health Administration (OSHA) standards for the Construction Industry and all other applicable Federal, State, local laws and regulations. Contractors Safety and Health Plan, and included health and safety procedures and policies, shall be submitted to the Architect and Owner's Representative within fifteen (15) Days after the date of Notice to Proceed and in no event later than commencement of the Work, whichever occurs first.

1. Perform pre planning to ensure access Is provided to Fire Department for all areas of the work site throughout the duration of the Contract. The Contractor shall provide the Fire Department site access maps, updated regularly, to reflect changes in the layout of the work site and shall notify the Fire Department when each update is made
2. Post and maintain, at prominent locations throughout the Project site, emergency telephone numbers and shall insure that all personnel on site are continuously aware of this information.
3. Ensure safe access to the Work for the Owner, Architect, Architect's consultants, their designated representatives, and all others charged with inspection, testing and monitoring of the Work, and visitors to the site. The Contractor shall furnish site visitors with safety equipment, test equipment, safety apparel and instructions that are required to insure their safety on site, and In the performance of their duties related to the Work of this Contract

C. All employees to be employed at the worksite will have successfully completed a course in construction safety and health approved by the United States Occupational Safety and Health Administration (OSHA) that is at least 10 hours in duration. The OSHA training and certification course shall occur at the time each employee begins work. Furnish documentation to Owner and Architect, for each employee documenting successful completion of the OHSA safety training and certification course. Submit with the first certified payroll report. Comply fully with all laws and regulations applicable to awards made subject to Massachusetts General Laws (MGL) Chapter 149, Section 44A.

1.5 CONTRACTOR'S QUALITY CONTROL PROGRAM

A. Procedures: Contractor and each subcontractor shall include all labor, materials, equipment, services and incidental items necessary to implement quality control procedures to the extent necessary to demonstrate and maintain compliance with the Contract Documents.

B. Quality Control Plan: Within 20 days after Notice to Proceed, the Contractor shall submit a Quality Control (QC) Plan to the Owner's Representative and Architect for approval. The plan shall address the following, as a minimum:

1. The Contractor's commitment to quality and implementing and managing the QC program.
2. Identification of the Contractor's onsite QC Manager, with name, qualifications, duties and responsibilities. The QC Manager shall have the authority to direct the removal and replacement of non-conforming work. The QC Manager shall be present for all QC meetings, inspections and tests during the project.
3. Procedures for addressing and commenting QC with Contractor's staff, all subcontractors and suppliers, and Owner, Architect and Owner's representative.
4. Procedures for review of submittals and submittal status, and documentation of same.
5. Procedures for pre-installation meetings and documentation of same.
6. Procedures for inspections of deliveries and documentation of same.
7. Procedures for benchmark inspections, defined as initial installations, and documentation of same.
8. Procedures for mockup inspections and documentation of same.
9. Procedures for equipment in place, inspections and documentation of same.
10. Procedures for inspections prior to closures of concealment and documentation of same.
11. Procedures for start-up and commissioning and documentation of same.
12. Procedures for turnover and documentation of same.
13. Procedures for identifying, recording, tracking correcting and reporting items requiring rework, using a Rolling Completion list chronological item number, phase area, date listed, description, party responsible for correction, date notified, and date corrected.
14. Procedures for testing and documentation of same.
15. Procedures for corrective action on Architect's Field Reports and Testing Agency reports and documentation of same.

C. Procedures for reporting on all of the above on a monthly basis as a condition precedent to review of the Contractor's application for payment.

1.6 SOURCE QUALITY CONTROL

A. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

B. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Product Labeling: Attach label from agency approved by authority having jurisdiction for products, assemblies, and systems required to be labeled by applicable code(s).

1. Label Information: Include manufacturer's or fabricator's identification, approved agency identification, and the following information, as applicable, on each label.

a. Model number.

b. Serial number.

c. Performance characteristics.

1.7 FIELD SAMPLES

A. Install field samples demonstrating quality level for the Work, at the site as required by individual specifications Sections for review and acceptance by Architect. Remove field samples prior to date of Final Inspection, or as directed.

1.8 MOCK-UPS

A. Comply with requirements of Section 01 43 39 - MOCK-UPS.

1.9 MOCK-UPS

A. Where requested by Architect, or as specified in individual specification sections, assemble and erect specified items, with specified attachment and anchorage devices, flashings, seals, and finishes. Remove mock-up assemblies prior to date of Final Inspection, or as directed.

B. Mock-ups, when approved by the Architect/Engineer, will be used as datum for comparison with the remainder of the Work for the purposes of acceptance or rejection.

C. Demolish and remove from site prior to requesting inspection for certification of Substantial Completion, all Mock-ups which are not permitted to remain as part of the finished work.

1.10 MANUFACTURER'S FIELD SERVICES AND REPORTS

A. When called for by individual Specification Sections, provide at no additional cost to the Owner, manufacturers' or product suppliers' qualified staff personnel, to observe site conditions, start-up of equipment, adjusting and balancing of equipment, conditions of surfaces and installation, quality of workmanship, and as specified under the various Sections.

1. Individuals shall report all observations, site decisions, and instructions given to applicators or installers. Immediately notify Architect of any circumstances which are supplemental, or contrary to, manufacturer's written instructions.
2. Submit full report within 30 calendar days from observed site conditions to Architect for review.

1.11 FIELD QUALITY CONTROL

A. The Owner reserves the right to take samples and perform, at random, tests of approved materials delivered to the job site to verify compliance of actual materials with specifications.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 45 00

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SECTION 01 45 29
TESTING LABORATORY SERVICES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section consists of the following:
1. Quality assurance.
2. Laboratory responsibilities.
3. Laboratory reports.
4. Limits on testing laboratory authority.
5. Contractor responsibilities.
6. Contractor submittals.
7. Schedule of inspections and tests.
8. Concrete in situ relative humidity, calcium chloride and acidity/alkalinity testing.

1.2 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.
1. ANSI/ASTM D 3740 - Standard Practice for Minimum Requirements for Agencies Engaged in the. Testing and/or Inspection of Soil and Rock
2. ANSI/ASTM E 329 - Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
3. ASTM F 1869 – Standard Test Method for Measuring Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
4. ASTM F 2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using In-Situ Probes
5. ASTM F 710 – Standard Practice for Preparing Concrete Floors and Other Monolithic Floors to Receive Resilient Flooring.

1.3 QUALITY ASSURANCE

A. Comply with requirements of ANSI/ASTM D 3740 and ANSI/ASTM E 329.

B. Laboratory: Authorized to operate in state in which Project is located.

C. Laboratory staff: Maintain a full time specialist on staff to review services. Provide registered Engineer on staff for all review of services related to structural testing.

D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either the National Bureau of Standards (NBS) Standards or accepted values of natural physical constraints.

1.4 LABORATORY RESPONSIBILITIES

A. Cooperate with Architect and Contractor in performance of services; provide qualified personnel promptly on notice.

1. Attend preconstruction conferences and progress meetings, as requested.

B. Acquaint Owner, Architect, and Contractor's superintendent with testing procedures and with all special conditions encountered at the site.

C. Perform specified Inspection, sampling, and testing of products and construction methods in accordance with specified standards as specified in individual technical specification sections:

1. Comply with specified standards, ASTM, ANSI, and other recognized authorities.
2. Conduct and interpret the tests and state in each report whether the test specimens comply with the requirements, and specifically state any deviations therefrom.
3. Obtain Contractor's written acknowledgment of each inspection, sampling, and test made. Test samples of mixes submitted by Contractor.
4. Ascertain compliance of materials and mixes with requirements of Contract Documents.

D. Promptly notify Architect and Contractor of irregularities, deficiencies, or non-conformance of Work or Products which are observed during performance of services.

E. Promptly submit written report of each test and inspection; one copy each to Architect, Owner, Contractor, and one copy to Project Record Documents File.

F. Perform additional inspections and tests required by Architect/Engineer.

1.5 LABORATORY REPORTS

A. After each test, promptly distribute directly from the testing laboratory, copies of laboratory report to:

1. Owner’s Project Representative.
2. Architect's office.
3. Consulting engineer's office.
4. Contractor's office.
5. Municipal Inspectional Services Department, if required.

B. Include in report the following information:

1. Date issued,
2. Project title and number,
3. Testing laboratory name, address, and telephone number.
4. Name and signature of laboratory inspector.
5. Date and time of sampling,
6. Record of temperature and weather conditions (as appropriate to test).
7. Identification of product and Specifications Section,
8. Location of sample or test in the Project.
9. Type of inspection or test.
10. Results of tests and compliance with Contract Documents.
11. Interpretation of test results, when requested by Architect.
12. Observations regarding compliance with Contract Documents

1.6 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of Work.

C. Laboratory may not assume any duties for Contractor.

D. Laboratory has no authority to stop the Work.

1.7 CONTRACTOR RESPONSIBILITIES

A. Coordinate and cooperate with laboratory personnel, provide access to Work, and to manufacturer's facilities.
   1. Monitor each inspection, sampling, and test.
   2. Provide Laboratory or Agency with written -acknowledgment of each Inspection, sampling, and test.
   3. Within 24 hours notify Architect and Owner in writing of reasons for not acknowledging Laboratory results.

B. Secure and deliver to the Laboratory or designated location, adequate quantities of representational samples of materials proposed to be used and which require testing, along with proposed mix designs.

C. Furnish incidental labor and facilities:
   1. To provide access to Work to be tested.
   2. To obtain and handle samples at the Project site or at the source of the Product to be tested.
   3. To facilitate inspections and tests.
   4. For storage and curing of test samples.

D. Furnish verification of materials and equipment compliance with Contract Documents.

E. Notify Architect/Engineer and laboratory 24 hours prior to expected time for operations requiring inspection and testing services.

F. Identify materials to be tested or inspected by Testing Laboratory or Agency.

G. After determination of need for testing or inspecting by Owner, notify Laboratory sufficiently in advance, minimum five days, of operations to allow for its assignment of personnel and scheduling of tests.

1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractors negligence.

H. Make arrangements with laboratory and pay for additional samples and tests required for the following conditions:

1. Initial testing indicates Work does not comply with Contract Documents.
2. Contractor requested testing for additional testing and laboratory services beyond specified requirements.

1.8 CONDUCT OF INSPECTIONS AND TESTS

A. The General Contractor shall notify the Owner, Architect, and Testing Laboratory a minimum of 72 hours before the performance of work to permit the proper conduct of Owner-authorized inspections and tests.

B. Representatives of Testing Laboratory will inspect the manufacture, assembly, and placement of materials as required and as authorized by the Owner, and report their findings to the Architect, Owner, and Contractor.

C. Work shall be checked as it progresses, but failure to detect any defective work or materials shall in no way prevent later rejection when such defect is discovered nor shall it obligate the Owner to accept such work.

1.9 SCHEDULE OF TESTING AND LABORATORIES BY OWNER

A. Except as otherwise specified, Owner will appoint, employ, and pay services of independent firm(s) to perform inspection and testing and other services specified herein, in individual specification Sections, and as additionally required by the Architect.

B. Requirements for testing, observations, and inspections are described in individual specification sections; the schedule provided below is not intended to completely describe all of the inspection and testing Work required for this Contract, and is only furnished as a guide.

1. Section 03 30 00 - Cast-in-Place Concrete: Concrete test cylinders

2. Section 04 20 00 - Unit Masonry Assemblies: One day per week observation of masonry installation, grout, mortar and prism testing.
    a. Three cylinders tested for compressive strength at 10 days; ASTM C 91 test.
3. Section 05 12 00 - Structural Steel Framing: Testing of welds of field and shop fabricated components. Testing of bolting.
    a. Bolt torque testing.
    b. Welding X-ray and ultrasonic tests as specified.
    c. Coating thickness of primer coats.
4. Section 07 84 00 - Firestopping: Testing and certification of density and thickness of installation.
5. Section 07 92 00 - Joint Sealants: Chemical analysis; adhesive strength; compatibility with adjacent materials; elasticity.
6. Section 09 91 00 - Painting: Chemical analysis; coating thickness

C. Concrete slabs and floors: Relative Humidity, Moisture Vapor Emission and acidity/alkalinity (pH)Testing:
1. Owner will employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the Contractor, flooring subcontractors and Owner's Project Representative.
    a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor is to be installed. This includes, but is not limited to:
        1) Resilient flooring.
        2) Painted floors and concrete sealers.
        3) Carpet.
    b. Perform moisture and pH tests on all concrete floors over-which stone flooring is to be applied.
2. Requirements: As specified under Part 3 of this Section.
    a. Submit 1 copy of test data to the installers of all flooring materials or coating materials scheduled to be installed.
    b. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

D. Special Tests and Inspections: Owner will engage a testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner.

1. Testing agency will notify Architect, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Testing agency will submit a certified written report of each test, inspection, and similar quality-control service to Architect[, through Construction Manager,] with copy to Contractor and to authorities having jurisdiction.
3. Testing agency will submit a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Testing agency will interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
5. Testing agency will retest and re-inspect corrected work.

1.10 SCHEDULE OF TESTING AND LABORATORIES BY CONTRACTOR

A. General Contractor shall employ and pay for services of an approved independent testing laboratory to perform inspection and testing specified under this Article and as additionally in individual specification sections

1. Submit to Architect/Engineer a minimum of three independent testing laboratories for each type of testing specified by individual specification sections and those required by the referenced applicable codes, regulations and standards.
2. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

B. Earthwork: Lab tests to determine suitability of all fill materials shall be paid for by Contractor.

1. Owner reserves the right to retain and pay for his own testing for checking purposes

C. Concrete Paving and General Concrete Work: Concrete mix design testing shall be paid for by Contractor. Owner reserves the right to retain and pay for his own testing for checking purposes.

D. Moisture content testing of interior and exterior wood prior to application of field painted coatings.

E. Local Authority Inspections: The Contractor is also responsible for coordinating and cooperating with local requirements for inspections by local Authorities.

F. Massachusetts Energy Code Witness Testing: The Contractor shall engage the services of Massachusetts registered professional mechanical and electrical engineers who shall perform witness testing of all HVAC, lighting and power distribution systems in accordance with the requirements of the Massachusetts Energy Code. The registered professional engineer shall prepare a final performance acceptance report in accordance with the code requirements and in a

form acceptable to the local code official. The actual testing shall be performed by the Contractor, his designated subcontractors or authorized manufacturers' representatives. All costs associated with the testing, witnessing of the testing and preparation of reports shall be part of the base contract bid.

1.11 SCHEDULE OF TESTING AND LABORATORIES BY SUBCONTRACTORS

A. Respective Filed-subcontractors shall employ and pay for services of an approved independent testing laboratory to perform inspection and testing specified under this Article and as additionally in individual specification sections

1. Submit to Architect a minimum of three independent testing laboratories for each type of testing specified by individual specification sections and those required by the referenced applicable codes, regulations and standards.
2. Employment of testing laboratory shall in no way relieve Contractor of obligation to perform work in accordance with requirements of Contract Documents.

B. Fire Protection System: At least the following tests shall be performed. Conform to requirements specified in individual Division 21 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor, Resident Project Representative and authorities having jurisdiction:

1. Fire protection system flushed and pressure tested.

C. Plumbing: At least the following tests shall be performed. Conform to requirements specified in individual Division 22 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor, Resident Project Representative and authorities having jurisdiction:

1. Water supply piping hydrostatic pressure test.
2. Sanitary piping test before fixture installation: Cap pipes and fill to highest point in system.
3. Plumbing fixture operation.

D. HVAC Testing: All HVAC work shall be tested by an independent testing and balancing agency, approved by Owner. Conform to requirements specified in individual Division 23 Specification Sections. The tests shall be performed and paid for by the subcontractor and witnessed by the Contractor, Resident Project Representative and authorities having jurisdiction. Adjustments shall be made by the subcontractors directed by the Owner. At least the following tests shall be performed:

1. Piping hydrostatic tests.
2. Air and water balancing.
3. Thermostat control monitoring and testing.
4. Boiler efficiency testing.
5. Energy Management System operation.

E. Electrical Power System Testing: At least the following tests shall be performed. Conform to requirements specified in individual Division 26 Specification Sections. The tests shall be performed and paid for by the subcontractor and witnessed by the Contractor, Resident Project Representative and authorities having jurisdiction:

1. Polarity tests.
2. Operation of all circuits.
3. Testing of emergency system.
4. Security systems.
5. Generation system.
6. Grounding systems.
7. Voice/Video/Data networking testing.

F. Electrical Lighting System Testing: Conform to requirements specified in individual Division 26 Specification Sections. At least the following tests shall be performed and paid for by the Filed-subcontractor:

1. Operation of every component of entire system.

G. Fire Alarm System Testing: At least the following tests will be performed. Conform to requirements specified in individual Division 26 Specification Sections. The test shall be performed and paid for by the subcontractor and witnessed by the Contractor, and Resident Project Representative:

1. All smoke and heat detectors.
2. Proper operation as required by authorities having jurisdiction.

H. Where no testing requirements are described but the Owner or Architect/Engineer decides that testing is required, testing will be performed under current pertinent standards for testing.

1.12 FOLLOW-UP AND CORRECTIVE ACTION

A. The Contractor and the Owner will note the test record on the Testing Log to acknowledge test procedures and results. If follow-up or corrective action is needed, the Contractor shall submit to the Owner two written copies of proposed follow-up or corrective plans and obtain the Owner's written approval before proceeding.

1. Cost of Testing: If tests indicate that materials or work do not comply with requirements, the Contractor shall pay for all retesting, and shall remove and replace non-complying work at no additional cost to the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONCRETE IN SITU RELATIVE HUMIDITY, CALCIUM CHLORIDE AND ACIDITY/ALKALINITY TESTING

A. Scope:

1. Provide in situ concrete relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings. Includes concrete placed as part of this Work which occurs below grade, above grade (suspended slabs), and slabs on grade.

   a. Existing building suspended slabs may be excluded from this requirement.

B. Scheduling:

1. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than one, nor more than three weeks prior to scheduled flooring installation.

   a. DO NOT conduct testing unless the slab environment is identical to that In which the finished flooring Is to be installed.

2. In the event new flooring is to be installed over existing resilient flooring, remove the portion of the existing flooring and adhesive directly under the area where testing will be conducted. Patch flooring to match existing construction after completion of testing.

C. Test result submittals:

1. Report all test results in chart form listing test dates, time, depth of test well, in situ temperature, relative humidity, moisture vapor and pH levels.
2. List test locations on chart and show same on marked up Floor Plan Drawings.
3. Submit results In duplicate. Deliver copies directly to Architect, Owner's Project Representative and General Contractor.

D. Testing equipment: shall be equal to the following

1. For relative humidity testing:

   a. Digital Meter and Calibrated Humidity and Temperature probe kit as manufactured by Vaisala Inc. (Boston Office) 10D Gill Street, Woburn, MA, 01801 (telephone 781-933-4500).

      1) Minimum 2 point probe calibration.

2. For calcium chloride testing:

   a. Anhydrous calcium chloride testing in accordance with Rubber Manufacturer's Association (RMA) Test requirements.
   b. Test kits: Vaprecision, inc. 2941 West MacArthur Boulevard, Suite 135. Santa Ana, CA 92704 (telephone 800-449-6194).

3. For pH testing:
   a. pH test paper by Micro Essential Laboratory, Inc., P.O. Box 100824 4224 Avenue "H", Brooklyn, NY 11210, (telephone 718-338-3618).
   b. Distilled or de ionized water.

E. Testing Procedures Quantification of Relative Humidity
1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F), and 50 percent (plus or minus 10 percent) relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be Included with the test report.
2. The number of In situ relative humidity test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.
3. Drill test holes utilizing a roto hammer drill. Hole diameter shall not exceed outside diameter of the insertabie test sleeve by more than 0.04 inch. Drilling operation must be dry. Determine the thickness of the concrete slab from Construction Documents. Depths of test holes shall be as follows:
   a. For elevated slabs (not poured in pans): Drill test holes to a depth equal to 20 percent of the concrete thickness.
   b. For slabs on grade and elevated slabs in pans: Drill test holes to a depth equal to 40 percent of the concrete thickness.
4. Vacuum all concrete dust from test hole.
5. Insert a hole liner, or sleeve, to the full depth of test hole, assuring that the liner is capped or plugged at the end protruding from the concrete surface.
6. Permit the test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.
7. Remove the sleeve plug and place a probe into the sleeve assuring that it reaches the bottom of the test hole.
8. Allow the probe to sit in the test sleeve for 30 minutes before taking readings.
9. Read and record temperature and relative humidity at the test site.

F. Testing Procedures - Quantification of Concrete Moisture Vapor Emission through Calcium Chloride Testing.
1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative

humidity (plus or minus 10 percent). When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.

2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 In the first 1.000 square feet and I per each additional 1,000 square feet.
3. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials. 24 hours prior to the placement of test kits.
4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.
5. Expose Calcium Chloride and set dish on concrete surface.
6. Install test containment dome and allow test to proceed for 60 to 72 hours.
7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.
8. Weigh test dish on site recording weight and stop time.
9. Calculate and report results as pounds of emission per 1,000 square feet per 24 hours."

G. Testing Procedures Quantification of Acidity/Alkalinity (pH) Level

1. At or near the relative humidity test site and each vapor emission (calcium chloride) test site, perform pH test.
   a. At each testing site, lay down a loose 2 foot by 2 foot sheet of rubber flooring or non perforated polyethelene sheet backed by plywood. Leave in place for 48 hours.
   b. Remove rubber sheet/polyethelene and place several drops of distilled or de ionized water onto the concrete surface to form a puddle approximately 1 inches in diameter.
   c. Allow the water to set for approximately 60 seconds.
   d. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading
2. Record and report results.

H. Testing Procedures:

1. Initial testing: Provide 3 tests for the first 1,000 square feet.
2. Add one test for each additional 1,000 square feet.
3. Concrete surface area to be tested shall be completely clean. Remove all adhesives, residue, debris and sealing compounds. Remove all dust by vacuum or other methods. Do not use chemicals of any kind to clean concrete.
4. Perform moisture tests in strict accordance with the kit manufacturer's Instructions. Moisture tests shall remain undisturbed for 60 to 72 hours.

5. Immediately after moisture test has been removed from test area, conduct pH test in area previously covered by plastic dome of moisture test kit.
6. After completion of tests submit 2 copies of test data to the Architect. Submit a copy of the test data to all installers of flooring materials and resinous flooring materials scheduled to be installed.
7. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

END OF SECTION 01 45 29

SECTION 01 50 00
TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. General requirements for temporary facilities and controls.

B. Temporary utilities.

C. Construction facilities.

D. Temporary construction.

E. Construction aids.

F. Vehicular access and parking.

G. Temporary barriers and enclosures.

H. Site and environment controls.

I. Fire prevention measures.

J. Security measures.

K. Project identification and temporary signage.

L. Removal of temporary utilities, controls, and facilities.

1.2 RELATED REQUIREMENTS

A. Division 31 – EARTHWORK: erosion and sedimentation control.

1.3 GENERAL REQUIREMENTS

A. The General Contractor shall provide and maintain all temporary facilities, controls, and construction aids as specified herein until they are replaced by permanent work, or until Project Substantial Completion, as appropriate.

1. Additional temporary facilities and controls which may be specified under individual Filed Sub-bid sections are the responsibility of the respective Filed Subcontractors.

2. Temporary facilities removed from the Project shall remain the property of the Contractor, except as otherwise specified.

B. Except where specifically noted otherwise, cost or use charges for temporary facilities, utility services, controls, and construction aids and similar items specified in this Section or as required to perform the Work, are not chargeable to the Awarding Authority or Architect, and will not be accepted as a basis of claims for a Change Order.

C. Establish and initiate use of each temporary facility at time first reasonably required for proper performance of the Work. Terminate use and remove facilities at earliest reasonable time when they are no longer needed, or when permanent facilities have, with authorized use, replaced the temporary facilities.

1. Locate temporary facilities where they will serve Project adequately and result in minimum interference with performance of the Work.

1.4 SUBMITTALS

A. Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.
2. Schedule showing implementation and termination of each temporary utility within 15 days of commencement of the Work.
3. Shop drawings:
   a. Temporary signage.
   b. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel, fence and gate locations, temporary field offices, and all other equipment, storage and facilities required for the completion of Work.

1.5 REFERENCES

A. Comply with applicable requirements of the following standards and those others referenced in this Section, under the provisions of Section 01 42 00 - REFERENCES. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. ANSI A 10 - Safety Requirements for Construction and Demolition.
2. NFPA 70 - National Electrical Code.
3. NFPA 241 - Building Construction and Demolition Operations.

1.6 TEMPORARY WEATHER PROTECTION

A. Weather Protection Standards: The following weather protection standards pursuant to Sections 44F and G of Chapter 149 of the General Laws, are hereby incorporated into this specification, and shall be considered supplementary to the temporary heating and temporary enclosure requirements specified elsewhere in this Section and in individual specification Sections.

1. Limitation of Weather Protection Standards: Under the provisions of Chapter 149, Section 44F(1) and Section 44G, Para. D, of the Massachusetts General Laws (MGL), General Contractors are required to provide weather protection to allow building construction to be carried on between the dates of November 1 to March 31 (inclusive).
   a. These standards do not require enclosures for heat for operations that are not economically feasible to protect in the judgment of the Awarding

Authority; including for example, site work, excavation, pile driving, steel erection, erection of certain exterior panels, roofing and the similar construction elements.

2. Definition of Weather Protection: "Weather Protection" means temporary protection of work which may be adversely affected by moisture, cold, heat, and wind by the use of temporary covers, enclosures, and heat. Maintain at least the minimum temperatures specific. Comply with specific requirements which are specified within individual Specification Sections.
    a. Temperature at the working surface shall be at least forty degrees Fahrenheit (40 degrees F). This provision does not supersede any specific greater requirements for methods of construction of curing of materials.
3. General Contractors Responsibilities:
    a. The General Contractor shall furnish and install all "weather protection" Both (exterior and interior) during the time period from November 1 to March 31 (inclusive). The General Contractor is responsible to ensure that protection is provided for the building INTERIOR and all materials and equipment from weather at all times (year round).
    b. At completion of work, the General Contractor shall remove temporary weather protection and restore all surfaces to first class condition.
4. Filed Subcontractors Responsibilities: Individual Filed Sub-Contractors are responsible for all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions during NON-WINTER months. NON-WINTER period is from April 1 to October 31 (inclusive).
5. Proposed Plan: The General Contractor shall within 30 calendar days after Award of Contract, submit three copies of a typewritten proposed plan for "Weather Protection" and obtain the Architect's and Owner's written approval.
6. Reporting Requirements:
    a. Within thirty calendar days after Contract award, the General Contractor shall submit in writing to the Owner for approval, three copies of its proposed plan for weather protection.
    b. The General Contractor shall furnish and install accurate Fahrenheit thermometers at places designated by the Owner to determine whether the required temperature is being maintained.
7. Weather protection materials, equipment, and the installation thereof, shall comply with all the safety rules and regulations including provisions for adequate ventilation and fire protection devices.
8. Use of Permanent Heating System(s): The General Contractor may choose, if the Owner approves, to use the permanent heating system for temporary heat after the building is enclosed and the system has been tested and is ready to operate.
    a. The General Contractor shall thoroughly clean and restore to first class condition, acceptable to the Owner, all portions of the permanent heating system that are used for heating during construction.

b. Use of the permanent heating system for weather protection shall not affect any heating system guarantee that may be due to the Owner; such guarantee shall begin to run only when the Owner accepts the building.

B. Additional weather protection requirements: The General Contractor is responsible to ensure that the protection is provided by for the building interior and all materials and equipment from weather at all times (year round).

1. Where removal of existing roofing, roof sheathing, windows, doors, and other items is necessary to accomplish work, have materials and workmen ready to provide adequate and approve temporary covering of exposed areas.
2. Temporary coverings shall be attended as necessary to insure effectiveness and to prevent displacement.
3. Contractor shall repair or replace all elements of the building damaged by failure to properly protect them from the weather to the satisfaction of the Architect at no additional cost to the Owner.

1.7 TEMPORARY UTILITIES, GENERAL REQUIREMENTS

A. General Installation: Install temporary utility service(s), or connect to existing service(s) as indicated, and as specified. Comply with all applicable laws, regulations, and requirements of authorities having jurisdiction.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.8 TEMPORARY UTILITIES, ELECTRICITY

A. Temporary electricity: The Owner will pay for electrical energy required for temporary light and power. The Contractor is required to hire an electrician licensed where project is located to provide temporary feeders of sufficient capacity from the facility's power lines, at the point coordinated with the Owner, to furnish electric light and power requirements for the work, while under construction.

1. Metering: The Owner reserves the right to require separate metering and for the Contractor to pay for electricity used, if, in the Owner's opinion, electricity is being wasted.
2. Electric power service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.
   a. Heavy electrical loads such as welding and other equipment with similar special power requirements must be powered by individual installers using portable electric generators at each users own cost.
      1) Except as otherwise specifically provided, all additional costs resulting from such use shall be borne by the Contractor.
3. Distribution: A grounded receptacle (outlet) for an extension cord shall be provided by the Electrical Filed-Subcontractor within one hundred (100) feet

of any part of the building. Individual users are responsible for their own work lamps and extension cords.

1.9 TEMPORARY UTILITIES, LIGHTING

A. Temporary lighting: Provide lighting with local switching to fulfill security requirements and provide illumination for construction operations and traffic conditions. Maintain lighting and provide routine repairs.

1. Maintain a minimum lighting intensity of at least one 200 watt lamp per 1000 square feet of floor area of building. Provide higher lighting intensities necessary for finish work or special construction operations, when required.
2. Permanent building lighting may be utilized. Immediately prior to the Architect's inspection for substantial completion the Contractor is required to replace all used lamps which are broken or have burned out.
3. Install and operate temporary lighting with switching that fulfills security and protection requirements without operating entire system.

1.10 TEMPORARY UTILITIES, LIGHTING

A. Temporary lighting: The Electrical Subcontractor shall provide lighting with local switching to fulfill security requirements and provide illumination for construction operations and traffic conditions. Maintain lighting, replace broken lamps and provide routine repairs.

1. Temporary lighting shall be based on the following requirements:
   a. Rooms or spaces under 250 square feet: Two 100 watt lamps.
   b. Rooms or spaces over 250 square feet and under 500 square feet: Four 100 watt lamps.
   c. Rooms or spaces 500 square feet and over: Two 200 watt lamps for spaces 500 to 1000 square feet, and two 200-watt lamps for every additional 1000 square feet or fraction thereof.
   d. Provide sufficient additional fixtures and lamps to insure proper lighting in stairwells, corridors and passage areas.
2. Lamps: The Electrical Subcontractor shall furnish and install all lamps, both initial and all required replacements until the date of Substantial Completion.
3. Use of Permanent lighting fixtures.
   a. Permanent building lighting may be utilized during construction.
   b. Permanent lighting fixtures which have been used during Construction shall be thoroughly cleaned by the Electrical Subcontractor.
   c. Immediately prior to the Architect's inspection for Substantial Completion the Electrical Sub-contractor is required to replace all lamps, which are broken, burned out or are producing reduced light output (darkened).

B. Protective night lighting is required at all times (24 hours a day, seven days a week). General Contractor is required to arrange for adequate outdoor lighting to illuminate staging, stockpiles, trenches, dangerous projections, excavations and similar conditions and as additionally required to protect the safety of workmen, other personnel, and the public and as an aid in the protection against theft and vandalism.

1. Shield lighting to protect overflow beyond Contract limits, protect neighbors from night light overflow.

1.11 TEMPORARY UTILITIES, TELEPHONE

A. Temporary telephone service: Provide telephone service at time of project mobilization, and pay all costs for installation, maintenance, and removal. The General Contractor shall pay service charges for local calls; toll charges shall be paid by party who places call. Service and equipment required includes the following:

1. For Awarding Authority's Representative's Field Office General Contractor shall provide:

a. One direct line service dedicated for use by the Architect, Awarding Authority's Project Representative, the Architect's engineering consultants and other authorized agents of the Awarding Authority.

b. One touch tone phone having hands-free speaker (teleconference) capability, 25 foot length coiled cords connecting instrument base with receiver, and 10 feet length cords connecting instrument base with wall receptacle.

2. For Contractor's Field Office:

a. Provide one direct line service dedicated for use by the Contractor, Filed-Subcontractors, and personnel engaged in construction.

b. One answering machine or phone service with messaging.

c. One (direct) separate line for facsimile (FAX) machine.

d. Cellular (mobile) phone service for Contractor's Superintendent, continuously maintained until Project Substantial Completion.

e. Other instruments at the option of the Contractor, or as additionally required by Authorities having jurisdiction.

B. Temporary internet service: Provide internet service at time of project mobilization, and pay all costs for installation, maintenance, and removal. The General Contractor shall pay service charges through date of Substantial Completion.

1. For Awarding Authority's Representative's Field Office, General Contractor shall provide and maintain internet access consisting of digital signal 1 (T1), digital subscriber line (DSL), cable or, Fiber-Optic Service (FiOS) services, (dial-up modem service is not acceptable). Internet service shall include e-mail account allowing a minimum of 5mb attachments to ensure exchange of all construction related e-mail to the Architects/Owner's Representative's Field Office.

2. For Contractor's Field Office, General Contractor shall provide and maintain internet and email service. Internet service shall include e-mail account allowing a minimum of 5mb attachments to ensure exchange of all construction related e-mail to Contractor's field office.

1.12 TEMPORARY UTILITIES, WATER

A. Temporary water: Install and maintain water service and distribution piping of sizes and pressures adequate for construction. Provide hose bibs located so that water is available throughout the construction by the use of hoses.

1. Exercise measures to conserve water, Awarding Authority will pay for water necessary for the Work. The Awarding Authority reserves the right to require separate metering and for the Contractor to pay for water used, if, in his opinion, water is being wasted.

2. Protect piping and fittings against freezing.

1.13 TEMPORARY HEATING AND COOLING

A. General, 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.

B. Temporary heat: 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. Heating Units: UL 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.

a. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

b. Vent heaters directly to outside air, in areas where concrete is less than 15 days old.

2. In enclosed areas, maintain a minimum temperature of 50 degrees Fahrenheit; provide higher temperatures where required by individual specification sections. General Contractor is required to provide enclosures necessary to maintain specified temporary heat.

3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system. Coordinate with work of Division 23, Heating Ventilating and Air Conditioning (HVAC). Replace all air filters immediately prior to occupancy.

1.14 TEMPORARY VENTILATION AND HUMIDITY CONTROL

A. General:

1. Humidity Control: Monitor and regulate relative humidity as required for the installation of all interior products. Relative humidity shall be maintained within the limits set by manufacturers of all interior materials and equipment. Refer to individual specification sections in Divisions 6, 8, 9, 10, 11 and 12 for additional environmental requirements.

   a. Contractor shall enclose interior work areas, protect from weather, and maintain specified temperature and humidity prior to commencement of construction activities relating to interior finishes.

2. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases. Extend and supplement equipment with temporary fan units as required to maintain clean air for construction operations.

B. Monitor Humidity: Provide Hygrometer to measure temperature and relative humidity in each construction area.

1. Provide dehumidifier(s), as required to maintain humidity of enclosed areas below 70 percent. Humidity level shall be maintained in all areas where interior finish work is being performed, and all areas where interior finishes has been completed.

2. Provide fans as specified herein, and as required to eliminate significant variation in humidity levels within enclosed spaces.

C. Temporary Construction Ventilation: Contractor shall maintain sufficient temporary ventilation of areas where materials are being used that emit VOC's and maintain ventilation continuously during installation and until emissions dissipate after installation. If continuous ventilation is not possible via the building's HVAC system(s) then Contractor shall supply ventilation via open windows and temporary fans, sufficient to provide no less than three air changes per hour.

1. Vent all areas directly to outside. Areas shall not be vented to other enclosed areas.

2. During dust producing activities (e.g. drywall installation and finishing) Contractor shall turn off ventilation system and protect openings in supply and return HVAC system from dust infiltration. Provide temporary ventilation as required.

3. Dissipation of VOC's: The period after installation shall be sufficient to dissipate odors and elevated concentrations of VOCs. A minimum time period of 72 hours is required except where longer periods of time are specified under individual specification sections.

D. Preconditioning: Prior to installation, Contractor shall allow products which have odors and VOC emissions to off-gas in dry, well-ventilated space outside of

building for 14 calendar days, in order to allow for reasonable dissipation of odors and emissions.

1.15 FIELD OFFICES AND SHEDS

A. General:

1. . Designated existing spaces in the current Foxborough Town Hall shall be used for field offices and for storage. Refer to attached floor plan. Relocate offices to designated spaces in new building prior to demolition of existing Town Hall and without interruption of the Work.
2. Provide offices ready for occupancy within 15 days after date fixed in Notice to Proceed.
3. Offices and sheds located within the construction area, or within 30 feet of building lines shall be of noncombustible construction. Comply with requirements of NFPA 241. Access to trailer shall conform to Massachusetts Regulation 521 CMR – Architectural Access Board. *[*
4. General:
   a. Contractor shall provide periodic cleaning and maintenance of field offices and storage areas.
   b. Provide air conditioning and heating to maintain a temperature range of 65 to 78 degrees F.
   c. Provide sufficient lighting for 50 foot candles at desk top level over 100 percent of floor area.
   d. Excluding computer, computer software and related equipment; all other non-consumed furnishings and equipment, will be returned to contractor upon project completion.

B. Contractor's field office(s): Provide habitable office(s) or space, of size to accommodate personnel, include as a minimum the following:

1. Size: Contractor field office shall be not less than 12 by 50 foot long office trailer. Sectioning of trailer shall be as required by Contractor. Each section of trailer shall have direct access to an exterior locking door and a communicating door.
2. Furnishings:
   a. Conference table and chairs to seat at least 12 persons;
   b. Racks and files for Contract Documents, submittals and Project Record Documents.
3. Outdoor weather thermometer.
4. Hard-hats for site visitors.
5. Duplex convenience outlets, at least one per wall.
6. Telephone service as specified herein above.
7. Other equipment and furniture as the Contractor deems necessary.

C. Clerk of Worksfield offices: Provide separate lockable space, minimum 150 square feet, for sole use of Clerk of Works, with separate entrance door with new lock and two keys. Provide office furnished, insulated, weathertight, and habitable, with the following equipment and furniture:

1. Telephone and internet service as specified herein above.
2. Desk and chair.
3. Drawing rack.
4. Drawing reference table.
5. Coat rack.
6. Four drawer file cabinet.
7. Book shelves, minimum 8 linear feet, 12 inches deep.
8. Indoor and outdoor thermometer(s).
9. Water cooler/hot water dispenser with contract for water and paper supplies for the duration of the project.
10. Computer (with internet access as specified herein above): Provide one (1) computer workstations having the following features, or approved equivalent:
    a. Processor: 3rd Gen IntelCore i7 (3.1 Ghz)..
    b. Memory: 8 GB DDR2-800MHz dual channel SDRAM (4x1024).
    c. Monitor: 22 inch widescreen flat panel.
    d. High-performance graphic card: 1 GB.
    e. Hard Drive: 320GB 7200 rpm SATA 3.0 Gb/s NCQ
    f. Optical Drive: 16x speed DVD Read/Write drive.
    g. Keyboard: Extended wireless keyboard.
    h. Mouse: Wireless mouse & mouse pad
    i. Operating System: Latest Windows Professional Operating System.
    j. Corporate Software: Microsoft Business Professional Full Package with Adobe Acrobat (Latest versions).
    k. Norton Anti-Virus Software:
    l. Network Card: PCI based network card, 10/100 capable.
    m. UPS (uninterrupted power supply).
    n. Service Program: (maintained until date of Substantial Completion with transfer to Owner for continued maintenance service). 3 Year Parts & Labor Limited Warranty with 3 years on-site service with response time within 24 hours of notice.
11. All-In-One printer/copier/scanner/fax machine, color printing, copy/print up to 11 by 17 paper, WIFI accessible and compatible with furnished temporary computer. Provide pertinent connecting cables (internet, USB, phone cord, etc), driver software and all required ink, toner, paper required for the duration of the project.

12. Furnish supplies required to maintain OPM's for duration of project, including, but not limited to the following:
    a. Fax machine, copiers, printers: Maintain toner, ink, and paper supplies for the project duration
    b. Assorted stationery accessories, such as loose file holders and file folders
    c. Drinking Water: Provide bottled water for water dispenser in 6-gallon bottles, delivered as necessary to avoid running out, and supply of flat bottom cups for duration of project.
    d. Lamps: Incandescent bulbs and fluorescent lamps of appropriate types and wattage for the overhead light fixtures.
    e. Office supplies: Provide office supplies for duration of Project. Supplies include, but are not limited to: paper, pens, file folders, staplers and staples, heavy duty stapler and staples, heavy duty hole punch, scissors, paper clips, and 3-inch three-ring binders.
13. Other furnishings and equipment as required by Awarding Authority.

D. Storage and fabrication sheds: Provide as required, sheds, equipped to accommodate materials and equipment involved.
    1. Subcontractor's are responsible for their own storage facilities, coordinate locations.

E. Maintain approach walks to field office and storage/fabrication sheds free of mud, water, and snow.

F. When permanent facilities are enclosed with operable utilities, relocate offices and storage into building, with written agreement of Awarding Authority Owner, and remove temporary buildings.

1.16 SANITARY FACILITIES

A. Sanitary facilities: Provide self-contained single-occupant chemical toilet units, wash facilities and drinking water fixtures.
    1. Locate sanitary facilities within the fenced construction zone.
    2. Permanent facilities located in completed work may not be used by the Contractor's personnel.

B. Provide toilet tissue, paper towels, paper cups, cleaning compounds and similar materials.

C. Maintain facilities, through-out term of construction, and keep clean, provide covered waste containers for used material.

1.17 CANTEEN SERVICES

A. Canteen vehicles must access the worksite at predetermined times coordinated with the Owner, and are limited to service within the construction site only.

1.18 FIRST AID AND FIRE EXTINGUISHERS

A. First aid supplies: Comply with governing regulations.

B. Fire extinguishers: Provide and maintain on site, adequate fire extinguishers UL rated for A-B-C type fires. Provide red-painted plywood standards for each extinguisher. Additionally provide a dry chemical fire extinguisher at each location where welding, torch cutting and other similar hazardous work is in progress.

1. At welding and heat cutting work: Provide not less than a Multi-purpose dry chemical type (mono amonium phosphate) fire extinguisher, 20 pound capacity, multi-purpose rated "2A, 120 B:C".

1.19 CONSTRUCTION AIDS - USE OF PERMANENT ELEVATORS

A. Temporary use of elevator(s): Use of the permanent elevators during construction for the transportation of personnel and material shall not be permitted.

1.20 CONSTRUCTION AIDS - TEMPORARY HOISTS AND CRANES

A. Hoisting equipment and machinery: Furnish all hoisting equipment, crane services and lift machinery required to perform the Work of this Contract, except that required by Filed-subcontractors. Install, operate and maintain in safe condition.

1. Do not charge applicators and installers for these services during normal working hours.

2. Filed sub-contractors are responsible for their own hoisting equipment, crane services and lift machinery required to perform the Work of their respective trade.

1.21 CONSTRUCTION AIDS - SCAFFOLDING, PLATFORMS, STAGING, CHUTES

A. Provide all ladders, ramps, runways, platforms, railings, chutes, and other mounted or installed construction aids as specified herein and as required to facilitate the Work. Furnish and erect construction aids and maintain in safe condition for the use of all subcontractors, installers and applicators.

B. Furnish and erect scaffolds, staging, and maintain in safe condition, dismantle when no longer required. The General Contractor and Filed Sub-contractors shall provide scaffolds, staging, and other similar raised platforms, required to access the Work per the following guidelines:

1. Scaffolding required for used by Filed Sub-contractors, 8 feet in height and less, shall be furnished, erected, maintained, and dismantled, by the Filed Trade requiring such scaffolding.

2. Scaffolding required for used by Filed Sub-contractors, above 8 feet in height shall be furnished, erected, maintained and dismantled by the General Contractor.

3. Scaffolding of any height, required for used by installers and applicators of non-filed trades, shall be furnished, erected, and maintained by the General Contractor.
4. General Contractor is responsible to provide, maintain and remove when no longer required, all tarpaulins and enclosures necessary to cover scaffolding (including that furnished by Filed Subcontractor) to maintain specified temporary heat as specified herein under Article entitled "TEMPORARY WEATHER PROTECTION" from the dates of November 1 to March 31.
5. Enclose all exterior scaffolding outside of the construction fence with 8 foot height plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

C. Ladders, temporary stairs, platforms and railings, shall comply with OSHA guidelines.
1. Provide and maintain temporary stairs until permanent stairs are in place and functional. When permanent stairs are erected, provide temporary railings and guards. Protect permanent stairs with temporary covers and protective treads.
2. Portable ladders and mobile platforms of all required heights, shall be provided by individual users.

D. Temporary chutes: Provide, erect, and maintain properly supported and covered chutes from openings in exterior walls of each building level in convenient and accessible locations for use of all trades, that will permit direct disposal of rubbish and debris directly into trucks or disposal units.
1. Do not drop or throw any materials, rubbish, or debris from openings in the exterior walls of the project, or from roof.

1.22 VEHICULAR ACCESS AND PARKING

A. Vehicular access: Construct temporary all-weather access roads from public thoroughfares to serve construction area, of a width and load bearing capacity to provide unimpeded traffic for construction purposes.
1. Construct temporary bridges and culverts to span low areas and allow unimpeded drainage.
2. Extend and relocate as Work progress requires, provide detours as necessary for unimpeded traffic flow.
3. Locate access roads where acceptable to Architect.

B. Provide and maintain access to fire hydrants free of obstructions. Provide unimpeded access for emergency vehicles. Maintain 20 foot width driveways with turning space between and around combustible materials.

C. Snow and ice removal: Maintain all vehicular and pedestrian access roads and walkways free from ice and snow during the winter season for the duration of the Project.

D. Towing Services: Make arrangements to have illegally parked and stopped vehicles towed. Post conspicuous warning signs. Obtain approval of signs from authorities having jurisdiction.

E. Vehicular Parking:

1. Construct temporary parking areas to accommodate use of construction personnel.
2. When site space is not adequate, provide additional off site parking.
3. Locate parking areas where acceptable to Architect.

F. Prior to Substantial Completion, the installed base for permanent roads and parking areas may be used for construction traffic.

1. Avoid traffic loading beyond paving design capacity.
2. Permanent parking structures and final paved areas may be used by construction personnel on execution of agreement with Awarding Authority.

1.23 VEHICULAR TRAFFIC CONTROL

A. The Contractor shall not close or obstruct any portion of any street public or private, without obtaining permits therefore from the proper authorities.

1. Provide and pay for police traffic details at anytime that construction takes place in a public street (right of way). The Contractor is responsible for coordinating, requesting. and paying the prevailing rate of wage for police traffic details directly with the Foxborough Police Department.

B. Construction parking control: Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Awarding Authority's operations, or construction operations.

1. Monitor parking of construction personnel private vehicles . Maintain free vehicular access to and through parking areas. Prohibit parking on or adjacent to access roads, or in non-designated areas.

C. Vehicle and Equipment Security: Lock all unattended vehicles including construction machinery and equipment. Do not leave vehicles or equipment unattended accessible to public with the motor running, or with keys easily accessible.

D. Haul routes: Consult with governing authorities and establish public thoroughfares which will be used as haul routes and site access. Confine construction traffic to designated haul routes.

1. Confine construction traffic to designated haul routes.
2. Provide traffic control at critical areas of haul routes to expedite traffic flow and to minimize interference with normal public traffic.

E. Traffic signals and signs: Provide, operate and maintain temporary equipment, services, and personnel, with traffic control and protective devices, as required to

direct and maintain an orderly flow of traffic in all areas under Contractors control, or affected by Contractors operations, including but not limited to haul routes, at site entrances, at on-site access roads, and parking areas during construction.

1. Provide traffic control and directional signs, mounted on barricades or standard posts as needed to direct construction and public traffic, including but not limited to:
   a. At each change of direction of a roadway and each crossroad.
   b. At detours.
   c. At parking areas.
   d. At entrance points onto public roads.
2. Provide traffic signal and detour signs with breakaway post assemblies conforming to the applicable provisions of the Standard Specifications.
3. Provide automatic traffic control signals where required by local authorities having jurisdiction.
4. Provide traffic cones and drums as required to maintain orderly flow of traffic.
5. Provide flares and lights during periods of low visibility to clearly delineate traffic lanes and to guide traffic.

F. Provide areas of illumination of critical traffic and parking areas.

1.24 DUST CONTROL

A. Provide positive means to prevent air-borne dust from dispersing into atmosphere.
   1. Take all necessary measures and provide equipment and materials to minimize dust from rising and blowing across the site and also to control surface water throughout the operation so that it does not run onto paved ways without being filtered. Control all dust created by construction operations and movement of construction vehicles, both on site and on paved ways.
   2. During the progress of the work, maintain the areas of construction activities including sweeping and sprinkling of streets as necessary. Provide and use calcium chloride for more effective dust control, when deemed necessary by regulatory agencies, without additional cost to the Owner.

B. Construction Entrances: Stabilized construction entrances shall be installed at all points of access to reduce or eliminate tracking or flowing of sediment onto the town roads in accordance with the following criteria:
   1. Provide nominal 1 to 2-1/2 inch washed crushed stone, minimum 8 inches thick.
   2. Construction entrance shall be as wide or wider than all points of ingress and egress.
   3. Washing vehicle wheels before traveling on paved ways.
   4. Provide temporary swales and interceptor ditches to control runoff water where necessary.

C. Prevent air-borne dust from dispersing into ducts (air supply and return) during construction. Seal all open ends of completed ductwork, and overnight work-in-progress. Inspect ducts on daily basis to ensure seals are intact. Protect ductwork waiting, to be installed with surface wrapping.

1. Ductwork protection during construction is a joint responsibility between the General Contractor and HVAC Filed-subcontractor.
2. HVAC Filed-subcontractor is responsible to wipe down internal surfaces of ductwork immediately prior to installation to remove all dust and debris.

D. Prevent air-borne dust from dispersing into occupied spaces (after partial Owner-occupancy, if occurs). Provide interior dust-tight temporary partitions as specified under the Article entitled “Interior enclosures”.

1. Provide air filters over openings and grilles in air-return ducts occurring within construction areas.
2. Provide openings in temporary partitions where air-return grilles occur outside of work areas. In each opening, provide standard 2 inch thick, throw-away type filter having a rated efficiency of 35 percent. Review with Architect size requirements of filtered openings, locations of openings and how many are required.
3. Replace air filters as required to maintain their efficiency.

1.25 NOISE CONTROL

A. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum.

B. Execute construction work by methods and by use of equipment which will reduce excess noise.

1. Equip air compressors with silencers, and power equipment with mufflers.
2. Manage vehicular traffic and scheduling to reduce noise

C. Interior work involving cutting, drilling, hammering or noise generating procedures shall be completed during times schedule with the User Agency Owner in advance.

1.26 TEMPORARY BARRICADES

A. Provide barriers and barricades to prevent unauthorized entry to construction areas.

1. Comply with standards and code requirements for erection of barricades, where required provide lighting, including flashing lights.
2. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against.
3. Provide special barriers necessary to protect entrances and areas around building and to prevent persons from coming in contact with material or construction operations.

B. Provide temporary enclosures, as required, for protection of construction from exposure to weather, other construction operations and similar activities. Where heat is needed and the building envelope is incomplete, provide enclosures where there is no other provision for containment of heat.

1. Provide doors with self-closing hardware and locks.
2. Provide barricades and protective entrances at least 48 inches high around openings in floors, escalators and elevators.

C. Provide temporary roofing as needed to maintain the building watertight.

1.27 TEMPORARY FENCES

A. Construction fence: Provide a 8 foot high commercial grade chain link fence around construction site; equip with vehicular and pedestrian gates and locks.

1. Relocation of all fences and gates as required due to construction phasing. Relocations shall be provide at no additional cost to the Owner.
2. Vehicular and Pedestrian Gates: Build into fence at approved locations. Provide gates with cross-bracing, and hung on heavy strap hinges with post and hook for double gates. Provide heavy hasps and padlocks.
   a. Provide a set of keys to Project Resident Engineer to facilitate emergency access.

B. Fence, General: Fence shall be industrial-grade, heavy-duty construction: Galvanized fabric with galvanized frame.

1. Chain link fabric shall be made of coated-steel, 9 gage (0.148 inch) core wire woven in 2-inch uniform mesh, height (roll width) to suit fence height, with bottom selvage knuckled, top selvage twisted, with woven fabric having a minimum breaking strength of 1290 pounds.
   a. Privacy slats: Vinyl strips, sized to fit fabric weave, color as selected by Architect from manufacturer's full available range.
2. Framework: Posts and rails shall be sized as detailed on the drawings , Type 1 seamless steel pipe, ASTM A-120, standard weight schedule 40, hydrostatic testing waived.
3. Gate Posts: Standard weight pipe 2-7/8 inches OD nominal weight, 5.79 pounds per foot.
4. Gate Frames: 2 inches OD standard weight pipe, 2.73 pounds. per foot with heavy malleable iron or pressed steel corner fittings securely riveted. Fabric to match the fence shall be installed in the frame by means of tension bars and hook bolts. Each frame to be equipped with 3/8 inches diameter adjustable truss rods.
5. Bottom hinges to be ball and socket type designed to carry the weight of the gate on the post footing. Upper hinge to be wrap around adjustable type. All gates to be equipped for padlocking and with semi-automatic outer catches to secure gates in opened position.

6. Fittings: Pressed steel or malleable iron, hot-dipped galvanized conforming to the requirements of ASTM A153. Tie wires shall be minimum nine-gage galvanized wire,. Attachment bolts shall be galvanized.
7. Post Settings: Driven into ground. Temporary concrete bases may be considered where fencing is scheduled for relocation.

1.28 TREE AND PLANT PROTECTION

A. General: Comply with requirements specified in Divisions 31 and 32, in addition to those specified herein.

B. Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line.

C. Provide temporary guards to protect trees and vegetation to be left standing. Protect plant life by placing boards, planks, poles or fencing around them.

D. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.

E. Soil: Protect soil from contamination with toxic materials that are detrimental to plant growth.

F. Provide protection for roots over 1-1/2 inch in diameter that are cut during construction operations. Coat cut faces with an emulsified asphalt or other acceptable coating formulated to use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.

G. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations in a manner acceptable to Architect.
   1. Plant life or landscape feature scarred or damaged by the Contractor's equipment or operations shall be restored as nearly as possible to its original condition at the expense of the Contractor.
   2. Employ a licensed arborist to repair damage to trees and shrubs. Replace trees that cannot be repaired and restored to full-growth status.
      a. The Architect/Engineer will decide whether damaged trees shall be treated, or be removed and replaced.

H. A reasonable sum (cost of equivalent replacement) will be deducted from the Contract Sum for any permanent damage to existing trees or plantings which are outside the construction site area but on the Owner’s property or within the construction site area, and areas designated to be protected. Damage to trees and plants off the Owner’s property shall be fully the responsibility of the General Contractor.

1.29 POLLUTION CONTROL

A. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by, the discharge of noxious substances from construction operations.

1. Comply with all applicable Federal, State, County, and municipal laws regarding pollution.
2. Prevent pollution of streams, lakes, or reservoirs with fuels, oils, bitumens, calcium chloride, acids, waste products, effluents, chemicals or other harmful substances. Prevent from such substances from entering storm drains and sanitary sewers.

B. Provide equipment and personnel, perform emergency measures required to contain any spillage and to remove contaminated soils or liquids.

1. Excavate and legally dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

1.30 PEST CONTROL

A. Provide rodent control as necessary to prevent infestation of construction and storage areas. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.

B. Provide marked metal containers with lids for all edible rubbish and enforce their use by all employees. Empty containers and legally dispose of contents off site as required to maintain rodent control.

C. If the Contractor’s basic rodent control program proves to be ineffective, obtain the services of a professional exterminator, at no additional cost to the Awarding Authority Owner.

D. Should rodentcides be considered necessary, submit copies of proposed program to Awarding Authority Owner and Architect. Use of rodentcide shall comply with manufacturer’s published instructions and recommendations. Clearly indicate:

1. Area or areas to be treated.
2. Rodentcides to be used.
3. Manufacture’s printed instructions.
4. Pollution preventive measures to be employed.

1.31 FIRE PREVENTION MEASURES

A. Prior to commencement of work at the site, the Owner's Representative, and General Contractor shall meet with the Local Fire Marshal to plan site and building access in the event of fire.

1. Access paths for heavy fire fighting equipment shall be laid out and maintained.

2. Free access from streets to fire hydrants and to outside connections for standpipes, sprinklers or other fire extinguishing equipment shall be provided and maintained.

B. The Contractor shall take all necessary precautions for the prevention of fire during construction. Install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes. Ascertain and comply with requirements of Project insurance carrier, local fire department and the state fire marshal.

1. Maintain the area within contract limits orderly and clean.

a. Remove combustible rubbish promptly from the site and when required, store combustible materials in containers in fire-safe locations.

2. Maintain clear access to exits from within the building.

3. Smoking is not permitted in the building or adjacent areas.

C. Establish procedures for fire protection for welding, cutting and open torch work, and other potentially hazardous operations. Obtain permission from local authorities having jurisdiction for such work as required by law. Provide special fire extinguishers at welding and torch cutting work.

1. After Owner occupancy or partial occupancy: Maintain a fire watch when fire protection and warning systems have been temporarily de-activated. Maintain watch during all working hours for full period of de-activation.

2. The Contractor will assign personnel to inspect all construction areas at the end of each day's work for fire hazards prior to lock-up.

D. Provide for outside storage of gas tanks, sufficiently clear of any structure. Promptly remove welding and cutting equipment from the building when no longer required. Do not store welding or cutting materials within the building when work is not being performed.

E. Permanent fire protection system may be activated to meet these requirements. Replace fusible link heads and other expended or discharged components at time of Substantial Completion.

1.32 SECURITY MEASURES

A. Protect Work, existing premises and Owner's operations from theft, vandalism, and unauthorized entry. Maintain security program throughout construction period until Owner occupancy precludes the need for Contractor security.

1. General contractor is responsible for security of site during construction, including, prevention of illegal trespassing, unauthorized entry, theft and vandalism. All losses and damages which occur are the full responsibility of the General Contractor, who shall bear all costs incurred.

B. Provide entry control:

1. Restrict entrance of persons and vehicles into Project Site .
2. Allow entrance only to authorized persons with proper identification.
   a. Workers are required to present and have visible at all times, ID Cards as specified under Section 01 14 00 – WORK RESTRICTIONS.
3. Maintain log of workmen and visitors, make available to Awarding Authority on request.
4. Coordinate access of Awarding Authority's personnel to site in coordination, with Awarding Authority's security forces.

C. Do not allow cameras on site or photographs taken except by written approval of Awarding Authority.

1.33 PROJECT IDENTIFICATION AND TEMPORARY SIGNAGE

A. General: Signs other than those specified herein are not permitted, except those required by law or expressly authorized by the Awarding Authority .

1. At all times during the project, signage must clearly direct occupants and the general public in the safe use of the building. Signs must clearly indicate areas of no admittance, and further must clearly define and direct users to building entries, exits, and other important destinations.
   a. All such interim signage must be painted by a professional sign painter on 3/4-inch medium density overlay plywood with letters no less than 3 inches in height.
   b. Coordinate required signage with Architect/Engineer.

B. Project sign:

1. Provide 8 foot wide by 4 foot high foot project sign of exterior grade MDO plywood and wood frame construction, painted, with self-adhesive color printed text with reproduction of building rendering. Architect will provide signage design.
   a. Color prints for rendering shall be 3M Scotchprint marking film series 8640 or equal, 4 mil thickness, "ControlTac" vinyl film as manufactured by 3M company having a positionable pressure activated pigmented adhesive.
   b. Overlay protecting film, Scotchprint Film, clear overlaminating film, as manufactured by 3M company.
2. List title of project, names of Awarding Authority, User Agency, Architect, professional sub-consultants, Contractor, and Filed-subcontractors.
3. Erect on site at location established by Architect/Engineer.

C. Signage at perimeter of construction site: Provide clear and visible warning signage with appropriate language such as: "Prohibited Access – Hard Hat Only – No Admittance – Authorized Personnel Only".

D. Conservation sign: Provide painted white sign not less than two square feet or more than three square feet in size bearing the words "MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION, FILE NUMBER 000-000". Locate sign where directed.

1.34 REMOVAL OF TEMPORARY UTILITIES, CONTROLS, AND FACILITIES

A. Remove temporary materials and construction prior to Substantial Completion.

B. Remove underground work and compacted materials to a depth of 2 feet; fill and grade site as specified.

C. Restore permanent facilities used during construction to specified condition.

D. Clean and repair damage caused by installation or use of temporary work.

1.35 KEY PLAN

A. Refer to the attached Existing Lower Level Floor plan for location of field offices in the existing Foxborough Town Hall.

B. *#2]* PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 50 00

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Definition of Terms

B. Basic product requirements.

C. General environmental requirements for products.

D. Owner furnished products.

E. Product delivery and handling requirements.

F. Product storage and protection requirements.

1.2 RELATED REQUIREMENTS

A. Section 01 25 13 - PRODUCT SUBSTITUTION PROCEDURES:

1. Product options.
2. Product substitution procedures.

1.3 DEFINITION OF TERMS

A. “Products” is defined as new material, machinery, components, equipment, fixtures, and systems used in the Work. Products do not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for re-use.

B. "Materials" are products that are shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

C. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

D. “Fasteners” include all products required for mechanical connections and include, but are not limited to: nails, screws, bolts, expansion bolts, chemical bolts, epoxy anchors, pins, powder-actuated devices, and similar fasteners, anchors, and connections.

E. Definitions in this article are not intended to negate the meaning of other terms used in Contract Documents, including "specialties", "systems", "structure", "finishes", "accessories", "furnishings", "special construction", and similar terms, which are self-explanatory and have recognized meanings in the construction industry.

1.4 BASIC PRODUCT REQUIREMENTS

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.

B. To the fullest extent possible, provide products of the same kind, from a single source.

C. Provide interchangeable components of the same manufacturer, for similar components.

D. When the Contractor has the option of selecting two or more products, ensure that products selected shall be compatible with products previously installed or approved.

E. Provide all products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

F. Galvanic Corrosion: Install materials in manner which will effectively isolate dissimilar metals which may potential for galvanic corrosion. Use non-absorptive dielectric material, isolation coatings, or other protective isolator approved by Architect.

G. Fasteners, Anchors, and Connections: Provide all fasteners, anchors, and connections needed to safely, securely, and appropriately secure all Work permanently in place.

1. General: The Contractor is solely responsible for the capacity, suitability, adequacy, and safety of all welded, fastened and anchored connections.
    a. Comply with applicable code requirements regarding fastener selection and installation.
    b. Provide at least two fasteners for each individual item being fastened.
    c. Utilize fastener manufacturer's published load tables for working loads to assist in determining fastener size and space. Do not use ultimate load capacity in determining fastener selections.
    d. Provide a minimum safety factor of 4.
    e. Select and utilize fasteners having minimum galvanic corrosion factor.
    f. Hydrogen embrittlement prevention:
        1) Do not use high-strength and low-alloy fasteners which have been subjected to an acid pre-treatment (because they can become brittle and fail), utilize instead equivalent capacity and size bi-metal, stainless steel or high strength aluminum fasteners, as appropriate to the conditions and materials where being used.
        2) Utilize low-hydrogen electrodes for welding high-strength steels to prevent hydrogen embrittlement.

2. To permit the Contractor control over means and methods, some fastener conditions may not be fully defined in the Contract Documents. In particular, individual specification sections that require delegated independent engineering. In such instances the Contractor is fully responsible to determine method of fastening appropriate for each condition. The Contractor shall take into consideration substrate material(s) and product(s) being fastened, live and dead loading, and both atmospheric and visual exposure considerations. Contractor is responsible to determine fastener type, material, finish, size, diameter, length and spacing.
3. Torque structural fasteners as recommended by fastener manufacturer, or as otherwise specified in the Contract Documents.

H. Permanent Labels and Nameplates:

1. Restrictions:
   a. Do not provide exposed-to-view labels, nameplates, or trademarks which are not required by code, or regulations.
   b. Do not expose manufacturers, suppliers, or installer's name, logo, or trade names on normally visible surfaces.
   c. Do not provide labels, nameplates or trademarks when individual specification sections specifically exclude them.
   d. All exposed-to-view advertising and name-brand labels shall be fully removed without damage to substrate finish.
2. Location for required labels: Required labels, approval plates and stamps shall be located on a concealed surface, or where required for observation after installation on accessible non-conspicuous surface.
3. Data Plates: Provide permanent data plate on each item of service-connected or power-operated equipment.
   a. Data Plate Information: Include manufacturer, model, serial number, date of manufacture, capacity, ratings, power requirements, and all other similar essential data.
   b. Locate data plates on easily accessible surface that is inconspicuous in occupied spaces.

1.5 GENERAL ENVIRONMENTAL REQUIREMENTS FOR PRODUCTS

A. General: Prohibit the use of or incorporation into the work of materials which contain toxic, hazardous and harmful materials.

1. Hazardous materials: Defined as pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA), the International Agency for Research on Cancer (IARC) or regulated under OSHA Hazard Communication Standard, 29 CFR 1910.1200.
2. Harmful materials: Defined as materials which contain the presence of chemical, physical, or biological elements or agents which adversely affect

human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purposes.

3. Owner restricted materials: Defined as all products to which the Owner has a reasonable objection because of its content, composition, properties, or characteristics.

B. Vapors, Gases, Fumes, Odors:

1. General: Comply with all state and federal VOC requirements. Where ever possible use non-VOC materials.

a. Limit use of products to the greatest extent possible which have "off-gassing", fumes, flammability, and other harmful characteristics.

1) Prohibit use of products which contain substances that contribute significantly to the production of photochemical smog, tropospheric ozone, or poor indoor-air quality.

b. Limit use of ozone-depleting compounds to the greatest extent possible. An ozone-depleting compound is any compound with an ozone-depletion potential greater than 0.01 (CFC 11 = 1).

c. Use organic and biodegradable cleaners to the greatest extent possible.

2. Do not install, use for installation, and use for cleaning those materials which may produce objectionable (to Owner and public) vapors, gases, fumes, odors, or similar conditions.

3. Do not install or use products which may have possible chemical or biological reactions with other on-site materials.

C. Toxicity of prefabricated wood products (composite wood and agrifiber products): Products shall contain no added urea-formaldehyde resins.

1. Laminating adhesives used to fabricate on-site and shop-applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins.

D. Adhesives: Provide adhesives approved by the manufacturer's of the products being adhered which are Low-VOC or non-VOC, non-flammable, water-proof after cured, odor free.

1. Comply with Commonwealth of Massachusetts Adhesives and Sealants Regulations 310 CMR 7.18 (30).

1)	Outdoor floor covering adhesives	250
2)	Non-membrane Roof Installation and Repair Adhesive	300
3)	Single-ply Roof Membrane Roof Installation and Repair Adhesive	250
4)	Thin-Metal Laminating	780
5)	Waterproof Resorcinol Glue	170
6)	Flexible Vinyl	250
7)	Rubber	250

8) Other Substrates 250

b. Adhesive Primers VOC Limit [g/L less water]

1) Plastic Cement Welding 650
2) Single-ply Roof Membrane 250
3) Traffic Marking Tape 150
4) Other 250

E. Carpet systems: Refer to Section 09 68 13 – Tile Carpeting for VOC requirements.

F. Interior Paints: Provide products that comply with specified VOC limits, refer to Section 09 91 00 – PAINTING for additional requirements.

G. Sealants: Provide products that comply with specified VOC limits. Comply with Commonwealth of Massachusetts Adhesives and Sealants Regulations 310 CMR 7.18 (30). Refer to Section 07 92 00 – JOINT SEALANTS, and as specified herein, for additional requirements.

1. Only use sealants and primers that comply with the following limits for VOC content:

a. Sealants VOC Limit [g/L less water]

1) Architectural 250
2) Single-Ply Roof Membrane 450
3) Non-membrane Roof 300
4) Roadway 250
5) Marine Deck 760
6) Other 420

a. Sealant Primers VOC Limit [g/L less water]

1) Architectural Non Porous 250
2) Architectural Porous 775
3) Marine Deck 760
4) Other 750

H. Material Safety Data Sheets (MSDS): Obtain and maintain on-site record data sheets for each product brought onto the Site.

1. Maintain an organized file of Material Safety Data Sheets at the job-site for quick reference.
2. Furnish MSDS for all finishes, paints, coatings, curing compounds, sealers, adhesives, mastics, waterproofing, dampproofing, sealants, cleaning chemicals, carpets, upholstery, fabrics and all similar products.

I. Cleaning and maintenance products:

1. Provide data on manufacturers' recommended maintenance, cleaning, refinishing and disposal procedures for materials and products utilized. These procedures are for final Contractor cleaning of the project prior to substantial

completion and for provided materials and products as required by the specific specification sections.

a. Where chemical products are recommended for these procedures, provide documentation to indicate that no component present in the cleaning product at more than 1% of the total mass of the cleaning product is a carcinogen or reproductive toxicant as defined in the lists in this specification section.

b. For purposes of reporting, identification of product VOC contents shall not be limited to those regulated.

2. Avoid cleaning products containing alpha-pinene, d-limonene or other unsaturated carbon double bond alkenes due to chemical reactions with ozone to form aldehydes, acidic aerosols, and ultra fine particulate matter in indoor air.

J. Establish written Contractor's safety and emergency response procedures for safety precautions, accidents, emergency conditions, and clean-up methods.

1.6 OWNER'S PROPRIETARY PRODUCTS

A. Owner's proprietary products: Under provisions of Massachusetts General Laws, Chapter 30, Section 39M(b) the Owner has determined that specific products shall be proprietary for 'sound reasons in the public interest'. This determination has been made under vote of the Owner, and has been recorded in writing for public record. The following categories of products are designated as proprietary, equipment and fixture references are included in the individual specification sections:

1.

1.7 OWNER FURNISHED PRODUCTS

A. Owner Furnished Products: As provided in the General Conditions, the Owner will provide products by others under a separate agreements.

1. Owner's responsibilities regarding Owner furnished products:

a. Arrange for and deliver Owner reviewed shop drawings, product data, and samples to Contractor.

b. Arrange and pay for product delivery to site.

c. On delivery, inspect products jointly with Contractor.

d. Submit claims for transportation damage, and replace damaged, defective, or deficient items.

e. Arrange for manufacturers' warranties, inspections, and service agreements.

2. Contractor's responsibilities regarding Owner furnished products:

a. Review Owner reviewed shop drawings, product data, and samples to Contractor.

b. For Owner-Furnished, Contractor Installed (OFCI) Products: Receive and unload products at site, inspect for completeness or damage, jointly with Owner.

c. Handle, store, and provide temporary protection.

d. Repair or replace items damaged after receipt.

e. As required by this Contract, finish, install, and clean products.

f. Provide protection of installed work.

g. When not installed under this Contract, the Contractor shall coordinate Owner installed work with interfacing work of this Contract. The Contractor shall provide temporary protection and final cleaning of Owner installed products, except as directed otherwise.

3. Items noted in Drawings as "Not in Contract" or "N.I.C.", identify work or products which either exist, or are furnished by Owner; such work requires coordination with the Work of this Contract and may even require installation by this Contractor.

B. The Contractor has coordinating responsibility for Testing laboratory services as identified under Section 01 45 29 - TESTING LABORATORY SERVICES and as specified under individual specification sections.

1.8 PRODUCT DELIVERY AND HANDLING REQUIREMENTS

A. Transport and handle products in accordance with manufacturer's instructions and as specified in individual specification sections.

1. Ductwork: All ductwork shall be sealed from time of manufacture, with seals intact upon delivery to construction site, and remain so, until ready for installation. Contractor is jointly responsible with HVAC&R subcontractor to ensure ducts are properly sealed and maintained.

a. Store ductwork in clean dry conditions and keep sealed while it is stored.

B. Schedule deliveries to avoid delays in installation of products, to minimize long-term storage, to prevent overcrowding of construction . Coordinate with installation to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

C. Promptly inspect shipments to assure that products comply with requirements, quantities are correct, and products are undamaged.

D. Provide equipment and personnel to handle and store products by methods to prevent soiling, disfigurement, or damage.

1.9 PRODUCT STORAGE AND PROTECTION REQUIREMENTS

A. Store and protect products in accordance with manufacturer's instructions and as specified in individual specification sections.

1. Provide all necessary equipment and personnel to store products by methods to prevent soiling, disfigurement and damage.
2. Store and protect products with seals and labels intact and legible.

B. For exterior storage of fabricated products, place on sloped supports, above ground.

C. Provide off-site storage and protection when site does not permit on-site storage or protection.
1. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
2. Store sensitive products in weather-tight, climate controlled enclosures.

D. Store loose granular materials on solid flat surfaces in a well-drained area; prevent mixing with foreign matter.

E. Arrange storage of products to permit access for inspection. Periodically inspect to assure products are undamaged and are maintained under specified conditions.

F. Store heavy materials in locations and in a manner that will not damage or disfigure existing, or new construction.

1.10 MOLD PROTECTION OF PRODUCTS PRIOR TO INSTALLATION

A. General:
1. Keep building materials dry to prevent the growth of mold and bacteria, including, but not limited to: gypsum wallboard, wood, porous insulation, paper, and fabric.
2. Cover materials to prevent rain damage, and if resting on the ground, use spacers to allow air to circulate between the ground and the materials.
3. Thoroughly dry all water damaged materials within 24 hours from time of moisture damage. Materials that have been damp or wet for more than 24 hours shall not be incorporated into the Work.
a. Review moisture damaged materials for signs of mold and mildew, including any with moisture stains, from the site and properly dispose of them.
b. Replace water damaged and moldy materials with new, undamaged materials.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 73 00
EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Examination of existing conditions and acceptance of conditions.

B. Project preparation.

C. Surveying and field engineering.

D. Execution of the Work.

E. Cutting and patching of in-place work

F. Cleaning.

G. Building flush out.

H. Protecting installed work.

1.2 RELATED REQUIREMENTS

1.3 EXAMINATION OF AND ACCEPTANCE OF EXISTING CONDITIONS

A. The Contractor, its subcontractors and Filed-Subcontractors shall inform themselves of existing conditions before submitting his bid, and shall be fully responsible for carrying out all work required to completely and properly execute the work of the Contract, regardless of the conditions encountered in the actual work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the General Conditions.

B. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing damage to structure surfaces, equipment, or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Architect prior to starting work.

1.4 SURVEYING AND FIELD ENGINEERING

A. Employ a Land Surveyor or Professional Engineer registered in the Commonwealth of Massachusetts and acceptable to the Architect.

1. Submit evidence of Surveyor's Errors and Omissions (E&O) Insurance coverage in the form of an Insurance Certificate.

B. Submittals.

1. Submit name, address, and telephone number of at least three proposed Land Surveyors and obtain Architect's acceptance before starting survey work.

2. On request, submit documentation verifying accuracy of survey work.
3. Submit a copy of registered site drawing and certificate signed by the Land Surveyor, that the elevations and locations of the Work are in conformance with the Contract Documents.

C. Examination.
1. Verify locations of survey control points prior to starting work.
2. Promptly notify Architect of any discrepancies discovered.

D. Survey Reference Points.
1. Contractor shall locate and protect survey control and reference points.
2. Control datum for survey is that indicated on Drawings.
3. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
4. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
5. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to the Architect.

E. Survey Requirements.
1. Provide field engineering services. Utilize recognized engineering survey practices.
2. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer and water service piping.
   a. The existence and location of underground utilities and construction indicated on Drawings as existing are not guaranteed. Before beginning sitework, verify the existence and location of underground utilities and other construction.
3. Establish a minimum of 2 permanent bench marks on site, referenced to established control points. Record locations, with horizontal and vertical data, on Project Record Documents.
4. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
   a. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
   b. Grid or axis for structures.
   c. Building foundation, column locations, and ground floor elevations.
5. Periodically verify layouts by same means.

F. Project Record Documents.

1. As-built survey, progress submissions: Surveyor shall develop an as-built survey for the work-in-place. Copies of survey shall be submitted along with request for payments for foundation work, site utilities and paving work.
2. Surveyor's log: Maintain a complete and accurate surveyor's log of control and other surveys, as required by Owner and authorities having jurisdiction. Make this log available for reference.
3. Submit Final Property Survey and log under the provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

1.5 PROTECTION OF ADJACENT ELEMENTS

A. Protect installed Work and provide special protection where called for in individual specification Sections.

B. Protect existing facilities and adjacent properties from damage from construction and demolition operations. Provide temporary and removable protection for installed products and occupied areas.

C. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials. Coordinate with requirements under individual specification sections.

D. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

E. Protect all existing landscape areas [not indicated to be cleared]. Do not deface, injure, or destroy trees or other plant life. Do not remove or cut trees or other plant life, without authorization from the Owner. Do not attach any anchorages, ropes, cables or guys to any trees scheduled to remain.
   1. Prohibit traffic from landscaped areas.

F. Protect non-owned vehicles, stored materials, site and structures from damage.

G. Refer to respective Sections for other particular protection requirements.

1.6 PROTECTION OF INTERIOR CONCRETE SLABS

A. No satisfactory chemical or cleaning procedure is available to remove petroleum stains from the concrete surface. Prevention is therefore essential for areas scheduled to receive concrete stains and sealers, specified under Division 3.
   1. All hydraulic powered equipment must be diapered to avoid staining of in-place concrete.
   2. No trade will park vehicles on the inside slab. If necessary to complete their scope of work, drop cloths will be placed under vehicles at all times.
   3. No pipe cutting machine will be used on the inside floor slabs.
   4. Steel will not be placed on interior slabs to avoid rust staining.

1.7 EXECUTION REQUIREMENTS FOR INSTALLATION, APPLICATION AND ERECTION

A. Inspection of conditions: The Installer of each component shall inspect the substrate and conditions under which Work is performed. Do not proceed until unsatisfactory conditions have been corrected.

B. Resource Efficiency of Materials:

1. Use construction practices such as material reduction and dimensional planning that maximize efficient use of resources and materials.

a. Recheck measurements and dimensions, before starting installation.

2. Provide materials that utilize recycled content to maximum degree possible without being detrimental to product performance or indoor air quality.

3. Where possible and feasible, provide for non-destructive removal and re-use of materials after their service life in this building.

C. Manufacturer's instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that they are more stringent than requirements in Contract Documents.

D. Inspect material immediately upon delivery and again prior to installation Reject damaged and defective items.

E. Install each component during weather conditions and project status that will ensure the best results. Isolate each part from incompatible material as necessary to prevent deterioration.

F. Coordinate temporary enclosures with inspections and tests, to minimize uncovering completed construction for that purpose.

G. Limiting exposures: Supervise operations to ensure that no part of construction, completed or in progress, is subject to harmful or deleterious exposure.

1. Such exposures include, but are not limited to the following:

a. Excessive static or dynamic loading.

b. Excessive internal or external pressures.

c. Excessive weathering.

d. Excessively high or low temperatures or humidity.

e. Air contamination or pollution.

f. Water or ice.

g. Chemicals or solvents.

h. Heavy traffic, soiling, staining and corrosion.

i. Rodent and insect infestation.

j. Unusual wear or other misuse.

k. Contact between incompatible materials.

l. Theft or vandalism.

H. Provide attachment and connection devices and methods necessary for securing each construction element. Secure each construction element true to line and level. Allow for expansion and building movement.

I. Visual effects: Provide uniform joint widths in exposed Work. Arrange joints to obtain the best effect. Refer questionable choices to the Architect for decision.

J. Mounting heights: Where mounting heights are not indicated, review heights with Architect, prior to commencement of Work.

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

L. Clean and maintain completed construction as often as necessary through the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

1.8 CUTTING AND PATCHING OF IN-PLACE WORK

A. Scope: General contractor is responsible for coordination and quality of all cutting and patching work. Cutting and patching of the Work includes, but is not limited to:

1. All cutting, altering, patching, and fitting as necessary for the Work to comply with the Contract Documents.

a. Make all products and their components of the Work fit together properly.

b. Fully integrate all cutting and patching, to present the visual appearance of an entire, completed, and unified project in compliance with the Contract Documents.

2. Provide openings in elements of the Work, and the patching of same, for penetrations required by all trades, including but not limited to mechanical, plumbing, fire protection and electrical work.

a. Individual filed sub-trades are responsible for designated types of coring and drilling penetrations for piping, conduit, ducts and other penetrations.

3. Uncover work to provide for installing, inspecting, or both, of ill-timed work;

4. Remove and replace work not conforming to requirements of the Contract Documents or as otherwise determined to be defective.

5. Patch and match all surfaces and products disturbed or damaged.

6. Remove samples of in-place construction as specified for testing.

B. Structural elements: Do not cut and patch structural elements in a manner that would reduce the load-carrying capacity or load deflection ratio. Always obtain

written approval of the cutting and patching proposal before cutting and patching structural elements.

1. Do not drill through structural beams, slabs or columns. Core drilling through concrete block walls and stair platforms must be approved by the Architect.
2. Where cutting and patching involves adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with the structure.

C. Exposed elements: Employ appropriate tradesperson to perform cutting and patching for weather exposed and moisture resistant elements, and sight exposed surfaces.

D. Penetrating elements: Fit work tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with fire rated materials in accordance to applicable codes and regulations, and compatible to surrounding construction.

E. Visual requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

F. Operational and safety limitations: Do not cut and patch operating elements or safety components in a manner that would reduce their capacity to perform as intended, or would increase maintenance, or decrease operational life safety of the building when occupied.

G. General requirements of cutting and patching:

1. Submit written proposals to perform cutting and patching when cutting work affects the following:
   a. Structural integrity of any element in the project.
   b. Integrity of weather-exposed or moisture-resistant elements.
   c. Aesthetic and visual qualities of exposed-to-view elements.
   d. Work of Owner or work performed under separate Contract.
2. Cutting: Cut in-place construction using methods least likely to damage elements of as-built construction.
3. Coring and Drilling of holes incidental to work of individual sections shall be performed by the trade requiring the penetration, except as follows. The General Contractor is responsible for performing the following:
   a. Coring and Drilling of holes greater than 8 inches in diameter in concrete decks and slabs.
   b. Core drilling in exterior wall and roof surfaces leading to, or from, the outside of the Building.

c. Coordination of all coring and drilling and resultant patches necessary for the completion of this Contract and for the quality and appearance of all patch Work in exposed-to-view finished materials.

4. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break; for assemblies, refinish entire unit.

1.9 PROGRESS CLEANING AND DISPOSAL OF WASTE MATERIALS

A. General: Maintain site in a clean and orderly condition. Maintain work and surrounding areas free of waste materials, debris, and rubbish; remove from site on a on-going basis through-out the term of construction.

1. Adjacent Areas: Keep adjacent areas, neighboring properties, public ways, and all nearby areas clean and free of construction debris and dirt including wind blown debris.

2. Filed Sub-bid Subcontractors are responsible for cleanup and removal of their own rubbish, debris, shipping materials and waste materials throughout the term of their work.

3. General Contractor shall furnish dumpsters and provide general site cleaning services, except as explicitly specified otherwise under individual Sections of the Specifications.

B. Control accumulation of waste materials and rubbish; periodically dispose of off-site. The General Contractor shall bear all costs, including fees resulting from such disposal.

C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.

1. Do not burn or bury rubbish and waste materials on site.

2. Do not dispose of volatile wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.

3. Do not dispose of wastes into streams or waterways.

4. Comply with requirements of authorities having jurisdiction including, without limitation, requirements related to fire prevention, rodents, pests, vermin, waste storage, waste trucking, waste removal, waste disposal, street cleaning, truck tire cleaning, and other requirements.

D. Clean interior areas prior to start of finish work and maintain areas free of dust and other contaminants during finishing operations.

E. Maintain project in accordance with all local, Commonwealth of Massachusetts, and Federal Regulatory Requirements.

F. Store volatile wastes in covered metal containers, and remove from premises daily.

G. Prevent accumulation of wastes which create hazardous conditions.

H. Provide adequate ventilation during use of volatile or noxious substances.

1. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
2. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

I. Use only those materials which will not create hazards to health or property and which will not damage surfaces.

J. Use only those cleaning materials and methods recommended by manufacturer of surface material to be cleaned.

K. Execute cleaning to ensure that the buildings, the sites, and adjacent properties are maintained free from accumulations of waste materials and rubbish and windblown debris, resulting from construction operations.

L. General Contractor shall provide on-site containers (dumpsters) for collection and containment of, waste materials, debris and rubbish.
1. Trash Barrels and Containers: Use containers with tightly fitting lids. Use only steel containers and lids when there is any evidence of rodent or pest activity.
2. Returnables: Provide special, labeled containers for deposit returnables such as soda cans.

M. Remove waste materials, debris, and rubbish from site at least once weekly, and dispose off-site. Comply with NFPA 241 for removal of combustible waste.

N. Handle material in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

O. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not damage surrounding surfaces.

1.10 SITE MAINTENANCE AND CLEANING

A. Maintain traffic and parking areas in a sound condition, free of excavated material, construction equipment, products, mud, snow, and ice.
1. Provide means of removing mud from vehicle wheels before entering public streets and Owner's parking areas and access.

B. Maintain existing and permanent paved areas used for construction.
1. If any street or private way shall be rendered unsafe by the Contractors operations, the Contractor shall make such repairs or provide such temporary ways or guards as shall be acceptable to the governing authority.
2. Promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original, or specified, condition.

1.11 FINAL CLEANING

A. Scheduling: Perform final cleaning immediately prior to the Architect's review of the project for issue of the Certificate of Substantial Completion.

1. Re-clean all surfaces, materials and products of the Work immediately prior to Owner's occupancy of the Project.

   a. Should the Owner occupy any portion of the Work prior to completion of the Contract, the responsibilities for interim and final cleaning shall be in accordance with the General Conditions.

B. Qualifications: Commercial cleaning firm, with a minimum of 3 years experience specializing in the post-construction cleaning of facilities.

C. Protection: During the operation of final cleaning, protect surrounding materials and finishes against undue damage by the exercise of reasonable care and precautions. Clean, or repair all products and surfaces which are soiled or otherwise damaged by Work of this Section, to match original profiles and finishes. Materials and finishes which cannot be cleaned, or repaired shall be removed and replaced with new work in conformance with the Contract Documents.

D. General cleaning requirements:

1. Remove from the job site all tools, surplus materials, equipment, scrap, debris, and waste.
2. Remove all advertising matter and temporary instructional material from exposed surfaces throughout.
3. Use only methods and cleaning materials which are compatible with and as recommended by the manufacturer of the material being cleaned.
4. Finished surfaces: Remove paint smears, spots, marks, dirt, mud and dust and similar disfigurement created by the Work, from all exposed to view existing or new interior and exterior finished surfaces.
5. Polished surfaces: Apply the polish recommended by the manufacturer of the material being polished.
6. Cleaning Materials: Only non-hazardous cleaning materials shall be used in the final cleanup.

E. Exterior building surfaces:

1. Visually inspect exterior surfaces and remove all traces of soil, waste materials, smudges, and other foreign matter.
2. Remove all traces of splashed materials from adjacent surfaces.
3. If necessary to achieve a uniform degree of cleanliness, hose down the exterior of the structure.
4. In the event of stubborn stains not removable with water, the Architect may require light sandblasting or other cleaning at no additional cost to the Owner.

5. Concrete: Clean exposed concrete free of all foreign matter. If, in the opinion of the Architect, further cleaning of specific areas is required, they shall be scrubbed with water or other cleaning agents. Acid cleaners shall not be used, except as may otherwise specifically permitted in the trade sections.

F. Bright metal: Clean metal surfaces, hardware, fixtures, appliances, equipment, and similar items free of all foreign matter. As required, lightly scrub specific stains with clean water, mild soap, and soft rags, thoroughly rinsed and wiped with clean, soft white rags. Do not use abrasive cleaners.

G. Glass: Replace broken, chipped and defective glass. Remove from glass: stains, spots, marks, paint smears; dirt and foreign materials. Clean and polish both surfaces of all interior and exterior glass. Clean and polish mirrors.

H. Carpet: Vacuum clean carpet and remove all spots and stains.

I. Hardware: Clean and polish finished hardware, remove marks, stains, scratches and blemishes.

J. Tile: Clean and polish floor and wall tile, remove grout film and excess grout.

K. Woodwork: Dust and clean architectural millwork, and finish woodwork items, remove all stains, spots, and foreign matter using methods and cleaning agents which will not harm the various finishes.

L. Site: Sweep exterior paved surfaces broom clean; rake clean unpaved surfaces.

M. Equipment: Thoroughly clean all items of mechanical and electrical equipment; remove excess oils and grease from exposed surfaces.

1. Clean permanent filters and replace disposable filters if ventilating units were operated during construction.
2. Clean ducts, blowers and coils, if units were operated without filters during construction.

1.12 BUILDING FLUSH-OUT

A. Sequencing: Complete all interior finish material installation no less than 14 calendar days prior to Substantial Completion to allow for building flush out. Contractor shall submit notification to the Architect when all interior finish material installation is complete, highlighting the date of completion.

B. Building Flush Out: Prior to Project Occupancy, Contractor shall flush out building continuously (i.e. 24 hours per day, 7 days per week) using 100% outside air at standard operational set-point temperatures for at least 14 calendar days. For every interruption of continuous flush out of more than 4 hours, Contractor shall extend flush out period by a minimum of one day.

1. When touch-up work is performed, Contractor shall provide temporary construction ventilation during installation and extend building flush-out by a minimum of 4 days after touch-up installation is complete.

2. Contractor shall return ventilation system to normal operation following flush-out period to minimize energy consumption.
3. Contractor shall replace all outside air filtration media prior to occupancy. Filtration media shall have a MERV of 13 as determined by ASHRAE 52.2-1999.

1.13 PROTECTING INSTALLED WORK

A. Protect all built, and in-place Work. In addition to requirements specified elsewhere, the Contractor shall protect all installed work from subsequent damage or deterioration from construction activities, and atmospheric damage until Owner's Substantial Completion and occupancy precludes the need for protection activities. No attempt is made in this Section to list all elements requiring protection or to describe how each element will be protected. It is the responsibility of the Contractor to determine for itself the scope and nature of protection required.
   1. Protection of some products/building elements may be required to remain in place for a large portion duration of the project. As such, materials should be installed to provide adequate protection throughout the full extent of construction activities. Repair or reinstall protection throughout the duration of construction as required.

B. Finish Products: Some finishes may need to be physically isolated from construction operations by means of protective barriers and coverings.
   1. General: After installation, provide coverings to protect products from damage due to traffic and construction operations. Replace protective coverings which may become wet, torn, or ineffective. Remove coverings when no longer needed.
   2. Doors, door frames and hardware: Protect from damage due to traffic and construction operations.
   3. Floor and Finished Surfaces Protection: Protect against construction traffic, rolling loads, static loads, damage from material movement and storage, or similar causes of damage.
   4. Walls: Protect from impact, dents, marks, water damage, and similar damage.
   5. Glass: Protect from damage including etching and staining. Keep glass clean.
   6. Protect products sensitive to water damage from becoming wet.
   7. Protect products sensitive to ultra-violet exposure and atmospheric exposure by limiting exposure to within limits recommended by respective product manufacturer.
   8. Protect products from biological growth, molds and mildew.
   9. Protect products from rodents and other animals, birds and insect damage.

C. Roofing and waterproofing systems: Protect and isolate from traffic and construction operations. Protect from chemicals. Work and traffic directly upon roofing and waterproofing is prohibited, provide temporary walkways and platforms.

D. General Protection from chemicals:

1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners selected for Project unless chemicals being used will not damage adjacent surfaces. Use covering materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Do not clean surfaces during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
3. Neutralize and collect alkaline and acid wastes and dispose of off-site.
4. Dispose of runoff from chemical operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 73 00

SECTION 01 75 00
STARTING AND ADJUSTING

PART 1 - GENERAL

1.1 SUMMARY

A. Testing, adjusting, and balancing.

B. Operation, maintenance, and service.

1.2 TESTING, ADJUSTING, AND BALANCING

A. General: Adjust operating products and equipment to ensure smooth and unhindered operation.

1. Contractor is advised that testing and balancing agents may be required during commissioning activities or as may be additionally directed by Architect/Engineer.

B. Contractor will employ services of an independent firm to perform testing, adjusting and balancing. Submit to Owner at least three qualified testing firms for Owner's review and acceptance.

C. Filed-subcontractors under Division 21 – Fire Suppression, Division 22 – Plumbing and Division 23 – Heating, Ventilating and Air Conditioning are all responsible for primary system testing and balancing as specified under their respective Sections. General Contractor will be required to coordinate these services.

D. The independent firm will perform services specified under Division 21 - Fire Suppression, Division 22 - Plumbing, and Division 23 - Heating, Ventilating, and Air Conditioning.

E. Reports will be submitted by the independent firm to the Architect/Engineer indicating observations and results of tests and indicating compliance or non-compliance with specified requirements and with the requirements of the Contract Documents.

1.3 AIR QUALITY TESTING

A. Air quality testing: The Owner reserves the right to employ the services of an independent testing agency to perform air quality testing. Testing will occur prior to Contractor's request for inspection for Substantial Completion. The intent of testing is to certify that the building is "Clear" of airborne contaminants.

1.4 OPERATION, MAINTENANCE, AND SERVICE

A. Coordinate schedule for start-up of various equipment and systems.

B. Notify Architect/Engineer and Owner 7 days prior to start-up of each item.

C. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or other conditions which may cause damage.

D. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

E. Verify wiring and support components for equipment are complete and tested.

F. Execute start-up under supervision of responsible Contractors' personnel in accordance with manufacturers' instructions.

G. When specified in individual specification Sections, require manufacturer to provide authorized representative to be present at site to inspect, check and approve equipment or system installation prior to start-up, and to supervise placing equipment or system in operation.

H. Submit a written report in accordance with Section 01 77 00 - CLOSEOUT PROCEDURES that equipment or system has been properly installed and is functioning correctly.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 75 00

Section 01 77 00
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Closeout of incomplete work (punch list) requirements.

B. Closeout procedures.

C. Conferences occurring after Substantial Completion.

1.2 RELATED REQUIREMENTS

A. Section 01 78 00 - CLOSEOUT SUBMITTALS: Requirements for project record documents.

B. Section 01 78 36 - WARRANTIES: Administrative and procedural requirements for warranties, guarantees and bonds.

1.3 PUNCH LIST REQUIREMENTS AND PROCEDURES

A. Definitions:

1. Contractor's Punch List: Complete list of incomplete and incorrect Work prepared by the Contractor prior to request of Architect's inspection for Certification of Substantial Completion. As a minimum the List shall include the following information for each work item:

a. Location identification organized by Building, Area, Room Number, or combination thereof as appropriate to project.

b. Clear identification of each incomplete work item, including all subcontractor's work.

c. Estimated value of each incomplete work item.

d. A short statement of why work is not complete.

e. Identify subcontract responsibility, as appropriate to each item.

2. Architect's Punch List: A list of incomplete and incorrect Work prepared by the Architect, which modifies the Contractor's Punch List, following review and acceptance of the Contractor's Punch List.

B. Pre-Closeout requirements: Prior to requesting initial Architect's inspection for Certification of Substantial Completion, submit to the Architect a full and complete list of all incomplete work items (Contractor's Punch List).

C. Punch list procedures at Substantial Completion:

1. Architect will review submitted Contractor's Punch List and determine whether it is suitable to proceed with the Substantial Completion Process.

a. If the Architect determines that the amount of completed work is insufficient to be considered for Substantial Completion, the Architect will not proceed with the Punch List process until sufficient completion of the Project is achieved.

b. The Architect will review the Contractor's Punch List and if the Architect determines that it does not reflect proper identification of the incomplete

and incorrect work, he/she will request a revision and resubmission of the Contractor's Punch List.

c. If the Architect determines that the amount of work indicated on the Contractor's Punch List is excessive, the Architect will suspend its review until the scope of work identified in the Contractor's Punch List is reduced to a level satisfactory to the Architect.

d. When the Architect reviews and accepts the Contractor's Punch List as being an accurate reflection of incomplete and incorrect work; the Architect will prepare and issue to the Contractor the "Architect's Punch List".

1) The "Architect's Punch List" will be based on the Contractor's Punch List with modifications and additions as may be required.

2) The "Architect's Punch List" includes work which must be completed and corrected prior to final completion.

2. Upon receipt of the "Architect's Punch List", the Contractor shall immediately distribute the list to all subcontractors.

D. Completion of Punch List Work: Make reasonable efforts to ensure that all "Architect's Punch List" items are completed or corrected within 14 calendar days from the date of the Architect's Punch List" or within the Contract Time, whichever comes first.

E. Architect's Final Inspection and review of Punch List Work:

1. After Contractor certification that all Punch List Work has been properly completed the Architect will then perform the Final Inspection.

a. Incomplete Items: If the Architect discovers any incomplete or incorrect "Architect's Punch List" items or any other deficiency in the work, the Architect will prepare a "Revised Punch List" which may also include other incomplete Contract requirements such as record documents, owner's operation and maintenance manuals, warranties, and other Contract requirements. Architect's site reviews of the Work for this "Revised Punch List" and any subsequent revised Punch Lists shall be performed as additional service to Owner, back-charged to the Contractor.

b. The Architect may assign a dollar value for each item of incomplete or incorrect work remaining.

F. Additional Inspections and related additional services fee: The Architect and the Architect's consultants will provide two site inspections, one at Substantial Completion, and one to confirm that the "Architect's Punch List" has been completed.

1. "Revised Punch List: If the Architect prepares and issues a "Revised Punch List: because of the Contractor's failure to complete the Work, then the Owner shall compensate the Architect and the Architect's consultants for their additional services and additional inspections. The payment for additional services and inspections will be back-charged to Contractor. The Owner will deduct the amount of the Architect's additional services fee from final payment to the Contractor by Change Order.

1.4 CLOSEOUT PROCEDURES - SUBSTANTIAL COMPLETION

A. Prior to requesting inspection for certification of Substantial Completion, complete the following:

1. On Application for Payment, show 100 percent completion for portions of work claimed as substantially complete.
   a. Submit list of incomplete items (Punch List), value of incomplete work, and reasons work is not complete.
2. Obtain evidence of compliance with requirements of governmental agencies having jurisdiction including, but not necessarily limited to:
   a. Certificate of Final Inspections, “signed off” by authorities having jurisdiction.
   b. Certificate of Occupancy.
3. Submission of product and installation warranties, workmanship bonds, maintenance agreements, installer certifications and similar documents specified in individual sections.
4. Submission of test/adjust/balance reports.
5. Change-over permanent locks and transmit keys to the Owner.
6. Remove temporary facilities and services that are no longer required.
7. Remove mock-ups, field samples and similar items.
8. Complete Final Cleaning, including repair and restoration, or replacement of damaged Work.
9. Remove surplus materials, rubbish and similar elements.
10. Documentation of completed flush-out procedures.
11. Application for reduction of retainage.
12. Consent of Surety.
13. Advise the Owner of the change-over in security provisions.
14. Notification of shifting insurance coverage.
15. Final progress photographs.

B. Within 2 weeks after receipt of the notice of Substantial Completion from the Contractor, the Architect will inspect to determine status of completion.

1. Should the Architect determine that the Work is not substantially complete:
   a. The Architect will notify the Contractor in writing, stating the reasons therefore.
   b. The Contractor shall remedy the deficiencies and send a second written notice of Substantial Completion to the Architect, requesting re-inspection.

C. When the Architect concurs that the Work is substantially complete:

1. The Architect will prepare AIA Document G 704 - CERTIFICATE OF SUBSTANTIAL COMPLETION, in accordance with the requirements of the GENERAL CONDITIONS and SUPPLEMENTARY CONDITIONS, accompanied by the Contractor's list of items to be completed or corrected, as verified by the Architect.
2. The Architect will submit the Certificate to the Owner, and to the Contractor, for their written acceptance of the responsibilities assigned to them in the Certificate.

1.5 CLOSEOUT PROCEDURES - FINAL ACCEPTANCE

A. Prior to requesting inspection for certification of Final Acceptance and final payment, perform the following:

1. Completion of incomplete Work. Submit a copy of the final inspection list stating that each item has been completed or otherwise resolved for acceptance.
2. Prove that all taxes, fees and similar legal obligations have been paid.
3. Submit final payment requests with release of all liens, and supporting documentation.
4. Provide written assurances that all unsettled claims are in the process of and will be resolved.
5. Submit updated final statement, including accounting for final additional changes to the Contract Sum. Show additional Contract Sum, additions and deductions, previous Change Orders, total adjusted Contract Sum, previous payments and Contract Sum due.
6. Submit consent of surety to Final Payment.
7. Submit evidence of continuing insurance coverage complying with insurance requirements.
8. Transmit certified property survey.
9. Remove remaining temporary facilities and services.
10. Deliver to Owner and obtain receipts for:
    a. Operation and Maintenance Manuals for items so listed in individual Sections of the Specifications, and for other items when so directed by the Architect.
    b. Project Record Documents (as-builts), including CAD format drawings.
    c. Warranties and bonds specified in individual Sections of the Specifications.
    d. Keys and keying schedule.
    e. Spare parts and materials extra stock.
    f. Pest Control Inspection Report.
    g. List of subcontractors, service organizations, and principal vendors, including names, addresses, and telephone numbers where they can be reached for emergency service at all times including nights weekends, and holidays.
11. Submit Certification stating Work has been inspected for compliance with the Contract Documents.
12. Submit Certification stating equipment and systems have been tested in presence of Owner’s representative and are fully operational.
13. Submit Certification stating that Work is 100 percent complete and ready for final inspection.

B. Within 2 weeks after receipt of the request for Final Acceptance from the Contractor, the Architect will inspect to determine status of completion.

1. Should the Architect determine that the Work is incomplete or defective:
    a. The Architect will notify the Contractor in writing, stating the reasons listing the incomplete or defective work.

b. The Contractor shall take immediate steps to remedy the deficiencies and send a second written notice of request for Final Acceptance to the Architect.

c. Costs relative to the Architects re-inspection due to failure of Work to comply with claims made by the Contractor, will be compensated by the Owner, who will deduct the amount of such compensation from the Final Payment due to the Contractor.

C. After the Architect finds the Work acceptable, the Architect will review the Final Close-out submittals.

D. Application for Final Payment: Submit Application for Final Payment in accordance with procedures and requirements of the General Conditions and Supplementary Conditions.

1. The Architect will prepare a Final Change Order, reflecting approved adjustments to the Contract Sum not previously made by other Change Orders.

1.6 CONFERENCES AFTER SUBSTANTIAL COMPLETION

A. The Owner reserves the right to call for conferences commencing with the date of Substantial Completion and continuing for one year thereafter, for purposes of inspecting the Work and to plan correction of any deficiencies or failures discovered during this period.

1. Attendance is required by Contractor's Project Manager, Architect, Resident Project Representative and each applicator, installer, and supplier as the Owner may direct or the Contractor may wish to have present. All representatives attending such meetings shall be the same persons, or shall have the same powers and authority, as those attending progress meetings occurring prior to the Date of Substantial Completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 77 00

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SECTION 01 78 00
CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 SUMMARY

A. Project record documents.

B. Record Project Manual.

C. Project Record Drawings (As built drawings).

D. Final Site Survey.

E. Operation and maintenance data, preventive maintenance instructions.

F. Materials and finishes manual.

G. Pest control inspection and report.

H. Maintenance contracts.

I. Spare parts and maintenance materials.

1.2 RELATED REQUIREMENTS

A. Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION:

1. Coordination Drawing Requirements.
2. CAD File Requirements for base sheets to prepare Project Record Drawings (As-builts).

B. Section 01 78 36 – WARRANTIES: Administrative and procedural requirements for warranties, guarantees and bonds.

1.3 PROJECT RECORD DOCUMENTS

A. General: Record documents shall reflect actual "as-built" condition and the products installed. Include all changes and deviations from original Contract Documents, and incorporate information from:

1. Original Contract Documents.
2. Addenda.
3. Change orders.
4. Construction change directives.
5. Field directives, and instructions from the Owner, Architect or regulatory authorities having jurisdiction.

B. Project Record Documents include, but are not limited to:

1. Record Project Manual.
2. Project record drawings (as built drawings).
3. Final Site Survey.
4. Operation and maintenance data, preventive maintenance instructions.
5. Materials and finishes manual.
6. Product warranties and bonds.
7. Maintenance contracts.
8. Record of all test reports and inspections.
9. Wall charts and data such as valve diagrams, electrical panel board directories, and similar information.

C. Labeling and identification of Record Documents

1. Clearly label all record documents with name of Project and the words "Record Document".
2. Date progressive entries of information as appropriate.
3. Date Record Documents with the final submission date.

1.4 SUBMITTAL QUANTITY REQUIREMENTS

A. Furnish Architect with the following quantities of each submittal:

1. Record Project Manual: 4 bound copies.
2. Project record drawings (as-builts):
   a. 2 sets of Drawings in Autocad™ format. Verify release version and disc type with Owner prior to submittal.
   b. 2 "blackline print" sets of Drawings.
3. Final Site Survey: 4 copies.
4. Operation and maintenance data, preventive maintenance instructions: 4 bound copies.
5. Owner Training Video for operation of building systems and major equipment: 2 copies.
6. Materials and finishes manual: 2 bound copies.
7. Product warranties and bonds: 2 copies
8. Maintenance contracts: 2 copies
9. Record of all test reports and inspections: 4 copies.

1.5 RECORD PROJECT MANUAL

A. The General Contractor is responsible to maintain a Project Manual reflecting revisions and changes to the Original Issue Project Manual.

1. Clearly label the Record Project Manual as "Record Document Specifications, in a three ring binder.

2. Do not use Record Project Manual for construction purposes; protect from loss in a secure location.
3. Record all variations and deviations to the Contract Documents, including changes made by Addenda, Bulletin, Change Order, Change Directive and other modifications to the Contract.
   a. Cut and paste revisions into their applicable specification section.
   b. Identify all changes with cross-reference to appropriate Addendum Number, Modification Number, Change Order Number
4. In each individual Specification Section, under "*Part 2 – Products*", identify all manufacturers and products which are actually used as part of the Work.
5. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

B. Record Project Manual: Provide prior to request for Final Acceptance.
1. Manuals shall be in 8-1/2 by 11 inch pages and bound in 3-ring (D-shape) binders with durable plastic covers. Internally subdivide the binder contents by Division with permanent page dividers.
2. Label front cover and spine of each binder with laser printed titles, dates, and project information.
3. All information from "in-progress" manual shall be clearly and completely transferred.
4. Pages shall be undamaged.

1.6 PROJECT RECORD DRAWINGS

A. The General Contractor is responsible to maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and shop drawings for preparing the record drawings.
1. Where shop drawings are used, record a cross-reference at the corresponding location on the Contract Documents.

B. Do not use Record Documents for construction purposes; protect from loss in a secure location. Mark-up these drawings to show clearly and completely the actual installation reflecting all changes made in the Work during construction.
1. Mark whichever drawing is most capable of showing conditions accurately.
2. Record all variations and deviations to the Contract Documents, including changes made to schedules, details, and all architectural changes to structure, exterior enclosure, interior partitions and ceilings.
3. Record new information that is important to the Owner, but was not shown on the Contract Drawings or shop drawings.
4. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

C. The fire protection, plumbing, mechanical and electrical trades shall be responsible to the Contractor to keep the record documents for their portions of the work marked currently to record all changes in the mechanical and electrical work made during construction.

D. The Architect may periodically inspect these record drawings, and their proper maintenance may be a condition precedent to approval of applications for periodic payments.

E. Deliver all Project Record Documents, shop drawings, product data, and samples to the Architect for the Owner's use, upon completion of the Work and prior to request for Final Acceptance of the Work.

F. In addition at the completion of the work, the General Contractor is responsible for the preparation and submittal of neat, clean well drafted, and complete record drawings, at no additional costs to the Owner. These reproducible Project Record Documents shall be transmitted to the Architect as a condition precedent to final payment, and include documents prepared by the fire protection, plumbing, mechanical and electrical trades.

1.7 FINAL SITE SURVEY

A. Under provisions of Section 01 73 00 - EXECUTION, Surveyor shall provide final corrected submission of Final Site Survey (As-built Property Survey) after work has been completed.

1. Final site survey shall show significant features for the Project. Include a certification, signed by the Surveyor, to the effect that metes, bounds, lines and levels of the Project are accurately positioned as shown on the survey.

B. Survey format shall be in accordance with requirements of the authorities having jurisdiction, and show the following as a minimum:

1. Property boundaries.
2. All required legal descriptions.
3. Bench marks.
4. Completed foundation work.
5. Building extremities.
6. Pad mounted equipment.
7. All paving work.
8. Revisions to wetland areas.
9. Easements and modifications to easements.
10. Underground utilities and all changes in existing utilities.

C. Record deviations from required lines and levels. Advise the Architect when deviations that exceed indicated or recognized tolerances are detected. On Final Site Survey, record deviations that are accepted and not corrected.

D. Submit signed, sealed and certified copies shall be provided to the architect's office for review prior to filing with authorities having jurisdiction. Ensure information is complete, accurate submitted in a timely fashion.

1. Recording: At Substantial Completion, have the final survey recorded by or with local authorities as the official "Property Survey".

1.8 OPERATION AND MAINTENANCE MANUALS

A. Prepare data in the form of an instructional manual. Furnish manuals which contain all of the following groups of equipment:

1. Elevators.
2. Special equipment and systems.
3. Fire protection system.
4. Utilities and plumbing systems.
5. Heating, ventilation and air conditioning system.
6. Electrical systems.

B. Furnish bound and properly identified Manuals prior to request for Final Acceptance.

1. Manuals shall be in 8-1/2 by 11 inch pages and bound in three "D ring" capacity binders with durable plastic covers. Internally subdivide the binder contents with permanent page dividers.

a. Arrange content by section number and systems, process flow, under section numbers and sequence as listed in the Table of Contents of this Project Manual.

b. Drawings: Preferable 11 inches in height bound in with text with reinforced punched binder tab. Fold drawings larger than 8-1/2 by 11 inches to size of text pages. Provide a drawing pocket for Drawings larger than 11 by 17 inches; locate pocket inside rear cover or bound in with text.

2. Each manual shall include the same following minimum information:

a. Table of Contents.

b. Directory of Contractor, subcontractors, and major equipment supplies listing addresses, phone numbers and appropriate emergency phone numbers.

1) Include local sources of supplies and replacement parts.

c. Directory of Architect and consultants listing addresses and phone numbers.

d. Operation and maintenance instructions. Provide schematic diagrams of control systems, circuit directories for each electric panel and charts showing the tagging of all valves.

e. Air and water test and balancing reports.

f. Maintenance and cleaning instructions for finishes.

g. Product and manufacturer's Certificates.

h. Photocopies of all extended warranties and bonds.

3. Submit one copy of completed volume in final form 21 days prior to Final Inspection. This copy will be returned after final inspection with Architect's comments; Revise and submit all volumes to Owner.

C. For each item of equipment, include description of equipment, component parts and accessories. Identify function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number of replaceable parts. Additionally provide the following for each item:

1. Panelboard circuit directories: Provide electrical service characteristics, controls and communications.

2. Include color coded wiring diagrams as installed.

3. Operating procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

4. Maintenance requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and re-assembly instructions; alignment, adjusting, balancing, and checking instructions.

a. Maintenance drawings: Supplement product data to illustrate relation of component parts of equipment and systems, to show control and flow diagrams. Do not use project Record Documents as maintenance drawings.

5. Provide servicing and lubrication schedule, and list of lubricants required.

6. Include manufacturer’s printed operation and maintenance instructions.

7. Include sequence of operation by controls manufacturer.

8. Provide control diagrams by controls manufacturer as installed.

9. Provide Contractor’s coordination drawings, with color coded piping diagrams as installed.

10. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

11. Provide original manufacturer’s parts (OEM) list, illustrations assembly drawings, and diagrams required for maintenance.

a. Provide list of original manufacturer’s spare parts (OEM), current prices, and recommended quantities to be maintained in storage.

b. Include local source of supplies and replacement parts, and any other data pertinent for procurement procedures.

12. Additional requirements: As specified in individual specification Sections.

D. Standards:

1. Measurements: Provide all measurements in U.S. standard units such as feet and inches, pounds, and cfm; provide additional measurements in the "International System of Units" (SI).
2. Abbreviations: Provide complete nomenclature of all parts of all equipment; include part numbers of all replaceable parts.

1.9 MATERIALS AND FINISHES MANUAL

A. Furnish bound and properly identified manuals for all materials and finishes prior to request for Substantial Completion review.

1. Manuals shall be in 8-1/2 by 11 inch pages and bound in three “D ring” capacity binders with durable plastic covers. Internally subdivide the binder contents with permanent page dividers and logically organized.
2. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.
   a. Arrange content by section number and systems, process flow, under section numbers and sequence as listed in the Table of Contents of this Project Manual.
   b. Drawings: Preferable 11 inches in height bound in with text with reinforced punched binder tab. Fold drawings larger than 8-1/2 by 11 inches to size of text pages. Provide a drawing pocket for Drawings larger than 11 by 17 inches larger drawings; locate pocket inside rear cover or bound in with text.

B. Manuals shall include the following:

1. Product data, with catalog number, size, composition, and color and texture designations for all building products, applied materials, and finishes. Provide information for re-ordering custom manufactured products.
2. Instructions for care and maintenance: Include manufacturer’s recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
3. Moisture protection and weather exposed products: Include product data listing applicable reference standards, chemical composition, and details of installation. Provide recommendations for inspections, maintenance, and repair.
4. Additional requirements: As specified in individual specification Sections.

1.10 PEST CONTROL INSPECTION AND REPORT

A. Engage an experienced, licensed exterminator to make a final inspection and fully rid Project of rodents, insects, and other pests.

1. Prepare and submit report, identify:

a. Area or areas which were treated.

b. Rodentcides used.

c. Manufacturer's data including MSDS, special precautions and applications instructions.

d. Pollution preventive measures employed.

1.11 SPARE PARTS AND MAINTENANCE MATERIALS

A. Provide products, spare parts, maintenance and extra materials in quantities specified in individual specification Sections.

B. Deliver materials to on-site location designated by the Owner; obtain receipt.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 00

SECTION 01 78 36
WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

A. General: This Section specifies general administrative and procedural requirements for warranties, guarantees and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties. Warranty, Guarantee and Bond requirements of this Section are applicable to all trades, all Divisions of the Specifications, and applies to all Work performed under this Contract.

1. Warranties required under the Contract are in addition to and not in lieu of any remedy or warranty to which the Owner is entitled under law.
2. Warranties required under the Contract are not a waiver of Owner's legal rights.

B. Contractor's Procurement Obligations: Do not purchase, subcontract for, or allow others to purchase or sub-subcontract for material or units of work for project where a special project warranty, certification or similar commitment is required, until it has been determined that entities required to countersign such commitments are willing to do so.

1.2 RELATED REQUIREMENTS

A. General provisions of the Contract, including General and Supplementary Conditions apply to this Section.

B. Individual Specification Sections contain additional specific requirements for warranties and bonds.

C. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

1.3 DISCLAIMERS AND LIMITATIONS

A. General Limitations: It is recognized that specific warranties are intended primarily to protect Owner against failure of the work to perform as required, and against deficient, defective, and faulty materials and workmanship, regardless of sources.

B. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor .

1. Pro-rating of warranties: Except where explicitly specified otherwise, each warranty issued shall cover the full cost of warranty-related repairs throughout the full term of the warranty.

1.4 DEFINITIONS

A. Categories of Specific Warranties: Warranties on the work are in several categories, including those of General Conditions, and including (but not necessarily limited to) the following specific categories related to individual units of work specified in sections of Divisions 2 through 50 of these Specifications:

1. General Contractor's Comprehensive Warranty: The General Contractor shall provide a comprehensive one-year warranty covering all labor, materials, equipment and work related to the entire Contract, and shall promptly repair or replace defective and deficient work.
2. Special Project Warranty (Guaranty): A warranty specifically written and signed by contractor for a defined portion of the work; and, where required, countersigned by subcontractor, installer, manufacturer or other entity engaged by Contractor. Special Warranties extend time limits provided by standard warranties or to provide greater rights for the Owner.
3. Specified Product Warranty: A warranty which is required by Contract Documents, to be provided for a manufactured product incorporated into the work; regardless of whether manufacturer has published a similar warranty without regard for specific incorporation of product into the work, or has written and executed a special project warranty as a direct result of Contract Document requirements.
    a. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the Owner.
4. Coincidental Product Warranty: A warranty not specifically required by Contract Documents (other than as specified in this Section), but which is available on a product incorporated into the work, by virtue of the fact that manufacturer or product has published warranty in connection with purchases and use of product without regard for specific applications except as otherwise limited by terms of warranty.

1.5 WARRANTY REQUIREMENTS

A. Warranty Period Commencement Date: Effective stating date for Warranty periods is the Date of Substantial Completion for Project.

1. Equipment and systems start-up, operation and use, occurring prior to Project Substantial Completion, will not be considered commencement of warranty period under any terms of this Contract.
2. Exceptions: Starting dates for warranties prior to the Project Date of Substantial Completion are not permitted, except for the two conditions below:
    a. Warranty requirements specified in individual specification sections explicitly specify that a required warranty or guarantee shall be effective on date of shipment, date of manufacturer, or date of installation.

b. Warranties for Incomplete work: The effective date for warranty of work which has not been completed prior to the Date of Substantial Completion, shall be effective on the date of Final Completion and Owner's acceptance of the Work.

B. Related Damages and Losses: In connection with Contractor's correction of warranted work which has failed, remove and replace other work of project which has been damaged as a result of such failure, or must be removed and replaced to provide access for correction of warranted work.

1. Consequential Damages: Except as otherwise indicated or required by governing regulations, special project warranties and product warranties are not extended to cover damage to building contents (other than work of Contract) which occurs as a result of failure of warranted work.

C. Reinstatement of Warranty Period: Except as otherwise indicated, when work covered by a special project warranty or product warranty has failed and has been corrected by replacement or restoration, reinstate warranty by written endorsement starting on date of acceptance of replaced or restored work.

1. Reinstated warranty value: The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

2. Reinstated warranty period: A period of time ending upon date original warranty would have expired, if there had been no failure, but not less than half of original warranty period of time.

D. Warranties are Irrevocable: Warranties issued to the Owner are irrevocable.

1. Non-Payment: If warrantor refuses to issue warranty, or attempts to revoke warranty due to lack of payment by any party other than the Owner, the Contractor shall resolve the payment conflict, and cause the warranty to be issued or reinstated.

2. Incomplete or incorrect Installation: If warrantor refuses to issue warranty, or attempts to revoke warranty due to improper installation or other deficiency, the Contractor shall correct the deficiency and cause the warranty to be issued or reinstated.

E. Transferable Warranties: All warranties shall permit Owner to transfer or assign warranties to future owners or other assignors at no additional cost to the Owner for the full warranty period.

F. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.

1. Work repairs or replaced under warranty shall be warranted for the full duration of the original warranty.

G. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

H. Rejection of Warranties:

1. Owner reserves the right, at time of substantial completion or thereafter, to reject coincidental product warranties submitted by Contractor , which in opinion of Owner tend to detract from or confuse interpretation of requirements of Contract Documents.
2. Owner reserves the right to reject warranties and to limit selection to products with warranties which are not in conflict with the requirements of the Contract Documents.

I. Owner’s right to refuse Work: The Owner reserves the right to refuse to accept work for the project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.6 COMPREHENSIVE WARRANTY

A. Comprehensive Warranty: In addition to all other warranties, the General Contractor shall issue a Comprehensive Total Contract Warranty which shall include all work of this Contract, without limitation including consequential damages.

1. Duration of Comprehensive Warranty: One full year from date of Substantial Completion.
2. Consequential damages: Warranty includes consequential damages which relate to a warranty claim, these include without limitation:
   a. All costs required to uncover and repair all work related to warranty claim.
   b. All costs relating to repair and restoration of damaged property, resulting from warranty claim.
   c. All costs resulting from failure to conform to the Contract Documents, and for required rebuilding, construction or reconstruction to correct work.
   d. Perform to the satisfaction of the Owner all repairs, reconstruction, and restoration to original condition of adjacent and related work affected by damage under a warranty claim.

B. Warranty Claims: Owner will notify General Contractor in writing of each warranty claim. Warranty repairs shall be completed within 30 days of written notice, except as pre-approved by Owner.

1. In the event of an emergency condition, where in the reasonable opinion of the Owner an immediate repair under warranty is necessary, warranty repairs shall be completed within 14 calendar days from date of notice.
2. Owner's right to correct: In the event the Contractor fails to respond to a warranty claim within the specified time limits, the Owner reserves the right to make the necessary corrections or repairs and recover all costs and expenses from the General Contractor.

C. Contractor's responsibilities under Comprehensive Warranty:
1. Notify in writing each affected warrantor and original Filed-Subcontractor, subcontractor, installer, vendor as appropriate to the warranty claim.
2. Trade Subcontractor, Manage the warranty claim for the Owner.
3. Assist the Owner in obtaining warranty satisfaction.
4. Arrange and manage all warranty related work including work relating to consequential damages.

1.7 SUBMITTALS

A. Submit written warranties to the Owner prior to the date certified for Substantial Completion. In compliance with requirements specified under Section 01 77 00 – CLOSEOUT PROCEDURES and Section 01 78 00 – CLOSEOUT SUBMITTALS.
1. When a designated portion of the Work is completed and occupied, or used by the Owner by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Owner within 14 calendar days of completion of the designated portion of Work.
2. Refer to individual section of Divisions 2 through 50 for the determination of units of work which are required to be specifically or individually warranted, and for the specific requirements and terms of those warranties (or guarantees).
3. Specific Warranty Forms: Where a special project warranty (guaranty) or specified product warranty is required to be executed, prepare a written document to contain terms and appropriate identification, ready for execution by all required parties (including manufacturers, vendors, and subcontractors). Submit draft to Owner (through Architect) for approval prior to final executions.

B. Form of Submittal: At Final Completion, compile three (3) copies of each required warranty and bond properly executed by the General Contractor, or by the General Contractor , subcontractor, supplier or manufacturer. Organize the warranty documents into an orderly sequence based on the Table of Contents of the Project Manual.
1. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl-covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2" by 11" paper.

2. Provide heavy paper dividers with celluloid-covered tabs for each separate warranty. Mark the 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 the installer.
3. Identify each binder on the front and the spine with the typed or printed title "WARRANTIES AND BONDS", the project title or name, and the name of the General Contractor.
4. When operating and manuals are required for warrantied construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 SCHEDULE

A. Provide warranties on products and installations as specified in individual specification Sections in Divisions 2 through 50 of the Project Manual.

END OF SECTION 01 78 36

SECTION 01 79 00
DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Demonstrating equipment.

B. Instruction and training of Owner's personnel.

1.2 DEMONSTRATING EQUIPMENT

A. Demonstrate operation and maintenance of Products to Owner's personnel 2 weeks prior to date of Substantial Completion.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owners' personnel in detail to explain all aspects of operation and maintenance.

D. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at agreed-upon times, at equipment location.

E. Prepare and insert additional data in operations and maintenance manuals specified under Section 01 78 00 - CLOSEOUT SUBMITTALS when need for additional data becomes apparent during instruction.

1.3 INSTRUCTION AND TRAINING OF OWNER'S PERSONNEL

A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.

B. For equipment requiring seasonal operation, perform instructions for other seasons within six months .

C. Use operation and maintenance manuals as basis for instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Prepare and insert additional data in Operation and Maintenance Manual when need for such data becomes apparent during instruction.

E. Provide sufficient formal instructional time for training Owner's personnel, so that the Owner's personnel will fully comprehend operation and maintenance of the facility's equipment and systems. Contractor's personnel designated for Owner

training shall be competent and knowledgeable and have good communication skills.

1. Training sessions shall be pre-arranged directly with the Owner.
    a. Instructors shall arrive at pre-scheduled training sessions on-time and be fully prepared to teach using a preplanned training program.
    b. All instructors are subject to the Owner's approval. Replace unacceptable instructors and reschedule training as directed by the Owner at no increased cost to the Owner.
2. Training shall include the following:
    a. General overview of Record Documents:
        1) Record Drawings.
        2) Record Project Manual.
        3) Operation and Maintenance Manuals.
        4) Finishes.
        5) Warranty and maintenance agreements.
        6) Test reports and inspections.
    b. Fire suppression systems and equipment.
    c. Fire alarm systems and equipment.
    d. HVAC systems and equipment.
    e. Plumbing systems and equipment.
    f. Electrical systems and equipment.

F. Video Training Record: The Owner may, at its sole option, video record the instruction and training of the Owner's personnel. The Contractor and its subcontractors shall cooperate with the Owner.

G. Final payment is condition precedent on completion of Owner training (instruction). Contractor is required to submit affidavit that training and instruction of Owner’s personnel is completed.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 79 00

SECTION 02 41 19
SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY

A. General: The work described in this Section consists of selective demolition, cleaning, removal and legal disposal of all structures, equipment and materials indicated for demolition, or careful removal and temporary storage of materials and equipment indicated for salvage and re-use, or salvage and delivery to Owner. No attempt is made in this Section to list the entire scope of selective demolition required on this project or to describe each element to be removed. Drawings indicate both existing construction and final construction. It is the responsibility of the General Contractor to determine for itself the scope and nature of the existing materials, equipment and finishes required for removal or salvage, based on the information provided in the full set of Contract Documents.

1. Comply with requirements of Section 01 35 91 – HISTORIC TREATMENT PROCEDURES and Section 01 73 29 - CUTTING AND PATCHING.

B. Permits: Obtain and pay for all demolition and construction permits required by local authorities having jurisdiction and other regulatory agencies and utility companies.

C. Selective demolition and removal work includes, but is not limited to:

1. Remove existing bulkhead addition
2. Remove concrete slabs where indicated.
3. Cut existing concrete slabs and trench at floor drains and plumbing located beneath basement floor slabs.
4. Remove existing interior and exterior stairs where indicated.
5. Remove existing lights, diffusers, grilles, speakers and similar equipment where scheduled to be replaced.
6. Remove storage shelving, cabinetry, casework and similar items
7. Remove designated exterior walls, interior partitions, ceiling and suspension systems, and flooring systems
8. Remove designated doors, frames and associated hardware. Disconnect abandoned wiring and accessories for electrified hardware.
9. Remove all furnishings, utilities, equipment and fixtures, not indicated for salvage or re-use, and abandoned materials of all kinds.
10. Remove from site all abandoned, disconnected and dismantled fire protection, plumbing and mechanical equipment, including piping, conduits, system wiring, meters and other devices.

11. Remove from site all abandoned, disconnected and dismantled electrical fixtures and equipment, including conduits, wiring, meters and other devices.
12. In addition to demolition specifically shown, cut, move or remove existing construction to remain as necessary to provide access or to allow alterations and new work to proceed. Coordinate such relocation's and removal to accommodate the demands and requirements of other trades.
13. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals and deteriorated concrete.

D. Selective demolition and removal work by Filed Subcontractors and subcontractors includes, but is not limited to the following:

1. Each Filed subcontractor and subcontractor shall disconnect cut, cap and make safe all utilities, equipment and fixtures which are not indicated for salvage or re-use, or otherwise indicated to be abandoned in place as well as any abandoned materials of any kind.
    a. Disconnect cut, cap and make safe, all utility services indicated to be demolished at their primary source. Obtain the approval from authorities having jurisdiction, or applicable service provider prior to the execution of the work.
    b. Cut, cap and make safe all existing utility services indicated to be abandoned in place, where so indicated on the Drawings.
2. The Plumbing Filed subcontractor shall disconnect, detach and dismantle all existing abandoned plumbing systems and equipment including, but not limited to, fixtures, equipment, water heaters, piping, hangers, valves, insulation and appurtenances.
    a. Piping at slab will be disconnected by Plumbing Filed subcontractor.
    b. Suspended hangers, piping, equipment, fixtures and appurtenances scheduled for demolition, shall be disconnected and lowered to floor by the Plumbing Filed subcontractor.
3. The HVAC Filed Subcontractor shall disconnect, detach, dismantle all existing abandoned heating, ventilating, and air conditioning systems including, but not limited to, air handlers, air conditioners, pumps, cabinet unit heaters, unit heaters, radiation, exhaust fans, intakes, louvers, diffusers, grilles, and all related piping, ductwork, controls, and appurtenances.
    a. Suspended hangers, equipment, ductwork and appurtenances scheduled for demolition, shall be disconnected and lowered to floor by HVAC Filed subcontractor.
4. The Electrical Filed subcontractor shall disconnect, detach, dismantle all existing abandoned electrical systems and equipment including, but not limited to, panelboards, light fixtures, fire alarm, intercom, speakers, wiring devices, and all related conduit and appurtenances.

a. Suspended wiring, conduit, hangers, fixtures, equipment, and appurtenances scheduled for demolition, shall be disconnected and lowered to floor by the Electrical Filed subcontractor.

5. Remove, salvage and furnish to the General Contractor designated equipment, fixtures or other items so identified. Refer to notes on Drawings.
6. Identify locations of utilities for work of other sections.

E. Remove, salvage and provide storage for removed materials, equipment and furnishings indicated for reuse, including but not limited to:

1. Wood flooring.
2. Wood trim.
3. Weathervane.

F. Remove, salvage, and furnish to Owner for maintenance stock, or other future use, the following products. Carefully package and clearly identify prior to delivery to Owner.

1. TBD.

G. Conduct walk-through of existing site prior to commencement of selective demolition work and jointly identify and tag with Owner items required to be salvaged for the following

1. Identify products for Owner's own use.
2. Identify products for salvage and reuse.
3. Identify products of historic significance for salvage and determine disposition.

H. Identify locations of utilities for work of other sections.

1.4 OWNERSHIP OF REMOVED MATERIALS

A. If during the work, articles of unusual value, or, of historical or archaeological significance, are encountered (which have not previously identified as such in the Contract Documents) the ownership of such articles is retained by the Owner. Upon discovery, immediately furnish to the Architect and Owner, information regarding their discovery Resolution shall be handled as a Change in the Work.

B. Ownership of materials, equipment and furnishings designated for salvage for re-use in this Project or designated for Owner's use is retained by the Owner.

C. Ownership of materials, equipment and furnishings to be removed from the Project which are not defined by the above two paragraphs is retained by the General Contractor; if any of these are considered of salvageable value to the General Contractor, they may be removed from the Project as work progresses.

1. On-site storage or sale of removed items is prohibited.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.
2. Hazardous materials: When hazardous materials are encountered, they shall be handled, removed, and disposed of in accordance with all regulatory agency requirements.
3. Coordinate and arrange with utility, mechanical and electrical trades for their disconnecting, rerouting and maintenance of existing services leading to adjacent occupied buildings, as part of the work of this Contract.
4. Coordinate Work of this Section with related utilities work identified in the Contract Documents.

B. Pre-Demolition Meeting: At least two weeks prior to commencing the work of this Section, conduct a pre-demolition conference at the Project site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION. Coordinate time of meeting to occur prior to installation of work under the related sections named below.

1. Required attendees: Architect, General Contractor 's project manager and on-site superintendent, demolition subcontractor's project superintendent, and representatives of related utility trades.
2. Conference Agenda:
   a. Scheduling of demolition operations. Review critical demolition sequencing with other work.
   b. Coordination of utility service requirements and disconnects.
      1) Review functioning utility services which are to remain in service throughout demolition work.
      2) Review requirements for marking location of disconnected utilities, and project record (as-built) requirements.
   c. Review conditions of existing construction to be demolished.
      1) Review extent and location of selective demolition.
      2) Review special demolition and salvage procedures required for historic building elements.
      3) Exploratory demolition and concealed conditions.
   d. Coordination of demolition work with work of other contracts.
   e. Review shoring and bracing procedures, and structural load limitations of existing structure.
   f. Review of site use, staging, and storage locations for salvaged materials and materials for recycling program.
   g. Emergency weather protection procedures and weather limitations.
   h. Review conditions of existing construction to be demolished.

i. Review structural load limitations of existing structure.

j. Review extent and location of selective demolition. Review areas where existing construction is to remain and requires protection

k. Review special requirements for temporary protection of existing finishes and materials to remain.

l. Review requirements of work performed by other trades that rely on substrates exposed by demolition operations.

m. Procedures for processing field decisions.

n. Procedures for handling hazardous materials.

o. Review fire protection procedures for cutting torches, and other potentially hazardous operations.

p. Review general safety regulations and requirements for demolition work.

C. Sequencing:

1. Coordinate and arrange with mechanical and electrical trades for their disconnecting, rerouting and maintenance of existing services in the buildings as required, as part of the work of this Contract.

D. Scheduling:

1. Comply with all requirements of this contract relative to protection, scheduling, phasing, and coordination with the Owner.

1.6 SUBMITTALS

A. Information and Review Submittals: Submit the following under provisions of Section 01 33 00 - SUBMITTAL PROCEDURES:

1. Schedule: Prior to commencement of work, prepare a schedule indicating proposed methods and sequence of operations for demolition work.

a. Include coordination for shut-off, capping, and continuation of utility services as required, together with details for dust and noise control protection.

b. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner's on-site operations. Receive acceptance from Architect prior to commencing work.

2. Shop drawings: Indicate demolition sequencing and locations of salvageable items.

3. Design Data: Submit calculations for bracing and shoring, signed and sealed by professional engineer registered in the Commonwealth of Massachusetts.

4. Permits: Submit copy of permits required by regulatory agencies for demolition.

5. Special Procedure Submittals: Submit copies of written agreements from private landowners, landfill operators, or other agencies accepting disposal of

demolished materials at least two weeks prior to commencement of demolition work.

B. Closeout Submittals: Submit the following under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

1. Record Documentation: Indicate actual location of capped site utilities.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable codes for demolition work, safety of structure, dust control, and disposal of debris. Conform to procedures applicable when discovering hazardous materials or contaminated substances.

1. The General Contractor is directed not to disturb or attempt removal of any discovered hazardous materials or contaminated substances. Immediately notify both the Owner and the Architect upon discovery of such conditions.

B. Obtain and pay for required permits and licenses required from authorities prior to commencing demolition work. Arrange and pay for legal disposal of removed materials and equipment, obtain proper disposal receipts for verification.

C. Notify affected utility companies and Owner before starting work and comply with utility company requirements.

D. Do not close or obstruct egress width to exits. Do not disable or disrupt building fire or life safety systems without 3 days prior written notification to the Owner.

1.8 QUALITY ASSURANCE

A. General: Conduct the work in a manner giving prime consideration to protection of the public; protection from the weather, control of noise, shocks and vibration; control of dirt and dust; orderly access for and storage of materials; protection of existing buildings; protection of adjacent surfaces and property; coordination and cooperation with the Owner at all times.

1. Comply with all requirements of this contract relative to protection, scheduling and coordination with the Owner.

B. Qualifications:

1. Demolition: Company specializing in performing work of this section with minimum 3 years documented experience.
2. Shoring and bracing design: Design shoring, and bracing, under direct supervision of Professional Engineer experienced in design of this Work and licensed at Project location.

1.9 SITE CONDITIONS

A. Comply with wind and weather conditions established at pre-demolition meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Condition of Structures: Owner assumes no responsibility nor makes any claim as to the actual condition or structural adequacy of any existing construction to be demolished. The General Contractor shall investigate and assure himself of the condition of the work to be demolished and shall take all precautions to ensure safety of persons and property.

1. Notify both Owner and Architect, if any type of hazardous chemicals, gases, explosives, flammable material, unmarked containers, or similar dangerous substances are discovered. Cease work in affected areas until directed by Architect. Continue work in other areas.

B. The General Contractor shall have examined the existing conditions per requirements of the Conditions of the Contract and Division 1 - General Requirements, and reviewed Contract Documents prior to commencement of demolition. Coordinate and verify scope of selective demolition with other portions of work specified in other sections, and under separate Contract. Change orders will not be issued for the removal of any exposed to view materials or equipment, which are either indicated on the Drawings for removal, or not indicated, but necessary to remove for the Work of this Project.

C. Prior to commencement of selective demolition work, inspect areas in which work will be performed. Photograph existing damage to structure surfaces, equipment, or to surrounding properties which could be misconstrued as damage resulting from selective demolition work; file with Architect prior to starting work. Comply with requirements of Section 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION.

3.2 PREPARATION

A. General: Provide necessary protection of non-work areas during demolition operations. Provide, erect and maintain temporary barriers as required to protect non-construction related pedestrian and vehicular traffic using the adjacent portions of the site and building.

1. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued Owner occupancy of adjacent facility.

B. Protect existing structures which are not to be demolished. Protect designated materials and equipment to be removed and retained by Owner.

1. Cover or otherwise protect as necessary existing equipment, furniture and furnishing located beyond the immediate demolition work.
2. Protect existing landscaping materials, structures, and appurtenances which are not to be demolished.

C. Prevent movement of structure; provide required bracing and shoring.

1. Protect existing active utility services and structures from damage during selective demolition work including during installation of bracing and removal of same. Repair or replace damages to satisfaction of Owner.

D. Dangerous Materials: Drain, purge, or otherwise remove, collect, and dispose of chemicals, gases, explosives, acids, flammables, or other dangerous materials before proceeding with demolition operations.

3.3 GENERAL REQUIREMENTS FOR SELECTIVE DEMOLITION

A. Conduct demolition to minimize interference with adjacent building areas, in compliance with governing laws and buildings, with prime consideration given to the safety, protection and convenience of the public and Owner's personnel.

1. Maintain protected egress and access to the Work at all times.

B. Perform selective demolition in an orderly and careful manner. Carefully cut materials to be removed to eliminate damage to portions to remain. Protect existing structure designated to remain.

1. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
2. Except as otherwise required by Project phasing requirements, proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
3. Locate equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
4. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent. Do not throw trash from windows or from roof.
5. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
6. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
7. Pull nails and fasteners which remain after removal of attached material. Remove lath, strapping and other substructures associated with finishes to be removed.
8. Where existing finishes are indicated to be removed, remove down to bare subsurface without causing damage to the subsurface.
    a. After removal of non-asbestos finish flooring materials. Remove underlying mastic and prepare substrate to receive new flooring materials by shotblasting method. Create a uniform 20 mil profile. Mechanically scarify areas which cannot be profiled by shot blast

method. Thoroughly wash all flooring substrate and leave clean and dry ready for application of new flooring materials.

C. Remove foundation walls and footings as indicated on Drawings, and where indicated, to a minimum of two feet beyond area of new construction.

D. Cutting openings and holes: Neatly cut openings and holes plumb, square, and true to dimensions required. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces.

1. All penetrations in floors and roof shall be framed with miscellaneous metal work prior to cutting and demolition of deck and concrete.
2. Repair damage done to existing elements of building to remain, except repairs specified to be provided under other Sections. Repairs shall be done in such manner as to closely match construction, appearance and quality of original work.

E. Use of cutting torches:

1. Do not use cutting torches until work area is cleared of flammable materials.
2. Maintain adequate ventilation when using cutting torches.
3. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations.
4. Maintain fire watch and portable fire-suppression devices during flame-cutting operations. Comply with fire prevention measures specified under Section 01 50 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

F. Carefully observe existing structure during demolition operations, cease operations immediately if structure appears to be in danger. Immediately notify both Architect and Owner's Project Representative. Do not resume demolition operations until directed.

G. Disconnect, cap and clearly identify designated utilities within demolition areas.

1. Cap and remove abandoned existing utilities back to locations indicated, or to limit line of Contract where terminations are not indicated.
   a. Pipes to be demolished that require a connection shall be removed to the extent required to install the new connection. Remove ripe sections by saw-cutting, removing a complete pipe section to an existing joint, or other adequate means which results in a clean joint.
2. Protect and maintain conduits, drains, sewers, pipes, and similar utilities that are not to be demolished

H. Disconnect existing equipment and fixtures to be removed, or services abandoned, and piping, wiring, and conduit which would otherwise be exposed in the finished

work. Remove from site disconnected equipment and fixtures and piping not to be reused.

1. General Contractor to remove and dispose of all equipment not tagged or scheduled for reuse.

I. Abandoned Equipment, Utilities, Systems: Remove in their entirety. Abandonment in place is not acceptable, except where an item is specifically indicated to be abandoned in place.

1. "Abandoned" means the item is not operational in the completed Contract.
2. Without limitation, remove abandoned pipes, tubing, conduits, wires, cables, ducts, equipment, machines, and all elements and items related to abandoned work including, without limitation, hangers, connectors, anchors, valves, drains, strainers, sumps, panels, mounting boards, grounding rods, ground connectors, boxes, dampers, plenums, insulation, escutcheons, trims, and all other related items.
3. Where an existing element is indicated to be abandoned in place, the abandoned item shall be cut off and, if hollow, capped.
   a. Cut off sufficiently below the finished plane to permit space for patching over the abandoned element. The General Contractor shall provide all cutting and chipping required to recess the cut element, and to coordinate depth of cut-offs required for finishing.

3.4 BRACING

A. Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move a brace, install new bracing prior to removal of original brace. Provide suitable bracing materials which will support loads imposed

B. Do not place bracing where it will be cast into or included in permanent concrete work, except as otherwise acceptable to Architect.

C. Install internal bracing, if required, to prevent spreading or distortion to braced frames.

D. Maintain bracing until structural elements are re-braced by other bracing or until permanent construction is able to withstand designed live and dead loads.

E. Remove bracing in stages to avoid disturbance or damage to existing structure.

F. Repair or replace adjacent work damaged or displaced through installation or removal of bracing work.

3.5 EXPLORATORY DEMOLITION AND CONCEALED CONDITIONS

A. Exploratory Demolition and Concealed Conditions:

1. Selective demolition work includes controlled exploratory demolition work which is indicated on Drawings and as may be additionally field directed by

the Architect. Additional exploratory demolition may also be required to thoroughly investigate and determine the exact location of existing concealed work or to expose concealed conditions to view.

2. Exploratory demolition may be used to clarify the Contract Documents to improve the interface of new and existing work.

B. Concealed conditions: Carefully check for concealed structure, pipes, conduits, wires, utilities, systems, and other elements before beginning cutting and selective demolition work.

C. Discovery: When unknown, concealed utilities and systems are discovered, verify the purpose, routing, circulation, origin, and termination of these items.

1. If the unknown, concealed items are part of a system to be abandoned, remove the item in its entirety.

2. Protect discovered concealed items are part of an existing system to be preserved and incorporated into the Work, or part of an active system to remain. Protect system elements from disturbance and notify both Owner and Architect and follow the Architect's directions

a. In circumstances when existing system to remain is damaged due to the Work (including cutting, demolition or exploratory investigation) notify both Owner and Architect immediately. Repair or re-route the damaged system components as directed by the Architect at no additional cost to the Owner

3.6 GENERAL DUST CONTROL

A. General Contractor shall employ dust and pollution prevention procedures at all times during construction.

1. Clean up loose debris daily, or more frequently as required, to prevent the wind spreading debris. Keep dumpsters covered when not in use.

2. Wet down debris (as appropriate) to prevent air pollution by dust rising from demolition work. Wet down dumpsters to prevent fires caused by vandals.

3. Employ tarpaulins on all trucks carrying debris.

3.7 SALVAGE MATERIALS AND PRODUCTS

A. Carefully salvage and provide safe storage for products designated for salvage, reuse, as indicated on the Drawings, as specified herein, or as requested by Owner for reuse on the project, or to be stored for Owner's future use. Take particular care with finished items and items requiring special handling.

1. Remove items indicated to be salvaged with extreme care to prevent damage.

2. All components and parts of salvaged items shall be saved and packaged.

B. Removed and Salvaged Items:

1. Clean salvaged items.

2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area as designated by Owner.
5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.8 SPECIFIC DEMOLITION REQUIREMENTS FOR MATERIALS AND SURFACES.

A. Floors, General:

1. Completely remove existing flooring located in areas scheduled to receive new flooring surfaces and as additionally indicated. Remove all finish flooring layers of flooring down to the existing substrate.
   a. Completely remove flooring systems to substrate, including full removal of all setting beds and adhesives.
2. Except for vinyl asbestos tile (VAT) remove resilient flooring and adhesive in strict accordance with the technical bulletin entitled " Recommended Work Practices for the Removal of Resilient Floor Covering", as issued by Resilient Floor Covering Institute (RFCI).
3. The General Contractor shall provide all patching of flooring substrates and subfloors. Respective finish flooring trades and Filed subcontractors are responsible for patching of finish flooring systems matching abutting surface.

B. Walls, General:

1. Remove interior walls and partitions as indicated and as needed to accommodate new work.
2. Where existing walls-to-remain are indicated to receive new finishes, completely remove trim and fasteners.

3. The General Contractor shall provide patching of substrates and back-up systems except where such materials are specified as part of a Filed subcontractors system. Finishes work shall be provided under individual product specification sections.

C. Ceilings, General:

1. Where ceilings are indicated to be removed, also remove ceiling mounted systems and equipment leaving only bare structure free from hangers.
2. Patching: The General Contractor shall provide patching of substrates and back-up systems except where such materials are specified as part of a Filed subcontractor's system. Ceiling work shall be provided under individual product specification sections.

D. Doors and Frames: Where doors and frames are indicated to be removed from walls or partitions which are to remain, remove doors and frames carefully so as to minimize damage to wall. Repair and patch wall as necessary to accommodate new door frame or other new work.

E. Below-grade voids: Existing basements, cisterns and other below grade voids shall be filled with compatible fill material suitable acceptable by Architect for proposed construction and compacted per specific requirements defined in Division 31.

F. Concrete, General: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain, using power-driven saw. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete indicated for selective demolition. Neatly trim openings to dimensions indicated.

G. Concrete Slabs (suspended and slabs-on-grade): Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals, using power-driven saw, then remove concrete between saw cuts.

H. Plumbing Equipment: Plumbing Filed Subcontractor specified under Division 22 is responsible to disconnect, cap and lower to floor items required to be removed, including but not limited to fixtures, equipment, water heaters, piping, hangers, valves, and insulation. General Contractor is responsible for removal from site and proper disposal.

I. Heating, Ventilation, Air Conditioning. and Refrigeration (HVAC&R) Equipment:

1. Drain system components designated for disposal of all lubricants, hydraulics, and refrigerants without releasing into atmosphere.
2. HVAC&R Filed Subcontractor(s) specified under Division 23 is responsible to disconnect, cap and lower to floor items required to be removed, including but not limited to, ductwork, piping, fans, VAV boxes, unit ventilators, and all similar system equipment. General Contractor is responsible for removal from site and proper disposal.

J. Electrical Equipment and Lighting Fixtures:

1. Electrical Filed Subcontractor specified under Division 26 is responsible to disconnect, cap and lower to floor items required to be including but not limited to, panelboards, light fixtures, and overhead devices including, fire alarm, intercom, bus ducts. General Contractor is responsible for removal from site.

3.9 REPAIRS

A. Repair all damage done to elements of buildings and structures to remain, except repairs specified to be provided under other Sections, or as indicated for removal in subsequent project phase(s). Repairs shall be done in such manner as to closely match construction, appearance and quality of original work.

3.10 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated or specified to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.

1. As work progresses, regularly remove demolished materials from site. Do not allow demolished materials to accumulate on-site, except as required for materials determined to be reused, salvaged, or as required for waste segregation and diversion for recycling.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Do not burn or bury demolished materials on site, arrange for legal disposal of the same.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.11 CLEANING

A. Daily cleaning: Sweep all street and roads affected by demolition operations.

B. Upon completion of the work of this Section; remove unused tools and equipment, surplus materials, rubbish, debris, and dust. Leave area in raked or broom-clean condition, as appropriate.

C. Upon completion of the work of this Section; clean adjacent structures and facilities of dust, dirt and debris caused by demolition work to the satisfaction of Owner, owner(s) of adjacent properties, and authorities having jurisdiction.

END OF SECTION 02 41 19

SECTION 03 01 36
RESURFACING AND PATCHING OF CONCRETE SLABS

PART 1 - GENERAL

1.1 SUMMARY

A. Grind down high spots in existing concrete surfaces to specified tolerances.

B. Shot blast clean existing concrete slabs free of dirt, laitance, corrosion, or other contamination ready to receive finish flooring.

C. Prepare substrates, level and patch existing concrete surfaces, and concrete surfaces disturbed by the Work of this Contract, including:

1. Restore concrete surfaces after conclusion of demolition.
2. Fill openings in suspended slabs where indicated.
3. Patch concrete at slabs-on-grade where trenching has occurred.

1.5 QUALIFICATIONS

A. Materials manufacturer: Company specializing in manufacturing the products specified in this Section with minimum 3 years experience.

B. Mixing and application equipment as approved by the manufacturer.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of materials.

C. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

D. Perform work to provide homogeneous concrete with required strength, durability, and without planes of weakness, and other structural defects, and free of air pockets, voids, projections, off sets of plane, and other defacements on exposed surfaces.

PART 2 – PRODUCTS

2.1 DESCRIPTION

A. General Description: Interior Work consisting of:

1. Cement and polymer-based, trowel applied underlayment and patching mortar, for conditions:
    a. Feather to 1/2 inch thick.
    b. 1/2 to 3 inches thick.
2. Portland cement concrete fill.

2.2 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
    1. Ardex Americas, Aliquippa PA.
    2. Bonsal American (Pro Spec), Charlotte NC.
    3. Silpro Corporation, Ayer MA.

2.3 UNDERLAYMENT AND PATCHING MORTAR

A. General: Provide products that are compatible with flooring adhesives.

B. Concrete resurfacing and underlayment for applications up to 1/2 inch thick: Factory blended portland cement-based product mixed with latex admixture, having the following performance characteristics:
    1. Thickness Range: From feather edge to 1/2" maximum thickness.
    2. Working Time: At least 30 minutes at 70°F.
    3. Compressive Strength: ASTM C109, minimum 4,700 psi after 28 days.
    4. Tensile Strength: ASTM C190, minimum 1,040 psi after 28 days.
    5. Flexural Strength: ASTM C348, 1,560 psi after 28 days.
    6. Bond Strength to Concrete: ASTM C321, Crossed brick method, failure in concrete.
    7. Acceptable products:
        a. Ardex: “SD-F Feather Finish”.
        b. Bonsal (Pro Spec): “Feather Edge”.
        c. Silpro: “Masco Underlayment and Repair Mortar with Silpro C21”.

C. Concrete resurfacing and underlayment for applications over 1/2 inch thick and up to 3 inches thick: Factory blended portland cement-based product with latex admixture, having the following performance characteristics:
    1. Thickness Range: From 1/2 inch to 3 inch maximum thickness. Provide without added aggregate, unless recommended by manufacturer for thickness required.
        a. Silpro: 1/2 to 3/4 inch without aggregate; use 3/8 inch pea stone for 3/4 to 3 inch thickness.

b. Ardex: 1/2 inch to 2 inches without aggregate; Use 3/8 pea stone for 2 to 3 inch thickness.

c. Bonsal (Pro Spec): 1/2 inch to 2 inches without aggregate; Use 3/8 pea stone for 2 to 3 inch thickness.

2. Working Time: At least 30 minutes at 70°F.

3. Compressive Strength: ASTM C109, minimum 6,000 psi after 28 days.

4. Tensile Strength: ASTM C190, minimum 710 psi after 28 days.

5. Flexural Strength: ASTM C348, minimum 1,200 psi after 28 days.

6. Shear Bond Strength: ASTM C1042, minimum 1,540 psi after 28 days.

7. Acceptable products:

a. Ardex: "SD-T".

b. Bonsal (Pro Spec): "Premium Patch 100".

c. Silpro: "Mascrete Topping and Structural Repair Mortar with Silpro C21".

D. Water: Clean and potable.

E. Primers: Unless otherwise recommended by underlayment and patching mortar manufacturer for substrate material, condition, and porosity encountered:

1. Ardex: "P-51".

2. Bonsal (Pro Spec): "118 Primer".

3. Silpro: "C 21 All Acrylic".

2.4 CONCRETE FILL MATERIALS

A. Minimum compressive strength of slabs on grade, and topping slabs on metal deck: 3000 psi at 28 days, unless otherwise indicated on the structural Drawings.

B. Maximum water to cement ratio: 0.45.

C. Concrete Materials:

1. Cement conforming to ASTM C 150, Type II - Normal.

2. Fine aggregates conforming to ASTM C 33; natural sand.

3. Course aggregates conforming to ASTM C 33; crushed stone or gravel.

4. Water: Clean and potable.

D. Concrete bonding agent: Two component epoxy bonding agent conforming with ASTM C881, Type 2.

2.5 ACCESSORIES:

A. Cleaning Agent: Commercial Muriatic acid.

B. Perimeter Joint Filler: Glass fiber strips, compressible to 50 percent original thickness under load of 25 pounds per square inch with full recovery. Conforming to ASTM C612, Class 2.

2.6 MIXING

A. Mix underlayment and patching mortars in strict compliance with manufacturer's written instructions. Do not overwater underlayment and patching mortars, do not retemper. Discard partially set underlayment and patching mortars which have not been placed.

PART 3 - EXECUTION

3.3 RESURFACING WORK - GENERAL

A. For spalling slab areas: Saw-cut around spalled areas to a depth of 1/2 to 3/4 inch. Angle bottom of saw cut away from spalled areas to provide keying. Chip out spalled area to saw cuts, chip area flat and level. Fill voids flush with surface with underlayment patching material.

B. In locations where concrete is loose, chipped or missing to a depth of more than 3 inches; dowel stainless steel reinforcing into existing concrete. Drill holes in existing concrete equal to depth of repair; insert 1/4-inch diameter stainless steel dowels and pack solid with high-strength non-shrink grout.

3.4 FILLING WITH CONCRETE

A. Install all framing, formwork and dowels required for the placing of concrete and for bonding new concrete to existing.

B. Shortly before placing concrete, saturate the perimeter edges of the openings with water. After the free or glistening water disappears, the edges shall be given a thorough coating of neat cement slurry mixed to the consistency of thick paste and scrubbed in with a stiff bristle brush.

C. Place mix and strike level with adjacent surfaces.

D. Texture of finished concrete shall match that of existing abutting concrete.

3.5 APPLICATION - CONCRETE UNDERLAYMENT AND PATCHING MORTAR

A. Surface Preparation:

1. Clean substrate free of grease, wax, curing compounds and all other foreign materials. Substrates shall be solid and sound; remove all soft or crumbly materials.
2. Make adhesion tests as recommended by manufacturer to ensure good bond to substrate. Acid etch polished floors. Completely strip sealed floors of existing sealer compounds.

3. Prime subfloors as recommended by underlayment manufacturer, using the correct primer for porous and non-porous subfloors.

B. Strictly comply with manufacturer's instructions and recommendations, except where more restrictive requirements are specified in this Section.

C. Mix product directly from sealed package with water in proportions recommended by manufacturer. Where recommended by product manufacturer, add crushed stone aggregate and blend to dry mix prior to adding latex admixture. Avoid over watering.

D. Apply underlayment and patching mortar while primer is still tacky. Place and trowel underlayment to the desired thickness. Do not use a power trowel. Steel trowel finish where underlayment will be a substrate for a finished flooring surface.

E. If two or more layers of underlayment are applied, place second layer after first layer has set to walkable hardness.

F. Where depressions occur, fill depressed area level with abutting surfaces.

G. Install expansion joint filler at:

1. Perimeter of placements.
2. Around penetrations through decks.

END OF SECTION 03 01 36

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SECTION 03 05 13
CONCRETE SEALERS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install concrete sealers/coatings on exposed-to-view concrete floors where shown and as scheduled on the Drawings

1.5 QUALITY ASSURANCE

A. Use an applicator approved by the manufacturer, experienced in the approved materials, and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.

1.8 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Transparent non-yellowing water-based acrylic sealer and dustproofer having a minimum of 10 percent solids, with a maximum VOC limit of 100 g/L. Subject to compliance with ASTM C309, Type 1, Class A and B, and requirements specified herein.

1. Products which may be incorporated in the work include the following, or approved equal:
   a. Dayton-Superior, Miamisburg OH, product "Ultra Seal EF".
   b. Euclid Chemical Company, Cleveland OH., product "EverClear VOX."
   c. Laticrete International Inc., Bethany CT, (L&M Construction Chemicals Brand), Omaha NE, product "Permaguard SPS".
   d. Nox-Crete Inc., Omaha NE, product "Cure & Seal 100E".

B. Primer/bonding agent: As recommended by sealer manufacturer.

PART 3 - EXECUTION

3.2 APPLICATION

A. Apply sealer with manufacturer's recommended sprayer, at recommended rate of 400 square feet per gallon. Apply second coat when sealer is dry to touch. Allow sealer to cure undisturbed for a minimum period of 6 hours. Maintain temperature at 60-degrees Fahrenheit minimum until floor surfacing has completely dry.

END OF SECTION 03 05 13

SECTION 04 03 43
HISTORIC STONE MASONRY REPAIR AND REPOINTING
(FILED SUB-BID REQUIRED AS PART OF SECTION 04 00 01)

PART 1 - GENERAL

1.1 SUMMARY

A. Provide masonry restoration work where shown on the Drawings and as specified herein; work includes, but is not limited to the following:

1. Repoint brick chimney where indicated.
2. Test original masonry mortars for composition.
3. Repoint stone masonry at areas indicated on Drawings.
4. Repair vertical cracks in stone masonry walls.
5. Repair previous improperly executed repairs.

B. Repair methods: The exact repair procedures shall be reviewed in the field, based on identifications in the Drawings, and the guidelines and materials specified herein. Review all procedures with the Architect and obtain acceptance prior to commencing the work. Repair methods selected shall take into account the total construction system of the building to be repaired and the different original materials used for the main building and the various additions.

1.7 QUALIFICATIONS

A. Restorer: Company specializing in performing the masonry restoration work of the type specified herein, with minimum of 5 years documented experience. Work shall be done by skilled workers, fully instructed as to the requirements Specified herein and adequately supervised during the work.

B. Certification of Workers

1. The Contractor shall certify that all workers preparing and repointing stone masonry joints and cutting joints prior to dismantling masonry have successfully completed a certification program administered by a masonry restoration specialist prior to beginning preparation of mockups, samples or general work.

1.8 QUALITY ASSURANCE

A. Field Supervised Work: Contractor shall notify Architect before beginning work of this Section. Obtain Architect's approval of Contractor's procedures before proceeding with the work.

B. Single-source responsibility for mortar materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.

1.9 MOCK-UPS

A. Scheduling of Mock-ups: Mock-ups shall be prepared only by certified workmen, after certification of workers as specified under the Article entitled "Qualifications" as specified herein above. Workmen preparing mock-ups shall be same as those performing the work.

B. Restore and repoint an area of stone masonry wall sized 8 feet long by 6 feet high, which includes all mortar and accessories, wall openings.

PART 2 - PRODUCTS

2.1 MORTAR COMPONENTS

A. Portland Cement: Type I, or Type III, ASTM C150, non staining, white color, without air entrainment.

1. Use type III as necessary for laying masonry in cold weather.

B. Sand: Clean, washed uniformly well graded, conforming to ASTM C 144-542.

C. Sand shall conform to the color, grade, composition and particle sizes results of laboratory analysis

D. Water: Clean and potable without contaminants

E. Lime: Approved brand of plastic hydrated lime, conforming to ASTM C 207, Type "S".

F. Oxide pigments: Oxide pigments shall be stable, non-fading, and alkali resistant, conforming to ASTM C979.

G. Acrylic Admixture:

1. Larsen Products Corp., Jessup MD., product "Acrylic Ad-Mix 101".
2. TK Products (Division of Sierra Corp)., Minnetonka MN., product "TK-225 Liquid Bonding Agent".
3. BASF Building Systems., Shakopee MN., (Thoro Brand), product "Acryl 60".

2.2 MORTAR

A. Mortar for pointing and setting masonry, General: Mortar mixes for pointing and setting masonry shall be hopper batch, preblended mortar to exactly match existing pointing mortar composition, formula, color, porosity, density, such as SpecMix, Inc., or approved equal. Pointing shall be completed in compliance with manufacturer's printed instructions and all materials stored, transported, and used in compliance with manufacturer's printed instructions.

B. Mortar for pointing and rebuilding stone masonry:

1 part by volume, White Portland Cement

2 parts by volume, hydrated lime (Type S)

3 parts by volume, "00" aggregate (selected to match sand in original mortar).

Oxide pigments as required to match original mortar color.

2.3 MORTAR MIXES

A. General: Measure mortar ingredients carefully to control proportions, maintain proportions through-out the work. Mix mortar with power operated batch mixer. Provide not less than 5 minutes mixing time to ensure a homogeneous plastic mortar. Provide at least 2 minutes mixing time for dry material Use a minimum amount of water to product a workable consistency for the mortars intended purpose.

B. Mortar mix for pointing and rebuilding stone masonry: Mix as dry a consistency as will produce a sufficiently plastic mortar which can be worked into the joints. Allow mortar to sit for 20 minutes prior to use to allow for initial shrinkage. Place within two hours of mixing, do not retemper partially hardened materials

C. Mortar mix for small batches: Batches less than one cubic yard may be mixed by hand with permission of Architect. Mix using clean paddles and plastic or metal mixing boxes.

PART 3 - EXECUTION

END OF SECTION 04 03 43

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SECTION 04 20 00

UNIT MASONRY
(FILED SUB-BID REQUIRED AS PART OF SECTION 04 00 01)

PART 1 - GENERAL

1.2 SUMMARY

A. Furnish and install:

1. Concrete masonry unit construction for interior partitions.
2. Grout fill for hollow metal steel frames, and wherever ties or anchorage items occur, and as further indicated in the Drawings at masonry construction.
3. Reinforcing, ties, anchors, and other metal accessories, for anchoring unit masonry together and to other materials.
4. Control joints in concrete masonry.

B. Place, install and build-in, as work progresses, the following products and materials furnished under the indicated Sections:

1. Anchor bolts, wood blocking, and anchorage items furnished or set by other trades as specified in individual Sections.
2. Steel lintels furnished by Section 05 50 00 - METAL FABRICATIONS.
3. Access door frames furnished by Section 08 31 00 - ACCESS DOORS AND PANELS or by section requiring the same.
4. Hollow metal door and window frames set in place by Section 06 10 00 - ROUGH CARPENTRY, and furnished by Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.

C. Clean and point exposed to view surface masonry.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source:

1. Concrete masonry units: Obtain concrete masonry units for the project from a single manufacturer.
2. Mortar materials: Obtain mortar ingredients of uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source and producer for each aggregate.
3. Prepackaged mortar materials: Obtain masonry cement or masonry mortar from a single manufacturer. Where colored mortar is required provide batch tickets confirming all materials are from a single production run to ensure uniformity of the mix.

C. Qualifications:

1. Welders Certificates: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
2. Testing Agencies: To qualify for performing tests and inspection specified in this Section, an independent testing laboratory must demonstrate to Architect's satisfaction, based on evaluation of laboratory-submitted criteria conforming to ASTM C 1093, that it has the experience and capability to conduct satisfactorily the testing indicated without delaying the progress of the Work.
3. Professional Engineer Qualifications: Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in the Commonwealth of Massachusetts

D. Inspection, Testing, and Quality Control: A program of Inspection and Testing of structural masonry work will be established by the Structural Engineer of Record (SER) who will direct the implementation of tests as carried out by an independent testing agency. All costs for inspection and testing will be borne by the Owner.

1.12 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY UNITS

A. Load bearing hollow and solid, normal weight concrete masonry units: Conform to ASTM C90, Type 1, Class 1, normal weight, 2-core, 58 percent solid for 2 hour fire resistant construction:

1. Plain-faced units of nominal thickness indicated on the Drawings, nominal 8 by 16 inch face dimension with light gray color and uniform medium-fine texture, sound, true to plane and line, and free from chips, cracks, and other defects.
2. Aggregate: sand and gravel: conform to ASTM C 33.
3. Minimum allowable compressive strength for an individual unit of not less than 1700 psi (net area); and not less than 1,900 psi. (net area) for average of 3 units; when tested in accordance with ASTM C 140.
4. Oven dry density: 125 pounds per cubic foot.
5. Moisture content for average of 3 units, when delivered, not exceeding 35 percent of the total absorption, when tested in accordance with ASTM C 140.

B. Non-loadbearing concrete masonry units (at interior non-load-bearing partitions only): Conform to ASTM C129, Type 1, normal light weight, 2-core, 58 percent solid for 2 hour fire resistant construction:

1. Plain-faced units of nominal thickness indicated on the Drawings, nominal 8 by 16 inch face dimension with light gray color and uniform medium-fine texture, sound, true to plane and line, and free from chips, cracks, and other defects.
2. Aggregate: sand and gravel,
   a. Normal weight block: conform to ASTM C 33.
   b. Light weight bock: conform to ASTM C 331.
3. Minimum allowable compressive strength for an individual unit of not less than 500 psi (net area); and not less than 600 psi. (net area) for average of 3 units; when tested in accordance with ASTM C 140.
4. Oven dry density:
   a. Normal weight units: 125 pounds per cubic foot
   b. Light weight units: 105 pounds per cubic foot
5. Moisture content for average of 3 units, when delivered, not exceeding 35 percent of the total absorption, when tested in accordance with ASTM C 140.
6. Provide units clearly labeled as non-load-bearing.

C. Concrete Building Brick: ASTM C55 and characteristics indicated below for grade, type, size and weight classification.

1. Grade: N.
2. Type: moisture controlled units, Type 1.
3. Size: modular, 2-1/4" x 3-5/8" x 7-5/8".
4. Weight classification: Same as for concrete block.

D. Concrete masonry grout blocks (bond beams): Open end high strength concrete masonry units and slot type strength concrete masonry units for use at reinforced concrete masonry construction where indicated on the Drawings. Conform to all requirements specified above for standard concrete masonry units, and the following additional requirements:

1. Plain-faced units of nominal thickness indicated on the Drawings, nominal 8 by 16 inch face dimension with light gray color and uniform medium-fine texture, sound, true to plane and line, and free from chips, cracks, and other defects.

2.2 MORTAR

A. Prepackaged mortar (ready mix) complying with ASTM C 1142, or site-mixed portland cement mortar complying with ASTM C 270 may be used.

1. Admixtures are not permitted except where expressly specified herein or as otherwise approved by Architect for specific field conditions.

B. Mortar materials for site mixed mortar:

1. Portland cement for masonry conforming to ASTM C 150, Type I, non-staining, without air entrainment. Use Type III as necessary for laying masonry in cold weather.
   a. For concrete masonry, use light gray color portland cement
2. Aggregates for grout: Conforming to ASTM C 144 for fine aggregate and ASTM C 404, Size 8 or 89.
3. Aggregate for concrete masonry mortar: Clean, washed uniformly well graded sand conforming to ASTM C 144, with the following gradation, and having a fineness modulus between 2.15 and 2.35:

Sieve Size	Percentage Passing
#4	100%
#8	95 to 100%
#16	70 to 100%
#30	40 to 75%
#50	10 to 35%
#100	2 to 15%
#200	0 to 5%

4. Lime: Approved brand of plastic hydrated lime, conforming to ASTM C 207, Type "S".
5. Water: Clean and fresh without contaminants.

C. Prepackaged mortar (ready mix)

1. General: complying with ASTM C 1142, factory blended consisting of:
   a. Portland cement: Comply with ASTM C 150, Type I.
   b. Hydrated lime: Type S, complying with ASTM C 207.
   c. Aggregate: Provide clean, sharp, well graded aggregate free from injurious amounts of dust, lumps, shale, alkali, surface coatings, and organic matter, and complying with ASTM C144.
   d. Admixtures: Prepackaged mortar mixes contain manufacturer's own proprietary admixtures, additional field admixtures are strictly prohibited.
   e. Water: Provide water free from deleterious amounts of acids, alkalis, and organic materials. Water shall be potable.
   f. Pigments: Chemically inert synthetic iron oxide pigments, lightfast, weather resistant, complying with ASTM C-979.
      1) Mortar Color: As selected by Architect from manufacturer's full range of standard colors.

D. Mortar types:

1. Mortar for masonry below grade or in contact with earth: ASTM C 270 type M using the property specification.
2. Mortar for load bearing masonry: ASTM C 270 type M or S using the property specification.
3. Mortar for non-load bearing masonry above grade: ASTM C 270 type N using the property specification.
4. Mortar for pointing, dirt and stain resistant type: ASTM C 270 type N using the property specification with added aluminum tristearate, calcium stearate, or ammonium stearate to a quantity of 3 percent of Portland cement weight.

2.3 GROUT MIXES

A. Prepackaged grout (ready mix) complying with ASTM C 1107, or site-mixed Portland cement grout complying with ASTM C 476 may be used.

B. Grout for setting equipment, anchor bolts, structural steel elements and miscellaneous metals: Non-metallic high-strength controlled expansion grout of flowable consistency, having a compressive strength of 6,500 pounds per square inch (44.9 MPa) at 28 days; slump 8 to 10 inches.

1. Basis of Design: Five Star Products, Inc., Fairfield CT, product "Five Star Grout."
2. L&M Construction Chemicals, Omaha NE, Product: "Crystex."
3. Master Builders, Cleveland, OH, product "Masterflow 713".
4. Sika Corporation, Lyndhurst, NJ, product "SikaGrout 212".
5. Sonneborn Building Products, Minneapolis, MN, product "Sonogrout 10K".
6. Symons Corporation, DesPlaines, IL, product "Symons Multi Purpose Grout".

C. Grout for engineered masonry (core fill): Course grout having a compressive strength of 2,000 to 2,250 pounds per square inch (13.8 to 15.5 MPa) at 28 days; slump 8 to 10 inches.

1. Use 1/3 fly ash cement replacement in grout for exposed walls to reduce risk and intensity of efflorescence. Comply with ASTM C 476, for fine grout.
   a. Proportions by volume 1:1/3:3 (Portland cement, fly ash, sand).
   b. Fly ash: Class F.

D. Grout for bond beams and lintels: Fine grout having a compressive strength of 2,500 to 3,000 pounds per square inch (17.2 to 20.6 MPa) at 28 days; slump 8 to 10 inches.

2.4 REINFORCEMENT AND ANCHORAGE MATERIALS

A. Single wythe longitudinal reinforcement for concrete masonry unit walls and partitions: in overall width 1-5/8 inches less than the overall wall thickness, as manufactured by Dur-O-Wal, Hohmann, AA Wire, or equal.

1. Interior partitions: Ladder design, 9 gage ASTM A 641 class 1 galvanized wire.

2. Exterior partitions: Ladder design, 9 gage ASTM A 641 class 3 hot dipped galvanized wire.
3. Provide preformed reinforcing sections at intersections of masonry walls and partitions, and whenever walls and partitions change direction.

B. Reinforcing steel, additional to rods which are embedded in concrete: Solid steel reinforcing bars, conforming to ASTM A 615, Grade 60, hot dipped galvanized in accordance with ASTM 123, B2 finish, of sizes indicated on the Drawings.

2.5 ACCESSORIES

A. Compressible filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.

B. Compressible filler for joints at tops of non-load bearing masonry partitions, and for beneath lintels and support angles in veneer walls: Closed cell Neoprene, soft grade, 25 percent thicker than joint width, continuous in length, and in width to fill the joint to a point 3/4 inch back from each face of wall or partition.
   1. Basis of Design: Hohmann & Barnard, Inc., Happauage NY, product "NS" (without tear strip), 1/2 inch thickness, 3 inch width.

C. Premolded control joints for concrete masonry construction: Solid rubber of profile as indicated (to maintain lateral stability of wall), 60-80 shore A hardness.

D. Building paper (to maintain joints open for subsequent application of sealant and backer rod): Nº. 15 asphalt saturated felt.

E. Cleaning solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.6 MIXING MORTARS AND GROUT

A. General: Mix mortar and grout in accordance with the requirements of ASTM C270, and ASTM C476 as applicable.
   1. Control batching procedure to ensure proper proportions by measuring materials by volume. Amount of mixing water and mortar consistency shall be controlled by mason.
   2. Control batch sizes to allow for use within manufacturer's recommended pot life.
   3. Retempering will be permitted only within the first two hours of initial mix or shorter times as directed by manufacturers.
   4. Discard all mortar and grout which exceeds the time limits allowed by the manufacturer .Discard mortar that has partially set.

B. Maintain sand uniformly damp immediately before mixing process.

C. Add mortar color and admixtures in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.

D. Do not use anti-freeze compounds to lower the freezing point of mortar or grout.

E. Pouring grout shall be fluid consistency (as fluid as possible for pouring without separation of constituent parts).

2.7 SOURCE QUALITY CONTROL

A. Preconstruction testing: Except for testing by the Contractor, required as part of this Section, or Section 01 45 29 – TESTING LABORATORY SERVICES, the Owner will employ and pay a qualified independent testing laboratory to perform the following preconstruction testing indicated as well as other inspecting and testing services required by referenced unit masonry standard or indicated herein for source quality control:

1. Concrete Masonry Unit Tests: For each different concrete masonry unit indicated, units will be tested for strength, absorption, and moisture content per ASTM C 140.
2. Mortar efflorescence: Test each mortar type which will be exposed to weather for efflorescence in accordance with the "Wick test" procedure in BIA Research Report Number 15, The Causes and Control of Efflorescence in Brickwork", Section 4.4. Mortar mixes which show efflorescence shall not be used in the Work.
3. Mortar composition and properties will be field evaluated per ASTM C 780 for compressive strength, consistency, mortar aggregate ratio, water content, air content, and splitting tensil strength.
4. Grout compressive strength will be tested per ASTM C 1019 for compressive strength and slump.

PART 3 - EXECUTION

3.3 INSTALLATION - GENERAL

A. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase recess and jamb of openings and between adjacent chases and recesses.

B. Leave openings for equipment to be installed before completion of masonry. After installation of equipment, complete masonry to match construction immediately adjacent to the opening.

C. Establish lines, levels and coursing indicated. Protect from displacement.

D. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

E. Isolate masonry partitions from vertical structural framing and where indicated on the Drawings. Maintain joints free from mortar, ready to receive sealant and joint bead back-up.

F. Provide compressible filler at tops of interior masonry partitions abutting structural above.

3.4 COURSING, BONDS AND JOINTS

A. Joints:

1. Exposed to view masonry: except as specified below, fill all joints with mortar, strike off flush, and when mortar is thumb print hard tool joints with a non-staining tool. Joints shall be free of drying crack.
   a. Horizontal joints
      1) Interior joints (all): Tool joints flush.
   b. Vertical joints (all):
      1) Concrete unit masonry: Tool joints flush.
2. Concealed from view masonry, including masonry which will be concealed by flashings and similar materials: Fill joints with mortar and strike joints flush. Concave tool exterior joints below grade.

3.5 CONTROL JOINTS

A. Locate control joints where shown on Drawings, at corners adjacent to openings in masonry, changes in wall height and intersections with structural walls as approved by Architect.

1. Do not continue horizontal joint reinforcement through control joints.

B. Form vertical control joints with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

1. Size control joints in accordance with the requirements of Section 07 92 00 - JOINT SEALANTS.

3.6 LAYING MASONRY - GENERAL

A. Build the masonry walls and partitions in the various combinations and thickness as indicated on the Drawings.

B. Erect all masonry work in compliance with the line and level tolerances specified herein. Hold uniform joint sizes. Correct, or replace, as directed by the Architect, non-conforming masonry work at no additional cost to the Contract.

C. Lay out coursing before setting to minimize cutting closures or jumping bond, Avoid the use of less-than-half-size units.

D. Laying masonry units:

1. Lay masonry units in full bed of mortar, with full head joints; uniformly joint with other work.
2. Lay hollow masonry units with face shell bedding on head and bed joints.
3. Use finished CMU end blocks at jambs of wall openings for storefront, windows, louvers and similar conditions.
4. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.
5. Interlock intersections and external corners.
6. Cut all exposed masonry with a motor-driven carborundum blade saw to ensure straight and clean, unchipped edges.
    a. Lay no unit having chipped edges or face defects where such unit would be exposed to view. Remove any such unit, if installed, and replace with an undamaged unit, and bear all costs therefore.
7. Do not spread any more mortar than can be covered before surface of mortar has begun to dry.
8. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove entirely, clean off mortar, and reset with fresh mortar.
9. Except for cleaning down and repointing, finish all masonry as the walls and partitions are carried up.

E. Build-in reinforcement and anchorage items as the work progresses, grouting for secure anchorage.
    1. Where steel reinforcing rods have been cast into concrete slabs, and left with upturned ends, carefully place masonry units down over the upturned ends of the rods, and fill cells of masonry units with specified grout.
    2. Embed prefabricated horizontal joint reinforcing as the work progresses, with a minimum cover of 5/8" (16 mm) on exterior face of walls and 1/2" (13 mm) at other locations. Lap units not less than 6" (152 mm) at ends. Use prefabricated L and T units to provide continuity at corners and intersections. Cut and bend units as recommended by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures and other special conditions.

F. Except as indicated otherwise, isolate masonry from overhead structure:
    1. Isolate masonry partitions from vertical structural framing members with a control joint.
    2. Isolate top joint of masonry partitions from horizontal structural framing members and slabs, decks or blocking with compressible joint filler.

G. Provide control joints at 30 feet on center maximum spacing, and keep clean of mortar droppings.

H. Provide complete protection against breakage and weather damage to all masonry work, including substantial wood boxing around door jambs, over the tops of walls and wherever necessary to protect work at all stages of completion. Protect masonry when not roofed over, at all times when masons are not working on the walls. Apply tarpaulins or waterproof paper, properly weighted, or nailed, to assure their remaining in place to protect masonry from all possible hazards.

I. Point and fill all holes and cracks in new mortar joints with additional fresh mortar; do not merely spread adjacent mortar over defect or use dead mortar droppings. Do all pointing while mortar is still soft and plastic. If hardened, chisel defect out and refill solidly with fresh additional mortar, and tool or rake joints as specified herein.

J. Protect all masonry from rain prior to, and during the installation thereof. If the temperature is in excess of 80 degrees Fahrenheit at time of installation, lightly moisten contact surfaces of masonry units by brushing with water.

K. Cold/Hot Weather Procedures: No masonry work shall be laid in temperatures below 40 degrees Fahrenheit without the submittal to and review by the Architect of cold weather procedures.

1. In ambient temperatures below 40 degrees Fahrenheit make provisions to adequately protect the masonry materials and the finished work from frost, including heating of masonry materials.
   a. Heat enclosed work areas as necessary to adequately protect the work of this Filed Sub-Bid. Such additional temporary heat and protection measures required is in addition to the protection furnished by General Contractor under provisions of Section 01 50 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS, which occurs from November 1st to March 31st.
2. No frozen work shall be built upon nor shall anti-freeze admixtures be permitted in the mortar mix.
3. Any completed work found to be affected by frost shall be taken down and rebuilt at no additional expense to the Owner.

3.7 ENGINEERED MASONRY

A. Lay masonry units with core cells vertically aligned and clear of mortar and unobstructed.

B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 7 calendar days before placing grout.

C. Refer to the Drawings for locations where vertical steel reinforcing rods will be required in masonry walls. Reinforce masonry unit cores with reinforcement bars and grout.

D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 192 bar diameters. Splice reinforcement in accordance with Division 3 - Concrete.

E. Wet masonry unit surfaces in contact with grout just prior to grout placement.

F. Grout spaces less than 2 inches in width with fine grout using low lift grouting techniques. Grout spaces 2 inches or greater in width with course grout using high or low grouting techniques.

G. When grouting is stopped for more than one hour, terminate grout 1-1/2 inch below top of upper masonry unit to form a positive key for subsequent grout placement.

H. Low lift grouting: Place first lift of grout to a height of three concrete masonry unit courses, and rod for grout consolidation. Place subsequent lifts in 8 inch increments and rod for grout consolidation.

I. High lift grouting:

1. Provide cleanout opening no less than 4 inches high at the bottom of each cell to be grouted by cutting one face shell of masonry unit.
2. In double wythe walls, omit every second masonry unit in one of the wythes for clean out and cell inspection purposes.
3. In double wythe walls, construct vertical grout barriers or dams between masonry wythes, with masonry units ever 30 feet maximum.
4. Clean out masonry cells [and cavities] with [high pressure water spray. Permit complete water drainage.] [compressed air, remove debris.]
5. Request inspection of the cells and cavities. Allow [3 working days] [24 hours] notice.
6. After cleaning and cell inspection, seal openings with masonry units.
7. Pump grout into spaces. Maintain water content in grout to intended slump without aggregate segregation..
8. Limit grout lift to 60 inches and rod for consolidation [mechanically vibrate]. Wait between 30 and 60 minutes before placing next lift.

3.8 BUILDING-IN WORK

A. As work progresses install built-in metal door and glazed frames, fabricated metal frames, window frames, wood nailing strips, fireplace accessories, anchor bolts, plates and other items to be built-in the work.

B. Install built-in items plumb and level; take care not to distort alignment of such items.

C. Bed anchors of metal frames in adjacent mortar joints. Fill frame voids solid with grout except where joints are indicated to receive caulking and sealant. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

1. Rake joints to receive sealant to a uniform depth of 3/4 inch for installation of caulking and sealant.

D. Do not build-in organic materials subject to deterioration.

3.9 BUILDING-IN LINTELS

A. Install loose lintels over all openings, whether or not scheduled.

B. Where not detailed otherwise, maintain the following minimum bearings for lintels on each side of opening:

1. 6 inches bearing on concrete.
2. 3 inches bearing on steel.
3. 8 inches bearing on masonry.

C. Install loose lintels over all openings, whether or not scheduled. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.

1. Openings up to 42 inches wide: Place two Nº4 reinforcing bars 1 inch from bottom web.
2. Openings from 43 inches wide up to 78 inches wide: Place two Nº5 reinforcing bars 1 inch from bottom web.
3. Openings over 79 inches wide: Reinforce as detailed in Drawings, consult Architect/Engineer if not detailed.
4. Do not splice reinforcing bars.
5. Support and secure reinforcing bars from displacement. Maintain position with 1/2 inch of dimensioned position.
6. Place and consolidate grout fill without displacing reinforcing.
7. Allow masonry lintels to attain specified strength before removing temporary supports.

D. Where not detailed otherwise, maintain the following minimum bearings for lintels on each side of opening:

1. 6 inches bearing on concrete.
2. 3 inches bearing on steel.
3. 8 inches bearing on masonry.

3.10 REINFORCEMENT AND ANCHORAGE

A. Reinforce horizontal joints with continuous masonry joint reinforcement, spaced 16 inches vertically commencing one course above supporting concrete slab.

B. Place masonry joint reinforcement in first and second horizontal joint above and below openings. Extend 16 inches each side of opening.

C. Place joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches .

E. Install preformed units (or optional field-formed units) at corners, reveals, and offsets in exterior masonry, at intersections of all masonry walls and partitions, and wherever walls and partitions change directions.

F. Do not bridge control and expansion joints in the wall system.

G. Anchor ends of walls to structure with anchors spaced 24 inches, except as otherwise shown.

H. Embed anchors in concrete. Attach to structural steel members. Embed anchorages in every second block.

I. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

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SECTION 05 40 00
COLD FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Design, engineer, furnish and install metal framing and support system for the following applications:

1. Load bearing formed steel stud exterior wall framing.
2. Framing for exterior soffits and ceilings.
3. Interior wall framing at double-height spaces, and as additionally indicated.
4. Support framing for mock-ups.
5. Metal plate blocking in conjunction with framing of this Section 05 40 00.
6. Include all connections, bracing, bridging and accessories.

B. Furnish the following products to be installed under the designated Sections:

1. Placement of anchors securing the work of this section: Section 03 30 00 - CAST-IN-PLACE CONCRETE.
2. Placement of anchors securing the work of this section: Section 04 20 00 - UNIT MASONRY.

1.6 QUALITY ASSURANCE

A. General:

1. Calculate structural properties of framing members in accordance with AWCI, MF/SLA and AWS D l.3 requirements.
2. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Qualifications:

1. Manufacturers: Company specializing in manufacturing the products specified in this section with minimum 3 years documented experience.
2. Welders Certificates: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
3. Professional Engineer Qualifications: Design structural elements under direct supervision of Professional Engineer experienced in design of this Work and licensed in the Commonwealth of Massachusetts

1.8 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. ClarkDietrich Building Systems, LLC, West Chester, OH.
2. Marino-Ware Industries Corp., South Plainfield NJ.
3. The Steel Network (TSN), Las Vegas NV.
4. Steel Elements, Gorham NH.

2.2 PERFORMANCE/DESIGN CRITERIA

A. Structural performance: Design, engineer and provide a complete metal framing and support system having deflection limits as specified herein under the full inward and outward lateral load prescribed by applicable codes for this project location. Deflection and structural calculations shall not include any structural benefit from the veneer(s), and curtain wall systems; metal framing alone shall carry the loads. Where a member supports more than one finish, the most restrictive deflection shall govern.

1. Design wall system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
2. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings. Comply with the following cold-formed steel framing design standards:
   a. Wall Studs: AISI S211.
   b. Headers: AISI S212.
   c. Lateral Design: AISI S213.
3. Deflection limits
   a. Exterior wall framing: Deflection limit for masonry veneer: L/600 where L is the length of the steel member. Design wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
   b. Interior load-bearing wall framing: Horizontal deflection of 1/360 of the wall height.

B. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.

C. Welding: Employ experienced welders who are certified in compliance with AWS Standard Qualification Procedures.

D. Engineering: Provide the services of a Professional Engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and as required by Massachusetts State Building Code.

2.3 MATERIALS

A. Steel Sheet: ASTM A1003/A1003M and ASTM A 653/A 653M, structural steel, of grade as follows and having G90 (Z275) galvanized coating:

1. Framing

a. Grade: As required by structural performance but in no case less than 18 gauge.

B. Steel Sheet for Connectors: ASTM A 570/A 570M, hot rolled or ASTM A 611, cold rolled; cleaned, pretreated, and primed with manufacturer's baked-on, lead- and chromate-free, rust-inhibitive primer complying with performance requirements in FS TT-P-664.

1. Grade: As required by structural performance but in no case less than 18 gauge.

a. Coating: G90 (Z275) galvanized coating.

2.4 FRAMING MEMBERS

A. Studs: Manufacturer's standard C-shaped steel studs complying with ASTM C 955. Formed of ASTM A-653/653M steel, G90 (Z275) galvanized, channel shaped with lipped flanges, punched web, size as shown on Drawings, thickness and grade as required by structural design calculations but in no case less than 18 gauge, 0.0428 inch (1.09 mm).

B. Z-shape span connectors: Manufacturer’s standard and custom formed Z-shape framing connectors, complying with ASTM C 955. Formed of ASTM A-653/653M steel, G90 (Z275) galvanized, having opposing lipped flanges. Sizes as shown on drawings, thickness and grade as required by structural design calculations but in no case less than 14 gauge, 0.0677 inch (1.72 mm).

C. Tracks: Manufacturer's standard U-shaped steel track complying with ASTM C 955. Formed of ASTM A-653/653M steel, same designation, coating, and thickness as studs except as otherwise noted, channel shaped, solid web, depth compatible with studs, size, thickness and grade as required by structural design calculations but in no case less than 18 gauge, 0.0428 inch (1.09 mm).

D. Drift and Vertical Deflection Clips: Manufacturer's standard bypass and head clips as required, capable of isolating wall stud from upward and downward vertical displacement of primary structure using mechanical fasteners.

1. Provide clips with step bushings. Mechanical attachment to structure and screw attachment to stud web using step-bushings to permit frictionless vertical movement. 68 mils (1.72 mm) minimum thickness. Size of clips shall be

as required by structural design calculations performed by clip manufacturer, and reviewed by specified Engineering Licensed Professional stamping Shop Drawings. Clips shall be fabricated/designed for the following conditions:

a. Exterior head of wall.

b. Exterior head of wall pre-assembled with track.

c. By-pass structural pour stop at floor slab.

d. By-pass floor slab or structure.

e. By-pass structure.

2.5 ANCHORS AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123.

B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel hex-headed bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

D. Mechanical Fasteners: Corrosion-resistant-coated, self-drilling, self-threading steel drill screws.

1. Head Type: Low-profile head beneath sheathing and metal panels, manufacturer's standard elsewhere.

E. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

A. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.

1. VOC limit: not more than 250 g/L.

2.7 PRE-ERECTION FABRICATION

A. Framing components may be pre-assembled into panels prior to erecting. Fabricate panels square with framing members fitted, reinforced, and braced to suit design requirements; attach components in a manner to prevent racking.

B. Fit and assemble in largest practical sections for delivery to site, ready for installation.

PART 3 - EXECUTION

3.3 ERECTION - GENERAL

A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed metal framing according to ASTM C 1007, unless more stringent requirements are indicated.

C. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed metal framing members by welding or screw fastening, as indicated on approved Shop Drawings, or where not indicated, as standard with fabricator. Wire tying or clip fasteners of framing members is not permitted.
   a. Where welding is indicated or required on approved Shop Drawings: Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
   b. Locate mechanical fasteners and install according to approved Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

D. Install framing members in one-piece lengths, unless splice connections are indicated for track or tension members.

E. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

F. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.

H. Accurately align and attach runners in strict compliance with manufacturer’s recommendations and approved shop drawings. . Allow for main structure deflection at top runner to avoid transferring load stud system.

1. Frame wall openings with additional framing members at perimeter of openings as needed.

2. Align holes in framing members to facilitate electrical conduit and piping work.
3. Provide all needed connections and accessories provide a complete structural system.
4. Provide all needed members for proper fastening interior gypsum wallboard.

I. Bracing: Provide continuous 1-1/2 inch cold-rolled channel horizontal bracing within 10 to 12 inches of tops of stud. Connect bracing to each stud as indicated on approved shop drawings. Provide additional bridging and bracing as recommended by manufacturer, as necessary, and as indicated on approved shop drawings. Provide kick-back bracing perpendicular to plane of framing system and securely anchored to building structure needed to create a complete structural system meeting specified performance requirements.

J. Touch-up damaged metal coatings, with galvanize repair paint.

END OF SECTION 05 40 00

SECTION 05 50 00
METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of miscellaneous metals, and ornamental iron where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install:

1. Steel stairs with intermediate landing construction, complete with all supporting members, shop primed.
2. Interior railings.
3. Exterior railings, shop primed and painted.
4. Elevator pit ladders, galvanized.
5. Elevator sill support angles, galvanized.
6. Elevator sump pit grating, galvanized.
7. Bollards.
8. Soffit and beam enclosure support framing.
9. Above ceiling supports for products furnished under other sections.
10. Supports for millwork counters
11. Restraining angles at top of masonry walls.

C. Furnish the following items for installation under related sections:

1. Anchors, bolts, inserts, and sleeves, required to attach miscellaneous metals for embedment into concrete under Section 03 30 00 - CAST-IN-PLACE CONCRETE.
2. Loose steel lintels at door, window, ductwork and similar openings in interior masonry partitions; installed under Section 04 20 00 - UNIT MASONRY.
3. Anchor bolts, with nuts and washers; inserts; and sleeves; required to attach miscellaneous metal items to masonry, for installation under Section 04 20 00 - UNIT MASONRY.

D. Perform all drilling and cutting in miscellaneous metal items required for the attachment of other items.

E. Perform all shop priming for all surfaces of exposed to view galvanized and non-galvanized metals, and post-erection touch-up of shop prime coat, using the same material as shop-prime coating.

F. Perform application of liquid zinc touch-up to all welds of galvanized steel items furnished hereunder.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. Galvanizer's tagging: The galvanizer shall mark all lots of material with a clearly visible stamp or tag indicating the name of the galvanizer, the weight of the zinc coating, and the applicable ASTM Specification Numbers.

B. Exposed Fabricated Steel Elements including stairs, railings, ornamental fabrications and exposed to view fabrications shall be fabricated and finished as Architectural Exposed Structural Steel (AESS) meeting tolerances and fabrication requirements as specified herein.

C. Qualifications:

1. Welders: Utilize only qualified welders employed on the Work. Submit verification that Welder's are AWS D1.1 and D1.4 qualified within the previous 12 months.
2. Licensed Professionals: Provide the services of a Professional Structural Engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and as required by Massachusetts State Building Code.
   a. Prepare Shop Drawings for under direct supervision of a same Engineer experienced in design of this work.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: All materials shall be new stock, free from defects impairing strength, durability or appearance, and of best commercial quality for each intended purpose. Unless specifically called for otherwise, work shall be fabricated from the following:

1. Steel shapes, plates and bars: ASTM Designation A 36.
2. Steel pipe: ASTM A53, grade A, seamless pipe, black finish unless otherwise noted.
3. Structural steel tubing, square and rectangular shapes: ASTM A500, Grade B.
4. Steel tubular shapes: ASTM A 501.
5. Steel plates to be bent or cold-formed: ASTM A283, grade C.
6. Steel bars and bar-size shapes: ASTM A36.
7. Cold-finished steel bars: ASTM A108.
8. Galvanized carbon steel sheets: ASTM A526, with G90 zinc coating in accordance with ASTM A525.

B. Steel materials: to be hot dip-galvanized: Provide steel chemically suitable for metal coatings complying with the following requirements: Carbon below 0.25 percent, silicon below 0.24 percent, phosphorous below 0.05 percent, and manganese below 1.35 percent. Notify galvanizer if steel does not comply with these requirements to determine suitability for processing.

C. Metal surfaces, general: For metal fabrications exposed to view upon completion of the Work, provide materials selected for their surface flatness, smoothness and freedom from surface blemishes. Do not use materials whose exposed surfaces exhibit pitting, seam marks, roller marks, rolled trade names, roughness, and, for steel sheet, variations in flatness exceeding those permitted by reference standards for stretcher-leveled sheet.

D. Welding rods: AWS E70XX grade, or select in accordance with AWS specifications for the metal alloy to be welded and in accordance with the recommendation of the welding rod manufacturer.

1. Where stainless steel is welded to mild steel, select rods to minimize dilution effects on the stainless steel component.

2.2 UNIVERSAL GRID SYSTEM

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Unistrut Corporation, Itasca IL.

1. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following.

a. Unistrut Corporation, Itasca IL., product “Unistrut”

b. Cooper US, Inc., Houston TX., product “Cooper B-Line”.

c. Gleason Partners, LLC., Grand Rapids, MI., product “Strut Channel Systems”.

d. Thomas & Betts Corporation, Memphis TN, product “Kindorf Superstrut”.

2. There are no other manufacturers of this product type available in the United States, fabricators may choose to fabricate grid system components using structural steel shapes, with submittal and approval of complete engineering Drawings and calculations as a substitution.

3. Finish:

a. Rust inhibiting acrylic enamel paint applied by electro-deposition, after cleaning and phosphating, and thoroughly baked. Color is per Federal Standard 595a color number 14109 (dark limit V-). Finish to withstand minimum 400 hours salt spray when tested in accordance with ASTM B 117.

B. All channel members shall be fabricated from structural grade steel confirming to the following ASTM specifications:

1. ASTM A 653 Grade A

C. All fittings shall be fabricated from steel conforming to one of the following ASTM specifications:

1. ASTM A 36, A 575, or A 576.

D. Provide ¾ inch diameter galvanized threaded rod and support assemblies at existing roof joists. Refer to Drawings.

E. All materials shall be stamped and identifiable by manufacturer and part number (where appropriate). Materials that appear damaged, distressed, unidentifiable or rusted shall not be used and will not be accepted.

2.3 FASTENERS

A. General: Provide all fasteners and attachments as required for work specified herein and as indicated on the Drawings.

1. In general,

a. Provide all fasteners and attachments of the same material and finish as the metal to which it is applied unless otherwise noted.

1) Provide Type 304 stainless-steel fasteners for exterior use.

2) Provide Type 304 stainless-steel fasteners for fastening aluminum.

B. Steel Bolts, Nuts and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.

C. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

D. Eyebolts: ASTM A 489.

E. Machine Screws: ASME B18.6.3.

F. Lag Bolts: ASME B18.2.1.

G. Wood Screws: Flat head, ASME B18.6.1.

H. Plain Washers: Round, ASME B18.22.1.

I. Lock Washers: Helical, spring type, ASME B18.21.1

2.4 ACCESSORIES

A. Adhesive for attaching anchors and for direct pinning: high-modulus, high strength, moisture tolerant, epoxy adhesive, two-component 100 percent solids, epoxy resin complying with ASTM C 881.

1. Minimum performance properties (as cured at 70 degrees F. and 50 percent relative humidity):

a. Minimum Compressive Strength, tested per ASTM D-695:
   1) at 3 days: 11300 psi (31.0 MPa).
   2) at 7 days: 11800 psi (44.8 MPa).
   3) at 28 days: 12200 psi (58.6 MPa).
b. Shear Strength, tested per ASTM D-732 at 14 days: 6200 psi (43 MPa)
c. Minimum Flexural Strength tested per ASTM D-790 at 14 days: 10700 psi (74 MPa).
d. Minimum Bond Strength tested per ASTM C-882 at 14 days:
   1) Plastic Concrete to Hardened Concrete 2200 psi (13.8 Mpa).
   2) Plastic Concrete to Steel 2000 psi (13.8Mpa).
e. Maximum Water Absorption, tested per ASTM D-570: 24 hour 0.27%
f. Minimum Tensile properties tested per ASTM D-638: Tensile Strength 6900 psi (48 Mpa).

2. Products which may be considered as equal include the following, or approved equal:
   a. Sika Corporation, Lyndhurst NJ., product: “Sikadur 32 Hi-Mod Gel.
   b. Simpson Strong Tie, Pleasanton, CA., product “SET High Strength Epoxy”.
   c. Symons Corporation, Des Plaines, IL., product “Rescon Gel anchor 304”.

B. Grout: Ready mixed, non-metallic high-strength controlled expansion grout of flowable consistency, conforming to ASTM C 1107 with minimum compressive strength of 8,000 pounds per square inch (55.2 MPa) at 28 days.
   1. Products which may be considered as equal include the following, or approved equal:
      a. Five Star Products, Inc., Fairfield CT, product “Five Star Grout.”
      b. L&M Construction Chemicals, Omaha NE, Product: “Crystex.”
      c. BASF Construction Chemicals, Cleveland, OH., product “Masterflow 713”.
      d. Sika Corporation, Lyndhurst, NJ., product “SikaGrout 212”.
      e. ChemMasters, Madison, OH., product “Conset”.

C. Metal paste filler: 2 component epoxy, high strength, structural adhesive putty:
   1. Products which may be considered as equal include the following, or approved equal:
      a. Abatron, Inc. Gilberts IL, product: “Ferrobond-P”.
      b. Dynatron/Bondo Corp., Atlanta, GA, product: “Bondo Plastic Filler”.
      c. U.S. Chemical & Plastics Company., Massillon OH, product “Metal filled epoxy”.

D. Liquid zinc coating, for touch-up of welds, field cuts, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint

20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.

1. VOC limit: not more than 250 g/L.

E. Primer for non-galvanized steel surfaces, modified alkyd rust-inhibitive, high solids primer:

1. Products which may be considered as equal include the following, or approved equal:

a. Benjamin Moore product: “Metal Primer KP14-70”, Gray Primer.

b. Rust-Oleum: 6100, Gray Primer.

c. Sherwin Williams: Kem Flash 500 Primer, Gray Primer E61A750.

d. Tnemec: V10-1009 Gray Primer.

2.5 FABRICATION - GENERAL

A. Metal surfaces shall be clean and free from mill scale, flake, rust and rust pitting; well formed and finished to shape and size, true to details with straight, sharp lines, and angles and smooth surfaces. Curved work shall be to true radii. Exposed sheared edges shall be eased.

B. Shop fabricate items wherever practicable, accurately fitting all parts and making all joints tight. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

C. Do all cutting, punching, drilling, and tapping required for attachment of anchor bolts and other hardware and for attachment of work by other trades. All such work shall be done prior to hot-dip galvanizing of the various components.

D. Grind all edges of bars and plates completely free from nicks and machine marks, prior to galvanizing and/or shop priming.

1. Fabricate AESS with exposed surfaces smooth, square and of surface quality consistent with the approved mock up or samples (as appropriate).

E. Grind all exposed-to-view welds completely smooth and flush to the surface plane of the base metals. Perform welding work prior to galvanizing in all cases, except where field welding is necessary, in which case, completely coat all such welds with two coats of specified liquid zinc coating, after performing grinding operations.

1. Finish welds on exposed to view components to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

F. Use screws and bolts only where welding cannot be performed, of sufficient size to ensure against loosening from normal usage of miscellaneous metal items furnished hereunder.

1. Countersink all screw heads and bolt heads as far as practicable. Use not less than two screw, bolts, or other anchorage items, at each connection point.
2. Draw up all threaded connections tightly, after buttering same with pipe joint compound, to exclude water.

G. Provision for Thermal Movement: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Design, fabricate and install for temperature change range of 120 degrees F, ambient temperature and 180 degrees F, material surfaces.

H. Carefully coordinate the installation of metal fabrications with the work of trades responsible for the installation of interfacing work, and for the installation of work into the various assemblies furnished hereunder, and permit the installation of the related materials to be made at the appropriate times.

I. Fit and assemble metal fabrications in largest practical sections for delivery to site, ready for installation.

1. Galvanized assemblies: Where size of assembly is too large for galvanizing kettle, galvanize components prior to fabrication and assemble after galvanizing.

2.6 FABRICATION - AESS

A. In addition to special care used to handle and fabricate AESS, employ the following fabrication techniques:

1. Fabrication Tolerance: Fabricate steel to one half the normal tolerance as specified in the Code of Standard Practice Section 10.
2. Welds ground smooth: Fabricator shall grind welds of AESS smooth. For groove welds, the weld shall be made flush to the surfaces each side and be within plus 1/16 inch, minus 0 inch of plate thickness.
3. Contouring and blending of welds: Where fillet welds are indicated to be ground-contoured, or blended, oversize welds as required and grind to provide a smooth transition and to match profile on approved mock-up.
4. Continuous Welds: Where welding is noted on the drawings, provide continuous welds of a uniform size and profile.
5. Minimize Weld Show Through: At locations where welding on the far side of an exposed
6. connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.
7. Coping and Blocking Tolerance: Maintain a uniform gap of 1/8″ ± 1/32″ at all copes and blocks.
8. Joint Gap Tolerance: Maintain a uniform gap of 1/8″ ± 1/32″.

9. Piece Marks Hidden: Fabricate such that piece marks are fully hidden in the final structure or made with such media to permit full removal after erection.
10. Mill Mark Removal: Fabricator shall deliver steel with no mill marks (stenciled, stamped, raised etc) in exposed locations. Mill marks shall be omitted by cutting of mill material to appropriate lengths where possible. Where not possible, the fabricator can fill and/or grind to a surface finish consistent with the approved mock up.
11. Grinding of sheared edges: Fabricator shall grind all edges of sheared, punched or flamecut steel to match approved samples.
12. Rolled Members: Member specified to be rolled to a final curved shape shall be fully shaped in the shop and tied during shipping to prevent stress relieving. Distortion of the web or stem, and of outstanding flanges or legs of angles shall be visibly acceptable to the Architect from a distance of 20' under any lighting condition determined by the Architect. Tolerances for the vertical and horizontal walls of rectangular HSS members after rolling shall be the specified dimension plus or minus ½ inch.
13. Seal weld open ends of round and rectangular hollow structural section with 3/8 inch thick closure plates. Provide continuous, sealed welds at angle to gusset-plate connections and similar locations where AESS is exposed to weather.

2.7 FABRICATION - STAIRS AND RAILINGS

A. Refer to the Drawings for location and details of steel stairs and railings (handrails and guardrails) to be furnished and installed hereunder.
   1. Verify heights shown in Drawings comply with referenced codes and regulations.
   2. Verify field measurements with approved Shop Drawings prior to fabrication.

B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
   1. Concrete pan filled stairs:
      a. Egress stairs: NAAMM Stair Standard, Commercial class.
      b. Monumental stairs: NAAMM Stair Standard, Architectural class.

C. Performance requirements; conform to all requirements of those codes and regulations referenced under Section 01 41 00 - REGULATORY REQUIREMENTS.
   1. Stairs: Design, fabricate and install stairs to safely support a minimum live load of 100 pounds per square foot and a concentrated load of 300 pounds on any area of four square inches as required under Section 1607 of the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments.
   2. Railings: Design, fabricate and install all railings in a manner which will ensure the railings will be capable of withstanding loads as follows and as required

under Section 1607 of the 2015 International Building Code with Massachusetts Building Code, Ninth Edition amendments.

a. Resist a load of 50 pounds per linear foot (0.73 kN/m) applied in any direction at the top and to transfer load through railing supports to structure.

b. Resist a single concentrated load of 200 pounds (0.89kN) applied in any direction at any point along the top, and to transfer load through railing supports to structure. Concentrated loading requirements are not concurrent with other loading requirements.

c. Intermediate rails, balusters and panel fillers shall resist a horizontally applied load of 50 pounds (0.89 kN) on an area equal to 1 square foot (.093m2), including openings and space between rails. Reactions due to this loading are not required to be superimposed with loadings specified for top rail.

D. Sizes of all headers, stringers, and other structural members; and gauges and configurations of all riser tread and landing plates and pans, railings, stringers, and posts shall be as indicated on the approved shop drawings, and in accordance with the standards of the National Association of Architectural Metal Manufacturers.

E. General fabrication: Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure. Indicate on shop drawings sizes of all members, gages and configurations of stairs and railings.

1. Join components by welding unless otherwise indicated.
2. Use connections that maintain structural value of joined pieces.
3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
4. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
5. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
6. Form exposed work with accurate angles and surfaces and straight edges.
7. Weld connections to comply with the following:
   a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   b. Obtain fusion without undercut or overlap.
   c. Remove welding flux immediately.
   d. Weld exposed corners and seams continuously unless otherwise indicated.

e. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

8. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

9. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

10. Fabricate stringers of steel channels or tubes as indicated on Drawings.

    a. Provide closures for exposed ends of channel and tube stringers

11. Construct platforms of steel channel headers and miscellaneous framing members as needed to comply with performance requirements.

12. Weld stringers to headers; weld framing members to stringers and headers.

13. Where stairs are enclosed by gypsum board or shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

14. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.

F. Fabrication, Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch (1.7 mm).

1. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.

2. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.

G. Fabrication, Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads and deflection criteria.

1. Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

    a. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.

2. Form changes in direction of railings as indicated on drawings, with radius bends of radius indicated. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire

bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

3. Close exposed ends of railing members with prefabricated end fittings.
4. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
5. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
   a. Connect posts to stair framing by direct welding unless otherwise indicated.

2.8 FABRICATION - SUPPORTS

A. Design, engineer and fabricate structural overhead support for equipment, furnishings, and products furnished under Sections, which includes, but is not limited to:
   1. Above ceiling support for products furnished under other sections.

B. Fabricate support system to carry the entire load of supported products to building structure above without transferring any horizontal or vertical load to ceiling system(s). Provide frequently spaced holes for multiple adjustment. Provide diagonal bracing. Use of a “Universal Grid” system members is acceptable.

C. Fabricate supports for equipment, fixtures, and appurtenances utilizing a “Universal Grid” system with rails extending wall-to-wall, perpendicular to the path of travel of the same.
   1. Design, engineer and fabricate supporting framework to support a concentrated load at any single point along the exposed rails, as exerted by the equipment to be purchased by the Owner.
      a. Installed framework shall have a minimum loading safety factor of 2.5, based upon ultimate strength under static loading conditions.
      b. The concentrated load shall be the maximum that will be encountered by positioning the equipment at the extremities of its travel (maximal load configurations).
      c. Base loads on the most severe conditions as may be encountered by any of the manufacturers producing equipment for the type of services of the rooms indicated.
   2. Rail shall be on centers as required by equipment manufacturer and allow continuous attachment along any point on the rail.
   3. System shall be true, plumb and level to the tolerances indicated, with no more than 1/720th of the span maximum deflection in either plane, when maximum loading conditions are applied due to equipment operations.

2.9 FINISHES - HOT-DIP GALVANIZING

A. Surface preparation prior to galvanizing: Pickle steel prior to galvanizing in conformance with SSPC-SP8. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter.

B. Hot-Dip Galvanizing: For steel exposed to the elements, weather or corrosive environments and other steel indicated to be galvanized, provide coating for iron and steel fabrications applied by the hot-dip process.

1. Basis-of-Design: "Duncan Galvanizing, Everett, MA., product "Duragalv."
2. Comply with ASTM A 123 for fabricated products and ASTM A 153 for bolts, nuts, washers, and other rough hardware. Provide thickness of galvanizing specified in referenced standards.
3. Wherever possible, perform galvanizing after assembly of items.
4. Galvanized items shall be straightened to remove all warpage and distortion caused by the galvanization process.
5. Fill vent holes after galvanizing (if applicable), and grind smooth.
6. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified herein above. Apply liquid zinc by brush or spray on all damaged areas in two coats to a total dry film thickness of not less than 3 mils. Apply first coat within two hours after damage to hot-dip film to prevent undue oxidation of exposed surface. On all welds remove weld spatter by power wire brushing or equivalent before applying liquid zinc coating. Repair material should extend at least 3 inches beyond all edges of the damaged galvanized area as possible to assure continuity of galvanic protection.
7. Touch-up of galvanized surfaces with aerosol spray, silver paint, bright paint, brite paint, or aluminum paints is not acceptable.

2.10 FINISHES - SHOP APPLIED COATINGS

A. Schedule: Shop applied coatings as indicated on Drawings, and as additionally specified and scheduled in this Section.

B. For non-galvanized steel surfaces:

1. Surface preparation prior to priming: Thoroughly clean all steel of all loose mill scale by power wire brushing or sandblasting. Remove all rust, dirt, weld flux, weld spatter, and other foreign matter by wire-brushing or scraping (power wire-brushing, if necessary). Grind smooth any sharp projections.
2. Shop apply specified primers thoroughly and evenly on the surfaces and worked into the joints and other open areas on the surfaces. Surfaces inaccessible after assembly shall be given two coats. Dry film thickness of primer shall be not less than 2.4 mils per coat.

C. For hot-dipped galvanized steel items scheduled for field applied painted finish:

1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified above under the Article entitle "Hot Dip Galvanizing".
2. Factory-Applied Primer over Galvanized Steel: Provide factory-applied prime coat, certified OTC/VOC compliant less than 2.8 lbs/gal. and conforming to EPA and local requirements. Apply primer within 12 hours after galvanizing at the same galvanizer's plant in a controlled environment meeting applicable environmental regulations and as recommended by the primer coating manufacturer. Primer coat shall exhibit a rugosity (smoothness) not greater than 4 rug (16-20 microns of variation) when measured by a profilometer over a 1 inch straight line on the surface of architectural and structural elements that are less than 24 pounds per running foot. Profilometer shall be capable of operating in 1 micron increments. Blast cleaning of the surface is unacceptable for surface preparation. Primer shall have a minimum two year re-coat window for application of finish coat. Coatings must meet or exceed the following performance criteria as stipulated by the coatings manufacturer:
    a. Basis-of-Design: Primergalv by Duncan Galvanizing, Everett, MA.
    b. Abrasion Resistance: ASTM D 4060 (CS17 Wheel, 1,000 grams load).1kg load, 200 mg loss.
    c. Adhesion: ASTM D4541, 1050 psi.
    d. Corrosion Weathering: ASTM D5894, 13 cycles, 4,368 hours; rating 10 per ASTM D714 for blistering and rating 7 per ASTM D610 for rusting.
    e. Direct Impact Resistance: ASTM D2794, 160 in. lbs.
    f. Flexibility: Method: ASTM D522, 180 degree bend, 1 inch mandrel, passes.
    g. Pencil Hardness: ASTM D3363, 3B.
    h. Moisture Condensation Resistance: ASTM D4585, 100 degrees F, 2000 hours; passes, no cracking or delamination.
    i. Dry Heat Resistance: Method: ASTM D2485, 250 degrees F.
3. Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.

D. For hot-dipped galvanized steel items scheduled for shop applied coating:
1. Touch-up all breaks on hot-dip surfaces caused by cutting, welding, drilling or undue abrasion with liquid zinc coating as specified above under the Article entitled "Hot Dip Galvanizing", herein above.
2. Finish: Provide factory-applied architectural coating over hot-dip galvanized steel matching approved samples.
    a. Basis-of-Design: Duncan Galvanizing, Everett, MA., product "Colorgalv 10".
    b. Primer coat shall be factory-applied. Apply primer within 12 hours after galvanizing and within 3 hours of surface preparation at the same facility where the galvanizing is done in a controlled environment meeting

applicable environmental regulations and as recommended by the primer coating manufacturer. Primer must meet or exceed the criteria for the following categories as stipulated by the coatings manufacturer:

1) Abrasion Resistance: ASTM D4060 (CS17 Wheel, 1,000 grams load) 1kg load, 200 mg loss.
2) Adhesion: ASTM D4541, 1050 psi.
3) Corrosion Weathering: ASTM D5894, 13 cycles, 4,368 hours; rating 10 per ASTM D714 for blistering and rating 7 per ASTM D610 for rusting.
4) Direct Impact Resistance: ASTM D2794, 160 in. lbs.
5) Flexibility: Method: ASTM D522, 180 degree bend, 1 inch mandrel, passes.
6) Pencil Hardness: ASTM D3363, 3B.
7) Moisture Condensation Resistance: ASTM D4585, 100 degrees F, 2000 hours; passes, no cracking or delamination.
8) Dry Heat Resistance: Method: ASTM D2485, 250 degrees F.

c. Finish coat shall be factory-applied high performance architectural finish. Apply finish coating at the galvanizer's plant, in a controlled environment meeting applicable environmental regulations and as recommended by the finish coating manufacturer. Finish must meet or exceed the criteria for the following categories as stipulated by the coatings manufacturer:

1) Abrasion Resistance: ASTM D 4060, CS17 Wheel, 1,000 cycles 1kg load, 87.1 mg loss.
2) Adhesion: ASTM D4541, 1050 psi.
3) Direct Impact Resistance: ASTM D2794, greater than 28 in. pounds.
4) Indirect Impact Resistance: ASTM D2794, 12-14 in. pounds.
5) Dry Heat Resistance: ASTM D2485, 200 degrees F.
6) Salt Fog Resistance: ASTM B117 9,000 hours, rating 10 per ASTM D714 for blistering.
7) Flexibility: ASTM D522, 180 degree bend, 1/8 inch mandrel, passes.
8) Pencil Hardness: ASTM D3363, 2H.
9) Moisture Condensation Resistance: ASTM D4585, 100 degrees F, 1000 hours, no blistering or delamination.
10) Xenon Arc Test: ASTM D 4798, pass 300 hours.

d. Coatings shall be certified VOC compliant and conform to applicable regulations and EPA standards. Apply the galvanizing, primer and coating within the same facility and provide single-source responsibility for galvanizing, priming and finish coating. Blast cleaning of the galvanized surface is not acceptable.

3. Engage the services of a galvanizing facility which will assume single-source responsibility for galvanizing and finish coating.

a. Touch-up finish in conformance with manufacturer's recommendations. Provide touch-up such that repair is not visible from a distance of 6 feet.

E. Powder coat finish:

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. TIGER Drylac, Reading PA.
   b. PPG Powder Coatings Division, Pittsburgh PA.
   c. Powder Technology, Inc., Schofield, WI.
2. Preparation Four step acidic cleaning treatment:
   a. Acidic degressing.
   b. Water rinse.
   c. Chromating
   d. Water rinse.
3. Preparation Etch and epoxy prime coat:
   a. Sandblast to white metal for removal of scale, oil and debris to create a minimum 2mil etching for proper adhesion.
   b. Electrostatic application of epoxy powder primer and heat cure.
4. Powder coating epoxy coating, as manufactured by TIGER Drylac, Reading PA, Product Special Series 49 in smooth low-semi-gloss finish or approved equal.
   a. Film Thickness: 2.5-3.5 mils, dry film thickness.
   b. Gloss: 36-54° (per gardener 60°, ASTM D523).
   c. Cross hatch adhesion test (per ASTM D3359): rated 5B.
   d. Mandrel bending test (per ASTM D522) 5mm (3/16 inch).
   e. Impact test (per ASTM D2794), Up to 120 in-lb.
   f. Pencil Hardness (ASTM B3363) 2H (minimum).
   g. Humidity resistance, maximum blistering (1500 hours, ASTM D2247): 1 mm (0.04 inch).
   h. Acid salt spray resistance, maximum undercutting (1500 hours, ASTM G85): 1 mm (0.04 inch).
5. Minimum Film Thickness, Finish Coat: 2.5-3.5 mils, dry film thickness.
6. Color: Custom color to match Architect's control sample.
7. Field touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

F. Field touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made bolt or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

1. Touch-up finishes shall be fully compatible with, and exactly match shop applied finish, color, texture and sheen.

G. Interior bronze railings finish: Shop finish all bronze elements, ANSI/BHMA A156.18-2012 Materials and Finishes designation 613 "Dark Oxidized Satin Bronze, Oil Rubbed," (former Equivalent US10B).

PART 3 - EXECUTION

3.1 ERECTION - GENERAL

A. General: Accurately set all work to established lines and elevations, and rigidly fasten in place with suitable attachments to the construction of the building. At the completion of the work, check all work, re-adjust as required, and leave in perfect condition. Grind all exposed to view welds smooth to the touch.

B. Setting bearing and leveling plates:

1. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
2. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
   a. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
   b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

C. Miscellaneous framing and supports: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and additional requirements indicated on Shop Drawings.

1. Anchor supports for operable partitions, and similar products, securely to and rigidly braced to building structure.

3.2 FIELD WELDING

A. Field weld components indicated on approved shop drawings in accordance with AWS D1.1. Weld profile, quality, and finish shall be consistent with approved samples and mock-ups.

1. Welds ground smooth: Erector shall grind welds smooth in the connections of AESS members. For groove welds, the weld shall be made flush to the surfaces of each side and be within + 1/16", -0" of plate thickness.
2. Contouring and blending of welds: Where fillet welds are indicated to be ground contoured, or blended, oversize welds as required; grind to provide a smooth transition and to match profile on approved mock-up .

3. Continuous Welds: Where noted on the drawings, provide continuous welds of a uniform size and profile.
4. Minimize Weld Show Through: At locations where welding on the far side of an exposed connection occurs, grind distortion and marking of the steel to a smooth profile with adjacent material.

B. Immediately after welding, touch-up welds, burned areas and damaged surface coatings.

1. Thoroughly remove all spatter by power wire-brushing (or if inaccessible, wire brushing) per SSPC, surface preparation specification SP2 or SP3. Allow surface to cool to ambient temperature. Clean surface with solvent wipe to remove oils, grease and dirt in accordance with SSPC surface preparation specification SP1.
2. Apply one coat of liquid zinc to attain a minimum of 1.5 mils dry film thickness. Coating should extend at least two inches beyond either side of weldment to ensure complete coverage of welded area.

3.3 FIELD BOLTING

A. Accurately drive all bolts into holes, protecting the bolt heads so as not to damage the thread during the driving. Ensure that bolt heads and nuts rest squarely against the metal. Where structural members have sloping flange faces, provide approved beveled washers at the bolted connections to afford square seating for bolt heads or nuts. Nick bolt threads for unfinished bolts to prevent the nuts from backing off.

1. Bolt Head Orientation: All bolt heads shall be oriented as indicated on the contract documents. Where bolt-head alignment is specified, the orientation shall be noted for each connection on the erection drawings. Where not noted, the bolt heads in a given connection shall be oriented to one side.

B. Use an approved calibrated manual or power torque wrench to obtain the proper torque and tension as recommended by the bolt manufacturer for all ASTM A 325 bolts.

3.4 INSTALLATION OF STAIRS

A. Preparation:

1. Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
2. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
3. Perform cutting, drilling, and fitting required for installing metal stairs.

B. Stair Installation: Construct and install stairs in strict accordance with the details, the approved shop drawings, and requirements of all codes, laws, and ordinances bearing on the work. Additionally comply with manufacturer's instructions for

prefabricated stair systems, as applicable. Set stair units accurately in location, alignment, and elevation, measured from established lines and levels and free from distortion or defects.

1. Fit exposed connections accurately together to form hairline joints.
2. Weld stair framing to steel structure or to cast-in-placed weld plates, unless otherwise indicated on Drawings.
3. Weld connections that cannot be shop welded because of shipping size limitations.
   a. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
4. General requirements for field welding: As specified herein above, and the following additional requirements:
   a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   b. Obtain fusion without undercut or overlap.
   c. Remove welding flux immediately.
   d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. Stair installation tolerances:
   a. Maximum Variation from Plumb: 1/4 inch (6 mm) for full height of stair.
   b. Maximum Variation from Level: 1/8 inch (3 mm) in 10 feet (3000 mm).
   c. Maximum Angular Variation of the Tread from True Position: 3 degrees.

C. Grouted baseplates (as applicable):
1. Clean cementitious bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
2. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
   a. Use nonmetallic, nonshrink grout, unless otherwise indicated.
   b. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

D. Concrete-filled-metal-pan stairs: Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 - CAST-IN-PLACE CONCRETE.

3.5 INSTALLATION OF RAILINGS

A. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated, or if not indicated, as required by design loading.

Plumb posts in each direction. Secure posts and railing ends to building construction as follows:

1. Anchor posts in concrete by means of pipe sleeves providing at least 1/2 inch clearance around entire perimeter of post, preset and anchored into concrete. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with nonmetallic, nonshrink grout, mixed and placed to comply with grout manufacturer's directions.
   a. For setting into colored concrete; hold grout back 1/2 inch from finish surface and fill void with Portland cement grout matching color and texture of adjacent surface.
   b. Leave anchorage joint exposed, wipe off surplus grout, and leave 1/8" build-up, sloped away from post.
2. Anchor posts to steel with steel flanges, angle type or floor type as required by conditions, welded to posts and bolted to steel supporting members.
3. Anchor rail ends into concrete and masonry with round steel flanges welded to rail ends and anchored into wall construction with lead expansion shields and bolts.
4. Anchor rail ends to steel with round flanges welded to rail ends and bolted to structural steel members, unless otherwise indicated.
5. Install removable railing sections where indicated in slip-fit metal sockets cast into concrete. Accurately locate sockets to match post spacing.

B. Secure handrails to wall with wall brackets and end fittings. Provide bracket with not less than 1-1/2 inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated, or if not indicated, at spacing required to support structural loads. Secure rails to walls with wall brackets, wall return fittings and anchor plates, in a manner required to meet code requirements, and as follows:
   1. Each bracket shall be fastened with not less than 2 bolts.
   2. For concrete and solid masonry anchorage, use drilled-in expansion shield and either concealed hanger bolt or exposed lag bolt, as applicable.
   3. For hollow masonry anchorage, use toggle bolts having square heads.
   4. For steel framed gypsum board assemblies, fasten brackets directly to steel framing or concealed anchors to steel reinforcing plate, using bolts of size and type required to support structural loads.
   5. For wood stud partitions, use lag bolts set into wood blocking or backing between studs. Coordinate with stud installations for accurate location of blocking or backing members.

3.7 SUPPLEMENTAL SCHEDULES

A. General: Items listed herein below provide further description of those already indicated in the Drawings. This list does not represent a complete list of miscellaneous metal components or types required to complete the Work.

1. Carefully review all Drawings and furnish and install metal fabrications required by the various trades, whether or not specifically listed herein, such as miscellaneous clip angles, miscellaneous steel bracketing, and other miscellaneous metal items as indicated on the Drawings, reasonably implied therefrom, or reasonably necessary for the thorough completion of the work.

B. Steel pan stair and related support components, as detailed on the Drawings and specified herein above.

C. Interior railings as detailed on the Drawings. Connections and sizing to conform to engineering and code requirements specified herein above.

D. Exterior railings: 1-1/4 inch (I.D.) steel pipe as detailed on the Drawings. Fabricated assemblies shall be hot-dipped galvanized, shop primed and shop finished.

1. Pipe railings: To prevent unnecessary damage to the galvanized coating by field welding, provide slip-fit method of connecting pipe railings. Fabricate pipe railing from mechanical steel tubing internally vented with holes 3/4 the size of the pipe's internal diameter.

E. Elevator pit ladders: Stringers 3/8-inch by 1-1/2 inch flat bar, rungs 3/4 inch diameter solid steel rods. Offset ladder from wall surface by 7 inches to centerline of rungs, with brackets.

1. Fabricate ladders in accordance with OSHA requirements, and ANSI A14.3 standards.
2. Hot dip galvanized finish assembled elevator pit ladders.

F. Elevator sill support angles: 4 by 4 inch by 3/8 inch thick, galvanized, shop primed.

A. Elevator sump pit grating: Provide either welded steel grating or pressure-locked steel grating fabricated by either pressing rectangular flush-top crossbars into slotted bearing bars or swaging crossbars between bearing bars.

1. Grating Characteristics:
   a. Bearing Bar Spacing: 15/16 inches on center.
   b. Bearing Bar Depth: 1 inch.
   c. Bearing Bar Thickness: 3/16 inch.
   d. Crossbar Spacing: 4 inches on center.
   e. Traffic Surface: Plain.
   f. Steel Finish: Hot-dip galvanized with a coating weight of not less than 1.8 oz./sq. ft. of coated surface.
2. Perimeter support angles: Hot dipped galvanized steel, size as indicated on Drawings, furnished to Section 03 30 00 – CAST-IN-PLACE CONCRETE for embedment into concrete.

B. Loose lintels: Steel angles complying with ASTM Designation A 36; in accordance with the following schedules:

1. Provide one angle for every nominal 4 inch width in 4, 8 and 12 inch width walls/partitions per the following table:

Maximum Opening	Interior Opening	Exterior Opening
Up to 4′-0″	4 x 3-1/2 x 5/16″	4 x 3-1/2 x 3/8″
4′-1″ to 6′-0″	5 x 3-1/2 x 5/16″	5 x 3-1/2 x 3/8″
6′-1″ to 8′-0″	6 x 3-1/2 x 5/16″	6 x 3-1/2 x 3/8″

2. Provide structural tees for 6 inch width walls/partitions per the following table:

Maximum Opening	Structural Tee
Up to 4′-0″	WT4
Up to 6′-0″	WT4 X 9
Up to 8′-0″	WT8 X 13

3. Provide lintels 12 inches longer than masonry openings. Where lintel abuts column, provide structural clip connection.
4. Lintels occurring in exterior walls shall be galvanized in conformance with the requirements of ASTM A 143, and ASTM A 123.

END OF SECTION 05 50 00

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SECTION 06 03 12
HISTORIC WOOD REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install:

1. Exterior trim, including replacement or repair of missing, damaged existing wood trim, casings, stools, fascias and soffits.
2. Cellular PVC paneling and trim as indicated on the Drawings.

B. Backprime all exterior wood trim, which comes in contact with cementitious and masonry materials

C. No attempt is made in this Section to list all elements of finish carpentry required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.

1.5 QUALITY ASSURANCE

A. Restorer: Company specializing in performing the wood restoration work of the type specified herein, with minimum of 5 years documented experience. Work shall be done by skilled workmen, fully instructed as to the requirements Specified herein and adequately supervised during the work.

B. Quality Standards: All materials and workmanship scheduled to receive transparent finishes shall meet AWI *Architectural Woodwork Standard,* Premium Grade quality standards. All other materials and workmanship shall meet AWI *Architectural Woodwork Standard,* Custom Grade quality standards.

C. Install work in accordance with the latest version AWI *Architectural Woodwork Standard,* except that standing and running trim joints shall be field mitered and fitted.

D. Discard lengths of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.

E. Epoxy consolidant and epoxy patching materials for the work of this Section shall be of a single manufacturer.

PART 2 – PRODUCTS

2.1 WOOD MATERIALS – GENERAL REQUIREMENTS

A. General: Materials, as fabricated and installed, shall comply with specified grades of the latest addition AWI Quality Standards.

B. Moisture content:

1. Wood for exterior use shall have a moisture content between 9 to 15 percent, when delivered to the project.

2.2 BOARD AND PANEL MATERIALS

A. Exterior finish lumber: Nominal 1 inch thick, S4S, Honduras Mahogany (Sweitenia macrophylla), plain sawn, in profiles and dimensions to match existing.

2.3 EPOXY PATCHING MATERIALS

A. Epoxy patch materials: Both epoxy consolidant and epoxy patching materials for the work of this Section shall be of a single manufacturer. Manufacturers offering products which may be incorporated in the work include the following, or equal:

1. Abatron, Gilberts IL., products:
   a. Epoxy consolidant: "LiquidWood".
   b. Epoxy paste filler: "WoodEpox".
2. Conservation Services, Kinnelon NJ., products:
   a. Epoxy consolidant: "ConServe (t) Flexible Consolidant 100".
   b. Epoxy paste filler: "ConServe (t) Flexible Patch 200".

2.4 ACCESSORIES AND HARDWARE

A. Glue for lamination and fabrication of wood and plywood items: Exterior Grade, phenolic resin glue.

B. Nails:

1. Nails for exterior trim items: 6d and 8d epoxy coated or hot dipped galvanized finish nails. Electro-plated nails are not acceptable as equal.

C. Screws: Flat-head wood screws of the appropriate sizes, galvanized finish for interior use and stainless steel for exterior use.

D. Bolts, nuts, washers, blind fasteners, lags: Galvanized, of size and type to suite application as indicated in the drawings.

E. Paint for back-priming:

1. Products which may be considered as equal include the following, or approved equal:

a. California: “Wipe-Out 100% Acrylic Latex Stain Block”, Nº 52500.
b. Glidden: Wall and Woodwork Primer Sealer, Nº 1020.
c. Moore: “Alkyd Enamel Underbody”, Nº. 217.
d. Pittsburgh: “Speedhide Alkyd Interior Quick-Drying Enamel Undercoater”, 6-6 Series.
e. Sherwin-Williams: "Wall and Wood VOC Primer", B49 WZ2 Series.

2.5 WOOD TREATMENTS

A. Comply with requirements specified under Section 06 10 00 - ROUGH CARPENTRY.

2.6 CELLULAR PVC TRIM

A. Expanded rigid poly vinyl chloride with a small-cell microstructure, in profiles and dimensions indicated, and complying with the following:
1. Density: Minimum of 0.50 g/cc per ASTM D792.
2. Water absorption: Less than 1 per cent per ASTM D570.
3. Hardness: At least 50 per ASTM D2240 (Shore D).
4. Flexural strength: At least 3,300 psi per ASTM D790.
5. Tensile strength: At least 2,200 psi per ASTM D638.

B. Acceptable manufacturers include the following:
1. New England Specialty Lumber Inc, W. Springfield MA, product: “Nels-Tek 600”.
2. Vycom Corporation, Moosic PA, product: “Azek”.
3. CertainTeed Corp., Valley Forge, PA, product “Restoration Millwork”.
4. Wolfpac Technologies, Inc., Aliquippa, PA, product: “Versatex”.
5. Fypon, Ltd., Archbold, OH, product “Cellular PVC Trim”.
6. PVC Sheets and Trim: “Celtec550” as distributed by New England Lumber Specialties, Inc., West Springfield, MA.

PART 3 - EXECUTION

3.3 INSTALLATION – GENERAL CARPENTRY

A. Comply with installation requirements of AWI (Architectural Woodwork Institute) Quality Standards, Eighth edition for Premium Grade quality work.

B. Dress and sand woodwork until free from machine and tool marks, abrasions, raised grain, or other defects that will show through the finish on surfaces exposed to view. Wherever possible, carry out sanding on a shop belt sander, not in the field. Sandpaper field joints and leave in perfect condition for finishing.

C. Make all joints tight, and form to conceal shrinkage. Glue all miters having a dimension of 4 inches or more from heel to point. Joints shall be glued tight and so formed as to conceal shrinkage. Cope trim at returns and miter at corners to produce tight-fitting joints with full surface contact throughout length of joint.

D. Make a minimum of splices and joints in running trim, and where such splices and joints occur, fasten securely, with all exposed surfaces having smooth, continuous planes. Stagger joints in adjacent or relate members. Use scarf joints for end-to-end joints.

E. Scribe and cut work to fit adjoining work closely. Refinish cut surfaces in prefinished items.

F. Woodwork shall be properly framed, closely fitted and accurately set to the required lines and levels and shall be rigidly secured in place. Shim as required using concealed shims to achieve specified tolerances.

3.4 SPLICING AND DUTCHMAN REPAIRS

A. Splicing Repairs: Where entire sections of existing elements are indicated to be replaced remove all damaged or deteriorated material and cut ends where the replacement member will be attached. End cuts should be on a diagonal to increase the gluing surface area. Replacement members shall match existing members in grain orientation and in any existing shape or profile. Where possible provide new members fabricated from matching salvaged stock. Attach new members by cutting the ends diagonally to match the existing member; drill aligned holes in both members, glue and insert wood reinforcing dowels.

B. Dutchman Repairs: Where localized damage or deterioration is present, provide dutchman repairs. Probe the deteriorated area to determine the approximate depth of the deterioration. Dutchman shall have their grain aligned with the existing member. Dutchman shall be either rectangular or diamond shaped. Ensure the dutchman is large enough to cover the affected area and thicker than the deterioration or damage is deep. Bevel all edges and orient the dutchman so that the widest face is at the top. Trace the outline of the dutchman's narrowest face on the existing member over the deteriorated area and carefully remove all of the deteriorated wood with a chisel. Test-fit the dutchman, and trim the hole until the dutchman bottoms out and fills the affected area entirely. The installed dutchman shall be slightly higher than the existing adjacent material. Glue and where possible clamp the dutchman in place. When glue has cured, use a chisel or hand plane to make the dutchman flush with the surrounding material. Hand sand for the final leveling of the dutchman with adjacent surfaces.

3.5 EPOXY PATCH EXISTING WORK

A. Strip existing finishes from windows sills, by sanding, scraping, and use of chemical removers.

B. General: Apply epoxy consolidant and paste filler to damaged wood sills, restoring wood components to original profile. Apply epoxy materials in strict accordance with manufacturer's instructions, and as specified herein.

C. Brush apply consolidant to full penetration and saturation, reworking areas as required. Check for penetration by drilling or cutting out small areas prior to consolidant hardening and re-apply consolidant for full saturation.

D. Paste patching:

1. Apply paste filler in layers not to exceed 1 inch. Allow each layer of paste filler to completely cure prior to application of subsequent layers.
2. Plane, and sand filler smooth with existing wood, matching profiles and dimensions.

END OF SECTION 06 03 12

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SECTION 06 10 00
ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of rough carpentry where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Fire retardant treated plywood backer panels for mounting of electrical panelboards, telephone/data backboards, HVAC and fire control equipment and other equipment.
2. Various wood blockings, edgings, nailers, curbs, cants, grounds, furring, sheathing, framing members including wood preservative or fire-retardant treated as indicated, for receipt of various finishes and surfacing materials, not described herein above.
   a. Refer to Drawings for locations of fire retardant treated wood blocking and plywood.
3. Rough installation hardware, including bolts, screws, spikes, nails, clips, and connection assemblies, as needed for installation of the rough carpentry work.
   a. Provide epoxy set 'restoration' anchors.

C. Install the following furnished under the designated Sections:

1. Metal door frames furnished under Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.
   a. Place frames and erect in correct positions within specified tolerances. Additionally provide temporary bracing at locations where frames are indicated to be built-into masonry. Section 04 20 00 - UNIT MASONRY shall grout frames and "build-into" into masonry work.
2. Concealed anchorage devices for handicap handrails in toilet rooms: Section 10 28 00 – TOILET, BATH, AND LAUNDRY ACCESSORIES.

D. Coordinate work of this Section with the work of the various trades responsible for applying finish materials and other items to rough carpentry work. Furnish and install furring, blocking, and shims, and other usual items of normal rough carpentry work as required by the various trades for the proper completion of the project.

1. The applicable requirements specified in Part 1 - GENERAL and Part 3 - EXECUTION of the individual specification sections furnishing materials to be installed under this Section, shall be included in and made a part of this Section.

E. No attempt is made in this Section to list all elements of rough carpentry required on this project or to describe how each element will be installed. It is the responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. All lumber shall:

a. Be new, dressed four sides (S4S), clear and free from warping and other defects.

b. Have a moisture content not exceeding 19 percent when delivered to the project.

c. Be in accordance with the grading rules of the lumber manufacturer's association under whose jurisdiction the lumber is produced and bear the mark of grade and mill identification.

B. Certifications:

1. Plywood: Conform to the requirements of Product Standard PS-1, and bear applicable APA grade trademarks.

a. Plywood for electrical boards treated for retardance, meet Class I or a flame spread rating of 25 or less and bear U.L. label "Classified FRS".

1.8 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 BOARD AND SHEET MATERIALS

A. Lumber for blocking, nailers and curbs as indicated or required: Hem-Fir, Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried stud or utility grade. Wood members shall be of sizes indicated on the Drawings or of the same size as the members being braced.

1. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

B. Furring: Nominal 1 by 3 inches or 1 by 4 inches Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried construction grade.

C. Plywood and sheet products:

1. For substrate beneath gypsum board: Square edge APA graded C-D-X EXT, touch-sanded, 1/2 inch thick, except as otherwise indicated on the Drawings
2. For electric panel board mountings and similar uses: APA graded B-D INT, Group 2 species, touch-sanded, fire-retardant treated, 3/4 inch thick, except as otherwise indicated on the Drawings.
3. For unspecified interior concealed from view locations: APA graded C-D PLUGGED INT, Group 2 species, thickness as indicated on the Drawings.
4. Exterior plywood: ¾ inch thick APA graded B-C, Exposure 1, EXT, Group 1 species, 5 ply/5-layer plywood, touch sanded.

2.2 WOOD TREATMENTS

A. Treated wood products shall be produced by a single treatment plant, fully licensed by the chemical manufacturers, and conforming to the requirements specified herein.

1. Toxicity and Environmental Quality:
   a. Products containing chromium will not be permitted.
   b. Products containing arsenic will not be permitted.
   c. Fire-retardant-treated wood products shall be free of halogens, sulfates, ammonium phosphate and formaldehyde.
2. Dye wood or otherwise color code all treated wood at treatment plant to clearly distinguish the different treatments in the field.
3. Kiln dry all treated lumber and plywood to the following maximum moisture content after treatment.
   a. Lumber: 19 percent.
   b. Plywood 15 percent.
   c. Discard pieces with defects which might impair quality of work.
4. Quality marks: Each piece of lumber and plywood shall be permanently affixed with a quality mark, containing the following information:
   a. Identification of the inspection agency.
   b. Standard to which material was treated.
   c. Identification of the treating plant.
   d. Fire retardant treated wood shall include: stamp signifying a FR-S rating
   e. Preservative treated wood shall include: Retention and end use for which product is suitable.

B. Fire retardant treated wood. Designated as “FRTW”

1. Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
   a. Arch Wood Protection, Atlanta, GA., product, “Dricon FRT Wood”.

b. Osmose, Inc., Griffin GA., product "FirePro".

c. Hoover Treated Wood Products, Inc., Thomson, GA product "PyroGuard".

d. Viance, LLC., Charlotte, NC, product: "D-Blaze FRT".

2. Fire retardant treated wood shall comply with the following requirements:

a. All fire-retardant lumber and plywood must have an Underwriters Laboratories stamp signifying a FR-S rating certifying a 25 or less flame spread and smoke developed value, when tested in accordance to ASTM E-84, or UBC Standard No. 42-1.

b. Corrosion rates: Less than one mil per year for carbon steel, galvanized steel, aluminum, copper and red brass in contact with the fire retardant treated wood when tested in accordance with Federal Specification MIL-L-19140E Paragraph 4.6.5.2.

c. The fire retardant treated wood must have an equilibrium moisture content of not more than 25 percent when tested in accordance with ASTM D 3201 procedures at 95 percent relative humidity and 80 degrees Fahrenheit.

d. Fire retardant chemical: Registered for use as a wood preservative by the U.S. Environmental Protection Agency.

e. Testing: Fire performance and strength properties for both lumber and plywood, of the fire retardant treated wood shall be recognized by issuance of a ICC Evaluation Service Report. Fire retardant chemical must not damage the middle lammella of the wood structure when exposed to 170 degrees Fahrenheit and 90 percent relative humidity for 23 days.

C. Pressure preservative treated wood. Designated as "PT"

1. Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:

a. Osmose, Inc., Griffin GA., product "NatureWood".

b. Universal Forest Products, Inc., Grand Rapids MI., product "ProWood ACQ".

c. Viance, LLC., Charlotte, NC., product "Preserve"

2. Treatment: Ammoniacal Copper Quaternary Compound (ACQ), arsenic-free and chromium-free chemical "ACQ Preservative" in accordance with AWPA Standards. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.

a. Minimum preservative retention for floor plates, framing, lumber and plywood above ground use: 0.25 pounds per cubic foot (4.0 kg/m^3) of ACQ chemical, in accordance with AWPA UC1, UC2, UC3A, and UC3B, or NER-643 as appropriate.

b. Minimum preservative retention for framing, lumber and plywood in contact with water, ground, concrete and masonry: 0.40 pounds per cubic

foot (6.4 kg/m^3) of ACQ chemical, in accordance with AWPA UC4A, UC4B, UC4C, or NER-643 as appropriate.

c. Minimum preservative retention for lumber and plywood in permanent wood foundations: 0.60 pounds per cubic foot (9.6 kg/m^3) of ACQ chemical, in accordance with AWPA UC4B, or NER-643.

3. Fixation of Chemical: Treated wood shall not be shipped from treatment plant until fixation of the preservative has occurred in the wood.

2.3 ACCESSORIES

A. Adhesives:

1. General: Provide adhesives approved which are Low-VOC or non-VOC, non-flammable, water-proof after cured, odor free, and comply with CHPS certification requirements.
2. Adhesive for lamination and fabrication of wood and plywood items: Exterior adhesives containing no urea formaldehydes, having a VOC limit of 70 g/L.
3. Adhesive for subfloors and underlayment: High strength, waterproof and non-freezing adhesive complying with AFG-01 “Frozen Lumber Test” and ASTM 3498, and having a VOC limit of 50 g/L.

B. Nails (interior and exterior): Galvanized common nails, of size and type to suit application and as required by state and local building codes.

C. Screws:

1. Screws for interior applications: Flat head electroplated-galvanized wood screws of the appropriate sizes.
2. Screws for exterior applications:
   a. For ACQ pressure preservative treated wood: Flat head type 304 or 316 stainless steel only, wood screws, of the appropriate sizes. Aluminum, galvanized steel, and coated metal fasteners are prohibited.
   b. For general application (non-pressure preservative treated wood): Flat head hard aluminum, or stainless steel, wood screws, of the appropriate sizes.

D. Anchor bolts, expansion bolts and lag screws: Hot-dipped galvanized steel, of the following types:

1. For lumber having actual thickness of 1-1/2 inches or greater to masonry and concrete: Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, 3/8-inch minimum diameter, spaced as shown on drawings, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.
2. For lumber having actual thickness of greater than 7/8-inch but less than 1-1/2 inches to masonry and concrete: Anchor bolts or expansion bolts, as most applicable for the specific receiving surface material, at least 1/4-inch

diameter of the most appropriate lengths for the specific application, spaced as shown, and staggered as far as practicable. Countersink all bolt heads, and provide head washers of matching material.

3. For lumber having actual thickness of 7/8-inch and less: Anchor bolts or expansion bolts, at least 1/4-inch in diameter; or screws, of the most appropriate sizes; in lengths most suitable for the specific application, countersunk, spaced, and staggered.

E. Protection paper: Canadian red-rosen paper or kraft paper.

F. Building paper: ASTM D 226, Non-perforated, No. 15 (73 kg/sq m) asphalt-saturated building felt.

PART 3 - EXECUTION

3.2 INSTALLATION - GENERAL

A. Closely coordinate the installation of the rough carpentry work with the work of other trades responsible for the installation of interfacing or overlaying materials, so as not to delay the work of the related trades.

B. Erect all rough carpentry work plumb, level, and true with tight, close fitting joints, securely attached and braced to surrounding construction, all in a first class workmanlike manner. Counterbore for bolt heads, nuts, and washers where required to avoid interference with other materials. Bear complete responsibility for structural integrity, connections, and anchorage of all rough carpentry work.

C. Make provisions for erection loads, and for sufficient temporary bracing to maintain structure safe, plumb, and in true alignment until completion of erection and installation of permanent bracing.

D. Use as long lengths as practicable for wood nailers, blockings, and curbs, to minimize number of joints, and attach the members with the types, and spacing, of fasteners specified herein.

E. Install blocking, grounds and furring, as required for proper attachment of the work of other trades, in accordance with the requirements provided by the respective related trades.

1. Spacing for furring and strapping shall not exceed 16 inches on center.

F. Field cuts of fire retardant treated lumber: Do not rip or mill fire retardant treated lumber. Only end cuts, drilling holes and joining cuts are permitted.

G. Field cuts of ACQ pressure-treated lumber: Apply solution of copper naphthenate containing a minimum of 2 percent metallic copper in-solution, in accordance with AWPA standard M4. Brush liberally all cuts and holes.

H. Install concealed from view plywood with specified fasteners spaced not more than 10 inches on centers.

I. Install fire-treated plywood backer boards with counter-sunk galvanized fasteners, of specified sizes, spaced not more than 12 inches on centers.

3.3 INSTALLATION – EQUIPMENT BACKBOARDS

A. Provide panel mounting backboards for HVAC, Fire Prevention, Electrical and telephone/data equipment. Fabricate panels using fire-retardant treated 3/4 inch thick panels mounted to fire-retardant treated 2 by 4's. Provide a nominal space of 3-1/2 inches behind panels to permit wiring.

3.4 INSTALLATION - METAL DOOR FRAMES

A. Place in position all steel frames, furnished under Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES, in accordance with the approved shop drawings and frame schedule. Place, erect and level all frames into correct scheduled locations, including those in masonry partitions.

1. During the installation of metal door frames, after the manufacturer's steel shipping bars have been removed, install wood spreaders at door opening, carefully dimensioned to permit square and plumb installation of door frames and doors.

   a. Provide rigid temporary bracing for frames as required to ensure maintenance of positioning, and remove only after frames have been permanently anchored.

   b. For doors located in masonry work, maintain frame position with temporary bracing until frames are built-into-place, and grout has sufficiently cured to maintain frame position.

   c. Spreaders shall remain in place until doors are installed.

2. Coordinate installation of frames with the various trades installing abutting wall construction for anchor placement.

B. Coordinate installation of frames with installation of hardware under Section 06 20 00 - FINISH CARPENTRY and as furnished under Section 08 71 00 - DOOR HARDWARE.

C. Install frames in accordance with the manufacturer's recommendations, ANSI/SDI-100, SDI-105, and the Door Hardware Institute (DHI) recommendations.

1. Secure frames with the following number of anchors per jamb.

   a. For frames 7'-6" in height or less: 3 anchors per jamb.

   b. For frames 7'-6" in height or less and having doors exceeding 3'-0" feet width, and for cross corridor frames: 4 anchors per jamb.

   c. For frames greater than 7'-6", up to 10'-0" in height: 4 anchors per jamb.

d. For frames greater than 7′-6″, up to 10′-0″ in height, and having doors exceeding 3′-0″ feet width, and for cross corridor frames: 5 anchors per jamb.

e. For frames over 10′-0′ in height: 5 anchors per jamb.

2. Secure frames, occurring in existing masonry, with expansion bolts and sleeves.

3. Where exposed fastener heads occur in frames, fill with automotive body filler and sand smooth.

3.7 SCHEDULES

A. Wood treatment schedule:

1. Pressure preservative treat all concealed or exposed-to-view:

a. Lumber and plywood which comes in contact with concrete, masonry, or earth.

b. Lumber and plywood nailers, blocking and curbing directly related to roofing, flashing, skylights, roof hatches, and roof accessories.

c. Lumber and plywood rough-bucks, blocking and nailers directly related to windows, curtainwall and storefront systems.

2. Fire retardant treat all concealed or exposed-to-view:

a. Wood blocking, nailers and curbing where indicated or noted on Drawings.

b. Equipment backer boards.

B. Wood blocking schedule: The following schedule lists common items for which blocking is required and may not be indicated on the Drawings. It is not the intention of this schedule to list all conditions requiring blocking or limit the extent of blocking required for completion of the Work; provide all wood blocking, edgings, nailers, required for receipt of various finishes and surfacing materials. Securely anchor wood blocking and run continuous between framing.

1. Blocking sizes indicated below are minimum sizes for conditions which not otherwise sized or indicated on Drawings. In case of conflict, sizes identified on Drawings govern.

Items	Nominal size of blocking with fastener notes
Door Frames, having openings exceeding 4 feet in width;	2 by 4 inch, full height of wall framing
Door frames, cross corridors;	2 by 4 inch.
Door stops, wall mounted;	1 by 3 inch.
Grab bars;	2 by 6 inch, with 1/4 inch dia. toggle bolts.
Lavatories;	3/4 inch plywood extending full

	height from floor to top of wall framing. Install lavatories with 1/4 inch dia. toggle bolts
Mirrors, framed;	2 by 4 inch
Soap dispensers, wall mounted;	1 by 3 inch
Paper towel dispensers, waste receptacles, feminine napkin dispensers;	1 by 3 inch.
Toilet paper dispensers;	2 by 4 inch
Towel bars;	2 by 6 inch, ¼ inch diameter toggle bolts
Wall mounted railings;	2 by 8 inch
Window treatment:	2 by 4 inch

END OF SECTION 06 10 00

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Section 06 16 00
SHEATHING

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of exterior sheathing board where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following scope.

B. Furnish and install the following:

1. Exterior wall sheathing.

1.8 MOCK-UP

A. Provide mock-up elements for field panel at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.10 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

B. Manufacturer Warranty:

1. Sheathing manufacturer's 12 month warranty for coverage against in-place exposure damage. Warranty shall commence on date of material purchase.
2. Sheathing manufacturer's 5 year limited warranty covering materials commencing on date of Project Substantial Completion.

PART 2 - PRODUCTS

2.1 PLYWOOD SHEATHING

A. Exterior wall sheathing: APA RATED SHEATHING, 3/4 inch (19.1 mm) thick having a minimum span rating 48/24, oriented strand board, or 5 ply/5 layer plywood touch-sanded complying with the following:

1. APA - applicable grades and specifications.
2. APA PRB-108 Performance Standards and Policies for Structural-Use Panels.
3. US. Department of Commerce Voluntary Product Standard PS1 for Construction and Industrial Plywood.
4. US. Department of Commerce Voluntary Product Standard PS2 for Wood-Based Structural-Use Panels.

2.2 GYPSUM SHEATHING

A. Acceptable Manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. United States Gypsum Company, Chicago IL. (USG), product "Securock Glass-Mat".
2. Georgia Pacific Corporation, Gypsum Division, Atlanta GA, product: "DensGlass Sheathing".
3. National Gypsum Company, Gold Bond Products Division, Charlotte NC. (Gold Bond), product: "e^2XP Sheathing".
4. Lafarge North America, Inc., Reston VA, product: "Weather Defense Platinum".

B. Sheathing Board: 5/8 inch thick gypsum sheathing board, Type X complying with ASTM C 1177 with fiberglass mat surface front and back with silicone-treated gypsum core conforming with the following requirements:

Properties	Test	Results
Surfacing:		Glass mat
Width:		4'-0" nominal
Length:		10'-0" (+/- 1/4 inch) maximum
Flexural Strength, lb/ft parallel (4'-0" weak direction):	ASTM C 473	100 pounds
Humidity Deflection, (inches):	ASTM C 473	1/8 inch, maximum
Linear Expansion with Change Moisture (in/in % RH):	ASTM C 518	$6.25 \times 10^{-6,}$, maximum
Thermal resistance "R" (in/ft^2°F/Btu):	ASTM C 518	0.56 minimum
Weight (per 1,000 sq ft):	ASTM C 1177	2,500 pounds minimum
Bending Radius	ASTM C 1177	8 feet, minimum
Mold growth:	ASTM D 3273	Score 10 with no mold detected
Racking Strength, lbs/ft, dry (ultimate):	ASTM E 72	>654 pounds per foot
Surface burning characteristics:	ASTM E 84	Flame spread: 10, maximum
Permeance (ng/Pa•s•m^2):	ASTM E 96 (dry cup method)	17 perms, maximum
Combustibility:	ASTM E 136	Noncombustible
Coefficient of Thermal Expansion (in/in/°F):	ASTM E 228 modified	$8.5 \times 10^{-6,}$, maximum

Properties	Test	Results
Surfacing:		Glass mat
Width:		4′-0″ nominal
Length:		10′-0″ (+/- 1/4 inch) maximum
Flexural Strength, lb/ft parallel (4′-0″ weak direction):	ASTM C 473	80 pounds
Humidity Deflection, (inches):	ASTM C 473	1/4 inch, maximum
Linear Expansion with Change Moisture (in/in % RH):	ASTM C 518	6.25×10^{-6}, maximum
Thermal resistance "R" (in/ft^2°F/Btu):	ASTM C 518	0.45, minimum
Weight (per 1,000 sq ft):	ASTM C 1177	1,900 pounds minimum
Bending Radius	ASTM C 1177	6 feet, minimum
Mold growth:	ASTM D 3273	Score 10 with no mold detected
Racking Strength, lbs/ft, dry (ultimate):	ASTM E 72	>540 pounds per foot
Surface burning characteristics:	ASTM E 84	Flame spread: 10, maximum
Permeance (ng/Pa•s•m^2):	ASTM E 96 (dry cup method)	23 perms, maximum
Combustibility:	ASTM E 136	Noncombustible
Coefficient of Thermal Expansion (in/in/°F):	ASTM E 228 modified	8.5×10^{-6}, maximum

2.3 ACCESSORIES

A. Fasteners for 1/2 inch thick sheathing: Type S-12 fine thread rust resistant self-drilling screws, for applying single layer sheathing board to light gage metal framing.

1. Fastener length for layer sheathing application: 1 inch [25 mm].
2. Fastener length for double layer sheathing application: 1-1/2 inch [38 mm].

PART 3 - EXECUTION

3.2 INSTALLATION

A. Install sheathing in strict compliance with manufacturer's recommended installation instructions and as specified here, comply with all applicable code requirements.

1. Install specified control joints where indicated on Drawings. Run vertical control joints continuously to top of wall.

B. Secure sheathing with long dimension perpendicular to wall studs with ends over firm bearing, stagger joints where possible. Use maximum lengths possible to minimize number of joints.

1. Install sheathing with panel edge joints no greater than 1/8 inch (maximum) spacing to abutting sheathing panels and at all sheathing termination edge and end joints.
2. For metal framing: Install screws with 8 inch on center spacing 1/2 inch in from edge around perimeter of each sheathing board, and 8 inches on center in field.
3. Drive fasteners tight and flush with surface of sheathing, do not countersink.

END OF SECTION 06 16 00

SECTION 06 41 16
ARCHITECTURAL WOODWORK AND FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of shop fabricated millwork and architectural woodwork where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Wood veneer millwork and casework
2. Wood items having shop applied stained and opaque finish including but not limited to wood trim, paneling and handrails.
3. Exposed blocking and blocking concealed by the work of this Section required for the installation of architectural woodwork.
4. Hardware for work of this Section, including custom fabricated hardware and accessories.
   a. Provide locking cylinders at cabinet doors and drawers.
5. Storage and closet shelving, coat rods and related hardware.
6. Sealant, for joints between cabinets and abutting wall and partition surfaces.
7. Millworker's touch up kit in sufficient size and quantity to allow for all required field touch up of shop finished items.

C. Install the following furnished under the designated Sections:

1. Install Cabinet cylinders furnished by Section 08 71 00 - DOOR HARDWARE.
2. Steel doors furnished by Section 08 11 13 - HOLLOW METAL DOORS AND FRAMES.
3. Wood doors furnished by Section 08 14 16 - FLUSH WOOD DOORS and Section 08 14 33 - STILE AND RAIL WOOD DOORS.
4. Door hardware, thresholds, weatherstripping, seals and gaskets furnished by Section 08 71 00 - DOOR HARDWARE.

D. Install cabinet cylinders furnished by Section 08 71 00 - DOOR HARDWARE.

E. Make all cut-outs within casework items as required to accommodate sinks, piping, conduit, and other mechanical and electrical work, from templates provided by the respective mechanical and electrical trades.

F. Provide glass shelving and perform shop-glazing of casework, furniture and accessories items fabricated by this Section.

G. No attempt is made in this Section to list all elements of architectural woodwork required on this project or to describe how each element will be installed. It is the

responsibility of the Contractor to determine for itself the scope and nature of the work required for a complete installation from the information provided herein and in the Drawings.

1.6 QUALITY ASSURANCE

A. Quality Standards: All materials, workmanship and finishes shall meet AWI/AWMAC/WI *NORTH AMERICAN ARCHITECTURAL WOODWORK STANDARDS* (NAAWS), version 3.1, as amended by published errata, for the following Quality Grades:

1. All work to receive transparent finishes: Premium Grade.

B. Qualifications:

1. Fabricator/Installer: Work of this section shall be performed by a firm licensed by the AWI Quality Certification Program (QCP).
   a. Contractor shall register the work under this Section with the AWI Quality Certification Program (855-345-0991). Furnish to Architect assigned AWI Project Number.
   b. Woodwork fabricator/installer is required to be licensed by AWI as competent to perform the work specified. Certification shall be evidenced through the application of AWI Quality Certification labels and issuance of an AWI letter of licensing for the project. AWI certification labels shall be applied to each item of work.

PART 2 - PRODUCTS

2.1 WOOD MATERIALS – GENERAL REQUIREMENTS

A. General requirements:

1. Solid wood components: New, dressed four sides (S4S), and free from warping and other defects.
2. Panel Products: Composite panel products and plywood shall be “no added urea-formaldehyde”, including all concealed components.
   a. Composite panel products include but are not limited to particle board (PB), Medium Density Fiberboard (MDF), wheatboard and strawboard and similar manufactured products.
3. Moisture Content:
   a. Solid hardwood(s) scheduled for transparent finish: Moisture content shall not exceed 8 percent when delivered to Project.
   b. Typical (hardwood and softwoods): Moisture content of wood shall be between 5 and 10 percent when delivered to the project.

B. Wood Species:

1. Exposed wood scheduled for transparent finish (for tops, tack board frames, and edge trim), meeting NAAWS Premium Grade Standards (as installed).

a. WD-1: TBD.

b. WD-2: TBD.

c. Wood shall color match specified veneer, and be clear without knots, and other natural defects.

2. Medium Density Fiberboard (MDF) Fire-Retardant Panels: No-Added-Urea-Formaldehyde (NAUF), of thickness indicated on the Drawings, conforming to ANSI A208.2 product class MR10, fabricated from 100 percent post-industrial recycled fiber, using formaldehyde free synthetic resin such as methyl diisocyanate (MDI), having a minimum density of 45 pounds per cubic foot (769 kg/m3).

a. Factory blend flame retarding additive with fibers, topical FR treatment not permitted.

b. SCS or equivalent certified for recycled fiber content.

c. Acceptable products include the following or approved equal.

1) Arauco (Trupan brand), Bennettsville, SC., product "Premier FR

2) Georgia Pacific, product: "UltraStock MR+Free".

3) Roseburg, South Dillard, OR., product "Medite FR."

C. Concealed supports for edge and corner backing shall be kiln dried birch or poplar, meeting AWI Premium Grade Standards.

D. Blocking and furring at base and walls shall comply with American Softwood Lumber Standard PS 20-70 and with specific grading requirements of SPIB: Kiln dried (KD15), Structural Light Framing, Nº. 2 grade, free of warping and large knots.

E. Internal concealed framing for casework: Kiln-dried, (KD15), eastern pine, poplar, eastern spruce, or southern pine, conforming to AWI Premium grade.

F. Fir plywood for concealed from view applications in conjunction with the various casework items: APA C-C PLUGGED EXT.

2.2 WOOD VENEERS

A. Veneered panels for transparent finish: The face veneer for transparent finishes shall be minimum 1/28 inch thick on doors, shelves, panels and other exposed surfaces meeting AWI Premium Grade Standards (installed). Each exposed face shall be of tight smooth veneer with joints parallel to vertical edges with no sharp contrasts.

1. Wood Species: TBD, Rift Sawn, Grade A.

2. Matching of adjacent pieces of veneer: Slip matched.

3. Panel face assembly: Running.

4. Direction of Grain: Vertical

5. Matching of Adjacent Panels: Sequence matched uniform size sets.

2.3 BACKING FOR VENEERS

A. Cabinetry case body, and countertops without sinks: Mattformed three layer medium density wood particle panel (PB), graded M2 per ANSI A 208.1 with a minimum density of 48 pounds per cubic foot or equivalent hardwood plugged plywood complying with ANSI/HPVA HP-1.

1. "No Formaldehyde Added": Provide board which is fabricated using pre-consumer recycled wood fibers and an exterior-grade urea-formaldehyde free resin binder. Product shall contain no formaldehyde additives. Acceptable products include the following or approved equal.
   a. Collins Pine Company (distributed through Panel Source International, Tacoma WA.), product: "PureKor Particleboard Plus"
   b. Plummer Forest Products, Post Falls ID., product "PFP particleboard".
   c. SierrePine Inc., Martel, CA., product "Encore SDP"
2. Thicknesses:
   a. 3/4 inch thick at cases.
   b. 1 inch thick at shelves under 30 inches wide.
   c. 1 1/8 inch thick at shelves 30 inches or more wide.
   d. 1 1/8 inch thick at counters without sinks.

B. Millwork end panels which extend to floor, and all countertops with sinks and similar wet conditions: Moisture resistant medium density fiberboard (MDF) conforming to ANSI A208.2 product class MD, fabricated from 100 percent pre-consumer recycled fiber, using formaldehyde free polyurethane/synthetic resin such as methyl diisocyanate (MDI) or (pMDI), having a minimum density of 44 pounds per cubic foot.

1. Acceptable products include the following:
   a. SierrePine Inc., Moncure, NC, product "Medex".
2. Thicknesses:
   a. Typical: 3/4 inch thick panels, except as otherwise indicated.

C. Wall panels: Mattformed three layer medium density wood particle panel (PB), graded M2 per ANSI A 208.1 with a minimum density of 48 pounds per cubic foot or equivalent hardwood plugged plywood complying with PS 51-71.

1. Thickness: 1 inch thick unless otherwise indicated on the Drawings.

D. Drawers and doors: Medium density fiberboard (MDF) conforming to ANSI A208.2 product class MD, fabricated from 100 percent pre-consumer recycled fiber, using formaldehyde free polyurethane/synthetic resin such as methyl diisocyanate (MDI) or (pMDI), having a minimum density of 45 pounds per cubic foot.

1. Acceptable products include the following or approved equal:
   a. Canfibre Group Ltd., Toronto, Ontario Canada, product: "AllGreen MDF".

b. Collins Pine Company (distributed through Panel Source International, Tacoma WA.), product: "PureKor MDF Plus"

c. SierrePine Inc., Martel, CA., product "Medite II"

d. Temple Inland, Austin TX., product "UltraStock – Free."

2. Thicknesses:

a. Typical: 3/4 inch thick panels, except as otherwise indicated or specified.

b. Doors over 36 inches tall: provide 1-1/4 inch thick panels.

2.4 GLASS AND GLAZING MATERIALS

A. Tempered glass for shelving: 3/8 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z 97.1.

1. Provide certification to Architect that glass complies with the specifications, do not label glass.

B. Tempered glass for casework doors, sides, and tops: 1/4 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z 97.1.

1. Provide certification to Architect that glass complies with the specifications, do not label glass.

C. Glazing tape: Preformed butyl compound with integral resilient tube spacing device 10-15 shore A durometer hardness; coiled on release paper; of sizes required for proper glazing.

D. Setting blocks: Neoprene, 80-90 shore A durometer hardness; sized as follows:

1. Length: 0.1 inch per square foot of glass, but not less than 4 inches.

2. Width: equal to glazing rabbet space minus 1/16 inch.

3. Height to suit glazing method and pane weight and area.

2.5 CABINET HARDWARE

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Accuride Corp., Santa Fe Springs, CA.

2. CompX International, Inc., Dallas TX.

3. Doug Mockett & Company, Inc., Manhattan Beach, CA.

4. Engineered Products Company, Flint MI.

5. Glynn-Johnson, Indianapolis IN.

6. Grass America Inc., Kernersville NC.

7. H.B. Ives Company, Wallingford CT.

8. Häfele America Company, Archdale NC.
9. Julius Blum, Inc. , Stanley NC.
10. Knape & Vogt, Grand Rapids, MI.
11. (Lamp) Sugatsune America, Inc. Carson, CA..
12. Mepla Inc., High Point NC.
13. Outwater Plastic Industries Inc., Bogata NJ.
14. Stanley Hardware, New Britain CT.
15. Waterloo Furniture Components, Ontario Canada.

B. Cabinet door and drawer pulls:

1. Typical: 3 inch long pull with 1-1/2 inch projection equal to Doug Mockett, model DP3A with minimum 1 inch finger clearance.

C. Locks: Provide at least three keys per keyed alike group.

1. Locks for drawers: Deadbolt type, equal to Timberline Supply, Model C281CB, lock plug finish LP-100 (nickel finish).
2. Locks for single cabinet doors: Deadbolt type, equal to Timberline Supply, Model C291CB, lock plug finish LP-100 (nickel finish)
3. Locks for double base cabinet doors: Deadbolt type, equal to Timberline Supply, Model C251CB, lock plug finish LP-100 (nickel finish)
4. Locks for double upper cabinet doors: Deadbolt type, equal to Timberline Supply, Model C256CB, lock plug finish LP-100 (nickel finish)
5. Locks for double door wardrobe: 3 point vertical lock bar type, equal to National Cabinet Lock Stock Lock disc tumbler handle lock (C8754) on right leaf with aluminum vertical rods and guides, and latch plate and tongue (C8756-2C). Provide dummy handle (C8755) on the left leaf. System shall be utilized in conjunction with automatic latching and releasing door catch to ensure the door without the vertical lock bar is automatically secured when both doors are closed and automatically released upon opening leaf with vertical bar lock.
6. Provide and coordinate all strike plates needed for each lock type.

D. Catches:

1. Typical: Small zinc roller catch with white roller, length, ¾ inch, width, 1-3/8 inch, projection, 3/8 inch.
2. Magnetic pressure catch: Equal to Hafele Magnetic Pressure Catch, Model number 245.80.320 and Hafele Strikes, Model number 2485.63.988.

E. Casework (European, concealed type) hinges:

1. General; number of hinges: Provide number of hinges recommended by manufacturer for size and weight of door, but not less than the following:

a. Doors up to 36 inches height, or weight not to exceed 11 pounds: 2 hinges.

b. Doors up to 60 inches height, or weight not to exceed 20 pounds: 3 hinges.

c. Doors up to 72 inches height, or weight not to exceed 33 pounds: 4 hinges.

d. Doors up to 90 inches height, or weight not to exceed 48 pounds: 5 hinges.

2. Hinge for full overlay cabinet doors: Self closing concealed hinge having maximum 110 degree angle of opening, 3 way adjustment. Hinges shall be equal to Blum "Soft-Close BLUMotion Clip-Top Overlay Hinge" with straight arm, model Nº. 71B3550.

a. Maximum door thickness 1 inch (26 mm).

3. Hinge for inset glass doors: Self closing hinge having maximum 95 degree angle of opening. Hinges shall be nickel plate over formed steel with nylon mounting cup. Blum "CLIP-top 95 Glass Door," model Nº. 75T4300, or approved equal, Glass thickness 4.5 mm to 7 mm.

a. Cover cap shape: D-Shape, with polished chrome finish.

b. Cover cap shape: round with black finish.

c. Cover cap shape: round with polished chrome finish.

d. Number of hinges: Provide as indicated in Drawings, or if not indicated, provide number recommended by manufacturer for thickness and area of glass supported.

F. Pad silencers for doors: 10 mm (3/8 inch) diameter, self-adhesive resilient plastic or nylon buttons, at least 2 per door, in clear color.

G. Drawer Slides (provide one pair per drawer except as noted otherwise):

1. For heavy loads including credenzas, file cabinets, store fixtures, linen closets and tool drawers: Full extension type, 150 pounds per pair minimum rated capacity (for drawers over 30 inches, provide 175 pounds rated capacity), steel ball bearing rollers, drawer hold in feature.

a. Acceptable slides, include the following, or approved equal:

1) For drawers up to 24 inches wide:

a) Accuride Nº. 4032.

b) Knape and Vogt Nº. 8500.

c) Häfele Nº. 4034.

2) For drawers over 24 inches and up to 30 inches wide:

a) Accuride Nº. 4032.

b) Knape and Vogt Nº. 8500.

c) Häfele Nº. No equal.

3) For drawers over 30 inches wide:

a) Accuride Nº. 4437.
b) Knape and Vogt Nº. 8520.
c) Häfele Nº. No equal.

b. Finish: clear lacquered zinc.

2. For desk and casework drawers (excluding file drawers): Full extension type, 100 pounds per pair minimum rated capacity, steel ball bearing rollers, lever disconnect, drawer hold in detent feature.
   a. Acceptable slides, include the following, or approved equal:
      1) Accuride Nº. 3832A
      2) Knape and Vogt Nº. 8400.
      3) Häfele Nº. 3832.
   b. Finish: clear lacquered zinc.
3. For pencil drawers: 3/4 extension type, 45 pounds per pair minimum rated capacity, steel ball bearing rollers, friction disconnect.
   a. Acceptable slides include the following, or approved equal:
      1) Accuride Nº. 2006 (regular mount), Nº. 2009 (bracket mount).
      2) Knape and Vogt Nº. 8200
      3) Häfele Nº. 2009
   b. Finish: clear lacquered zinc.

H. Shelf supports.
1. Shelf pins for laminated shelving, and wood shelving: plug-in type for 5mm diameter hole, Häfele model number 282.11.710 cast zinc alloy with nickel plated finish and recessed seat.
2. Shelf pins for glass shelving: plug-in type for 5mm diameter hole, Häfele model number 282.24.730 or approved equal, cast zinc alloy with nickel-plated finish support and transparent plastic coated clamping lugs.

I. Wire management grommets and covers: 2 inch diameter, as manufactured by Doug Mockett & Company, Manhattan Beach CA., model number " MM3 with 3A cover" or approved equal.
1. Grommet Finish: Provide in metallic finish selected by Architect from Manufacturer's standard finishes.
2. Locations: Provide where shown on Drawings, and if not shown, allow the following numbers of grommets; exact locations to be determined in field.
   a. For counters 6 feet or less provide 2 wire grommets and covers.
   b. For counters over 6 feet, provide 1 wire grommet and cover for every 42 inches of counter, or fraction thereof.

2.6 SHELVING HARDWARE

A. Adjustable shelving, wall mounted standards and brackets:

1. Acceptable manufacturers, include but are not limited to the following:
   a. Spur Systems International Limited.
   b. Knape & Vogt, Grand Rapids MI.
   c. Rakks/Rangine Corporation, Needham, MA.
2. Standards (uprights): 14 gage double tracked uprights, in epoxy powder-coat finish, color as selected by Architect from manufacturer's full range of colors.
   a. Locate uprights no greater than 24 inches on center.
3. Brackets: 14 gage formed brackets, color and finish matching standards,
   a. Depth (typical): 270mm (10-1/2 inch depth), or as otherwise indicated on Drawings.

2.7 ACCESSORIES

A. Glue for lamination and fabrication of wood and plywood items: Exterior Grade, phenolic resin glue.

B. Counter support brackets: Equal to Rakks Flush Mount Counter Supports by Rakks/Rangine Corp, Needham MA.
   1. Construction: Fabricated from horizontal aluminum T section and vertical aluminum L section. Vertical leg designed to attach to side of supporting stud and be concealed by gypsum board or other wall finish.
      a. Model EH-1212FM for up to 18 inch deep counters.
      b. Model EH-1818FM for up to 24 inch deep counters.
      c. Model EH-1824FM for up to 30 inch deep counters.
   2. Factory applied finishes: Exposed aluminum surfaces shall be free of scratches and other serious blemishes and be factory finished with:
      a. Electrostatically applied, powder paint coating complying with AAMA 2603 (minimum), custom color selected by Architect.

C. Counter support brackets:
   1. Construction: Fabricated from horizontal aluminum T section and vertical aluminum L section. Vertical leg designed to attach to side of supporting stud and be concealed by gypsum board or other wall finish. Alternative manufacturers provide equivalent sized steel T-sections and shop finishing.
      a. Bracket sizes:
         1) For up to 18 inch deep counters: 12 by 12 inch length legs
         2) For up to 24 inch deep counters: 18 by 18 inch length legs.
         3) For up to 30 inch deep counters: 18 inch vertical leg and 24 inch length horizontal leg.
   2. Basis of Design: Rakks Flush Mount Counter Supports by Rakks/Rangine Corp, Needham MA.
      a. Acceptable Manufacturers/products, or approved equal:

1) Rakks Flush Mount Counter Supports by Rakks/Rangine Corp, Needham MA, with powder coat finish.
2) Outwater LLC., Woodridge NY. "South Carolina" Series: CSBxx-SC-CRS with powder coat finish.
3) Federal Brace, Belmont NC., model "Streamline Countertop Bracket (steel). Requires separate shop finishing by this Section 06 40 00.

3. Factory applied finishes: Exposed aluminum surfaces shall be free of scratches and other serious blemishes and be factory/shop finished with:
   a. Electrostatically applied, powder paint coating complying with AAMA 2603 (minimum), in color selected by Architect from manufacturer's full range.

D. Fasteners:
   1. Concealed joint fasteners: Threaded steel.
   2. Bolts, nuts, washers, lags, pins, and screws: Of size and type to suit application chrome finish in exposed-to-view locations.

2.8 FABRICATION - GENERAL

A. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

B. Coordinate the fabrication of casework with that of the various trades responsible for installing materials and items which will be inserted into, or applied to, the casework surfaces. Obtain and verify templates, dimensions, and instructions from the respective trades before making cut-outs, holes, slots, and other cutting in the casework.

C. Shop assemble custom casework for delivery to site. Deliver in assemblies as large as possible for entrance into the designated areas. Provide for concealed job connections of adjacent units.

D. Prepare woodwork in the shop for all necessary electrical installations.

E. Fabricate, install and finish all work so that both sides of countertops, panels, doors, shelves and other casework are of balanced construction, to prevent warping.

F. Cap exposed plywood, and particle board edges with solid hardwood, matching color of wood veneer panels. Apply veneer over hardwood edging in manner to show no visible lines between wood veneer and hardwood edging.

G. Fit corners and joints hairline, secure with concealed fasteners.

H. Finish all solid wood and plywood surfaces smooth, and free from all machine and tool marks that will show through the wood veneer or facing materials.

I. Make all joints tight, and form to conceal shrinkage. Glue all miters having a dimension of 4 inches or more from heel to point.

J. Provide shop fabricated counters, shop mitered components, closure trims with ample allowance for field cutting and fitting. Provide additional trim as required for scribing and site cutting.

K. Finished work shall be free from visible adhesive and pencil marks.

2.9 FABRICATION - CASEWORK

A. Fabricate casework in accordance with requirements of AWI/AWMAC/WI "*Architectural Woodwork Standards,"* latest edition, in grades specified herein, under the Article entitled "QUALITY ASSURANCE," and the following additional requirements:

1. Cabinets shall be in flush overlay construction, with drawer fronts and hinged doors overlapping openings a minimum of 1/4 inch all four sides.
2. Fabricate all casework scheduled for veneer finish with exposed to view grain of wood vertical or horizontal as indicated on Drawings.
3. Fabricate cabinets in integral units, each completely enclosed, without the use of common partitions.
4. Drawers:
   a. Drawer sides and backs 1/2 inch thick solid hardwood of specified species.
   b. Wood veneer drawer fronts: body panel 1/2 inch thick solid hardwood of specified species, face panel same construction as specified for cabinet doors with matching veneer. Drawer fronts shall be applied to separate drawer body component sub-front.
   c. Drawer bottoms (wood veneer casework): 1/4 inch thick hardwood veneer panel housed and glued into front, sides and back.
   d. Underside of drawer to receive continuous hot melt glue at joint between bottom and back/sides/front for sealing and rigidity.
   e. Reinforce drawer bottoms as required with intermediate spreaders.
5. Doors: Square edge design, 3/4 inch thick, without any profiling and shall fully overlap the cabinet frame.
   a. Wood veneer doors: Fabricate doors with particle board core and front and rear faces grade AA wood veneer, and solid wood edging.
   b. Maintain a maximum 1/8" reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
6. Base cabinets: Provide full horizontal top frame with glued and doweled joints, 3/4 inch plywood end panels and bottom. Bottom shall be glued and doweled and let into routed end panels. Provide 4 inch high toe rail, securely screwed to the end panels and to the bottom panel by concealed glue blocks.

7. Wall cabinets: Provide same finishes as base cabinets, with 3/4 inch thick top and bottom veneered plywood panels. Top and bottom panels shall be glued and doweled and let into routed end panels. Back of case shall be recessed and let into routed end panels and further secured with glue blocks.
8. Door and drawer spreaders: Provide minimum 3/4 thick full width cabinet body spreaders immediately behind all door/drawer and multiple drawer horizontal joints to maintain exact body dimensions, and close off reveal. Front edge to be match face of adjacent cabinet doors/drawers.

2.10 FABRICATION - PANELING

A. Fabrication panels as detailed and at outside and inside corners with prominent grain horizontal Fabricate to required sizes within the following tolerances.
   1. Thickness: Plus or minus 1/16 inch.
   2. Size (dimension each side): Plus or minus 1/16 inch.
   3. Squareness (difference in length of two diagonal measurements): Plus or minus 1/16 inch.

2.11 FABRICATION FINISH CARPENTRY

A. General:
   1. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber in relation to relative humidity conditions existing during time of fabrication and in installation areas.
   2. Fabricate woodwork to dimensions, profiles, and details indicated.
   3. Edges: Ease edges to radius indicated for following:
      a. Corners of Edges of Solid Wood (Lumber) Members: Less than 1 inch nominal thickness, eased to 1/16 inch.
      b. Edges of Rails and Similar Members: 1 inch or more in nominal thickness, eased to 1/8 inch.
   4. Complete fabrication, including assembly, finishing, and hardware application, before shipment to Project site to maximum extent possible.
   5. Disassemble components only as necessary for shipment and installation.
   6. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

B. Standing and Running Trim:
   1. Quality Standard - Interior Work: AWI Section 6, Premium Grade.
   2. Field-Applied Interior Opaque Wood Finish: AWI 300, Custom Grade.
   3. Wood Species and Cut – Interior Work
      a. Shop-Applied Interior Stained Wood Finish: Cherry
      b. Shop-Applied Interior Opaque Wood Finish: Poplar

C. Finishing of Interior Architectural Woodwork

1. Quality Standard:
   a. Comply with AWI 1500.
   b. Grade: Provide finishes of same grades as items to be finished.
2. Shop-Applied Finish:
   a. Entire finish of interior architectural woodwork is specified in this Section.
   b. To greatest extent possible, finish architectural woodwork at shop; defer only final touch-up, cleaning, and polishing until after installation.
3. Stained Finish - Open-Grain Woods:
   a. Comply with requirements indicated below for grade, finish system, staining, effect, and sheen, with sheen measured on 60 deg. gloss meter per ASTM D523.
   b. Grade: Premium.
   c. AWI Finish System: Catalyzed polyurethane.
   d. Staining: Match approved sample for color.
   e. Effect: Closed-grain (filled finish).
   f. Sheen: Medium-gloss rubbed effect 35 to 45 deg.

2.12 SHOP APPLIED FINISHING

A. Stained exposed-to-view finish for millwork: AWI Premium Grade Factory Finish System Nº TR-4 "Conversion Varnish" system having a Medium rubbed effect with a sheen of 30° to 50° gloss units per ASTM D523. Finish system shall not substantially increase flame spread.

1. One washcoat, reduced conversion varnish.
2. Colorant: Stained to match Architect's approved sample.
3. One coat sealer, conversion varnish.
4. Two coats topcoat: Conversion varnish equal to Sherwin Williams product "V84 series Kem Var".

B. Concealed surfaces: Thoroughly coat all concealed surfaces of finish woodwork before assembling with two coats of clear wood preservative.

C. Field Touch-up: Shall be the responsibility of the installing contractor and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of raw surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

D. Interior wood trim, paneling and handrails to be shop primed and finished (opaque):

1. One coat shop applied acrylic primer-sealer (undercoater):
   a. California "Wipe-Out 100% Acrylic Latex Stain Block," No. 52500.

b. Glidden: "Wall and Woodwork Primer Sealer," No. 1020.

c. Moore: "Alkyd Enamel Underbody," No. 217.

d. Pittsburgh: "Speedhide Alkyd Interior Quick-Drying Enamel Undercoater," 6-6 Series.

e. Sherwin-Williams: "Prep-Rite Classic Latex Primer", B28W200 Series.

2. Two coats acrylic semi-gloss enamel:

a. California: "Fres-Coat Unite Semi-Gloss", No. 563.

b. Glidden Professional: "Ultra-Hide 250 Semi-Gloss", No. 1406.

c. Moore: "Superspec Latex Semi-Gloss", 276 Series,

d. Pittsburgh: "Speedhide Interior Semi-Gloss", 6-500 Series.

e. Sherwin-Williams: "ProClassic Waterborne", B31W20 Series.

PART 3 - EXECUTION

3.3 INSTALLATION - GENERAL

A. Install work in accordance with the latest AWI/AWMAC/WI joint publication: *Architectural Woodwork Standards* in grade specified herein, under the Article entitled "QUALITY ASSURANCE".

B. Woodwork shall be installed plumb, level, true and straight without distortions.

1. Use concealed shims as required

2. Work shall be installed to a tolerance of 1/8 inch in 8 feet for plumb and levelness, including tops.

3. There shall be no variations in flushness of adjoining surfaces.

C. Woodwork shall be scribed and trimmed to fit adjoining work.

1. Where cuts occur, refinish surfaces and repair damaged finishes

D. Secure woodwork to anchors or built-in blocking or blocking directly attached to substrates.

1. Secure woodwork to grounds, furring, stripping and blocking as required with countersunk, concealed fasteners and blind nailing performing a complete installation.

2. Use thin gauge finishing nails for exposed nailing, countersunk and filled flush with woodwork finished surface.

a. Match final finish materials where transparent finish is indicated.

3.4 INSTALLATION - CASEWORK

A. Install casework without distortion so that doors and drawers fit openings properly and are accurately and evenly aligned.

B. Adjust casework hardware centering the doors and drawers in the openings, and provide unencumbered operation.

C. Complete the installation of hardware and accessory items as indicated.

D. Maintain veneer sequence matching of casework with transparent finish, where so manufactured.

END OF SECTION

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SECTION 06 82 00
FIBERGLASS ARCHITECTURAL ELEMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following glass fiber reinforced polyester (GFRP) and cast resin components:

1. Cornices, factory finished.
2. Column covers, factory finished.
3. Panels, factory finished.
4. Sealant for all joints within glass fiber reinforced plastic components

B. Perform all drilling, cutting, tapping, coring, and molded-in mortises required for GFRP fabricated assemblies.

C. Provide internal reinforcing and molded-in steel members as manufacturer's engineering requires.

1.5 QUALITY ASSURANCE

A. Fabricator, with a minimum of 10 years documented experience demonstrating previously successful work of the type specified herein, and be capable of submitting a list of recent installations upon request.

B. Engineering: Provide the services of a Professional Structural Engineer, registered in the Commonwealth of Massachusetts to design and certify that the work of this section meets or exceeds the performance requirements specified in this section and as required by Massachusetts State Building Code.

C. Design of the various items shall comply with the requirements specified herein, and all OSHA and local safety codes. Use liberal safety factors in the design of all items. Do not exceed the lower value of one-third of the yield strength, or one-fifth of the ultimate strength of the material, for working stresses. Design all glass fiber products for stresses to which these items will be subjected during fabrication, erection, and continuous operation.

1.6 MOCK-UP

A. Provide mock-up elements for field panel in accordance with Section 01 43 39 – MOCKUPS at exterior location where directed by Architect. Mock-up will demonstrate quality of work, construction methods, relationship to other work.

1.11 WARRANTY

A. Provide 5 year warranty under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS. Manufacturer's standard written guarantee or warranty for the glass fiber reinforced material.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified manufacturer: To establish a level of quality and visual characteristics desired, Drawings and Specifications are based on products of Worthington, Panama City Beach, FL.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Worthington, Panama City Beach, FL.
2. Architectural Fiberglass Inc., Cleveland, OH.
3. Duro Fiber Company, Hudson, NH.
4. Edon Corporation, Horsham, PA.
5. Stromberg Architectural Products Inc., Greenville, TX.

2.2 GLASS FIBER AND RESIN FABRICATIONS

A. Panels and decorative elements: Pre-engineered molded fiberglass-reinforced polyester fabrications of orthophtallic resin, 95 pounds per cubic foot density, 16,800 psi tensile strength. Surface coat, polyester gel coat 18 to 20 mils thick with UV stabilizers; pigmented to match color selected by Architect.

1. Glass Fiber: "E" type random chopped fibers.
2. Glass Content: 25 to 30 percent by weight.
3. Glass Content: 15 percent by weight, maximum.
4. Shell Thickness: 3/16 inch (5 mm), minimum.
5. Surface Burning Characteristics: Flame spread index of less than 25, smoke developed index of less than 450,when tested in accordance with ASTM E 84.
6. Flexural Strength: 20,000 psi (138 MPa), when tested in accordance with ASTM D 790.
7. Modulus of Elasticity: 0.9 x 10^6 psi (6200 MPa), when tested in accordance with ASTM D 790.
8. Tensile Strength: 12,000 psi (83 MPa), when tested in accordance with ASTM D 638.
9. Compressive Strength: 17,000 psi (117 MPa), when tested in accordance with ASTM D 695.

10. Bearing Strength: 9,000 psi (62 MPa), when tested in accordance with ASTM D 638.
11. Thermal Expansion Coefficient: 10 x 10^{-6} per degree F (5.56 x 10^{-6} per degree C).

B. Barrier coat: Specifically formulated backup polyester surface veil 18-20 mils thick to prevent glass print through and ultimate Class A finish.

C. Back-up laminate:

1. Resin: Polyester resin shall be fire retardant and meet Class 1 flame spread rating of 25 or less and smoke density under 450 without the use of antimony trioxide as characterized by the ASTM E 84 tunnel test at typical 1/8″ glass mat laminate. General purpose resin will not be permitted.
2. Filler: Functional filler to be added to resin matrix to minimize shrinkage, add stiffness, control opacity, add fire retardence, improve aurface finish, minimize crazing, and control dimensional stability from weather extremes.
3. Fiberglass Reinforcement: Type "E" fiberglass, glass cloth, matt and/or random chopped glass fibers. Glass content approximately 20% to 30%.
4. Laminate Thickness: Nominal laminate shall be minimum 3/16" thickness. Larger cupola sections shall be manufactured with additional core reinforcements and/or sandwich structure added as required for rigidity and structural integrity.

D. Color and finish: Custom colors and textures as determined by Architect, and which match approved shop samples.

1. Directional grain, visible fibers, pinholes in gel coat and other visible defects are not acceptable.
2. Field painted elements: All finishing, including field painting shall be performed under the work of this Section 06 82 00. Paints and coatings shall be as recommended by the fabricator.

2.3 FASTENERS

A. General: Provide all fasteners and attachments as required for work specified herein and as indicated on the Drawings.

B. Steel Bolts, Nuts and Washers: ASTM A307, galvanized to ASTM A153 for galvanized components.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel type 304 bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.

D. Anchor Bolts: ASTM F 1554, Grade 36.

1. Provide hot-dip or mechanically deposited, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.

2.4 ACCESSORIES

A. Provide all connection and erection materials needed, including attachments to building structure. All ferrous metal components are to be hot dip galvanized.

B. Liquid zinc coating, for touch-up of galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.

1. VOC limit: not more than 250 g/L.
2. Specified manufacturer and product: ZRC Worldwide, Marshfield MA, product "ZRC-221".

C. Polishing Cream: Compatible gel coat polishing cream to restore gloss surface finish.

D. Joint Sealer: One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, FS TT-S-001543A, Type, Class A with a minimum movement capability of +100 percent and -50 percent, equal to the following:

1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. Dow Corning Corporation, Midland, MI.; product, "790".
   b. General Electric Company (GE Silicones) Waterford, NY: product, "SCS2700 SilPruf LM".
   c. Sika Corp, Lyndhurst, NJ.; product, "Sika Sil-C 990".
   d. Tremco, Beachwood, OH.; product, "Spectrem 1".
2. Color: Custom color to match Architect's sample.

E. Wire Rope: Stainless steel aircraft cable 3/8 inch diameter, Type 302/304 alloy, 1x7 construction conforming to Mil-W-87161.

2.5 FABRICATION - GENERAL

A. General: Fabricated all fiberglass shapes from molds of new shapes closely conforming in dimensions and profiles to existing configurations or contract drawings.

B. Patterns and Molds:

1. General: Fabricate work to be truly straight, plumb, level and square. Provide work to sizes, shapes and profiles indicated on approved shop drawings. Build

in reglets, slots, hanger assemblies and all other work as indicated on approved shop drawings.

2. Custom molds: Molds shall be produced with ample layers of tooling resin, tooling gel-coat, glass fibers and/or flexible rubber by skilled mold makers with minimum of ten (10) years experience with architectural elements. Produced molds shall have rigidity and thickness to prevent distortion and deflection of molded architectural fiberglass.
3. Components shall be manufactured with sealable lap and/or butt joints. Joints in decorative elements shall be manufactured to accommodate adjoining sections and alignment with abutting surfaces.
4. Shop fabricate all inside and outside corner pieces and unique transition sections. Field fabrication of corners is not permitted.
5. Coordinate miscellaneous cut-outs required for vents, drainage and other obstructions and penetrations.

C. Thickness of Surface Coat: Accurately provide thickness indicated on approved shop drawings. Make at least two thickness measurements per five square feet.

D. Inserts and embedments: Properly and securely embed inserts as needed to develop full strength of connections. Maintain proper cover over embedded items.

E. Panel Identification: Mark each unit on a concealed surface with identification mark corresponding to erection drawings and with fabrication date.

PART 3 - EXECUTION

3.2 INSTALLATION - GENERAL

A. General: Install in accordance in accordance with applicable code(s) and with fabricator's written instructions Accurately set all work to established lines and elevations, and rigidly fasten in place with suitable attachments to the construction of the building. At the completion of the work, check all work, re-adjust as required, and leave in perfect condition.

1. Component erection: Lift and handle units at designated lifting points identified for fabricator. Set units level, plumb, and square within specified tolerances. Install and erect units in strict compliance with manufacturer's recommendations. Maintain uniform joint widths and alignment. Install clips, anchors, and all needed accessories. Installer to provide all templates and field dimensions to fabricator

B. Miscellaneous framing and supports: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and additional requirements indicated on Shop Drawings.

1. Anchor supports for operable partitions, and similar products, securely to and rigidly braced to building structure.

C. Provide temporary supports and bracing as required to maintain position, stability, and alignment until permanent connections are made.

D. Fasten using methods that allow for thermal expansion and contraction.

E. Provide control joints at not more than 35 feet (10.5 m) on center if not indicated on drawings.

F. Provide expansion joints where moving joints in substrate occur.

G. Tolerances:

1. Maximum Variation from Indicated Position 1/4 inch.
2. Maximum Offset from Alignment Adjacent Components: 1/8 inch.
3. Face width of joint for units: 3/16 inch.
4. Warpage: One corner out of plane with other three: 1/6 inch per foot, or 1/8 inch maximum.
5. Bowing: Not over L/360 where L is component length.

3.3 SEALANT INSTALLATION

A. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.

1. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
2. Do not stretch back-up material into joints.

B. Install bond breaker in joints where shown in the Drawings and wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.

C. Apply masking tape or other precautions to prevent migration or spillage of materials onto adjoining surfaces.

D. Apply sealant materials into joints in accordance with manufacturer's instructions, using mechanical or power caulking gun equipped with nozzle of appropriate size, with sufficient pressure to completely fill the joints.

1. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
2. Maintain the outer edge of the sealant and caulking materials, where side faces of joints are in the same plane, back 1/8-inch from the faces.
3. Apply sealant in continuous beads without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length.

4. After placement of the sealant and caulking materials, concave-tool the surfaces to uniform density, using a water-wet tool. Do not use detergents or soapy water for the tooling operations.
5. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

END OF SECTION 06 82 00

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SECTION 07 00 01

WATERPROOFING, DAMPPROOFING AND CAULKING FILED SUB-BID REQUIREMENTS (FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Work of this Section requires Filed Sub-bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law - Chapter 149, Sections 44A to 44J inclusive, as amended, and applicable Sections of the MGL, Public Contract Law - Chapter 30.

C. Specification requirements for the filed sub-bid "WATERPROOFING, DAMPPROOFING AND CAULKING" include all of the following listed Specification Sections: in their entirety:

1. Section 07 00 01 - WATERPROOFING, DAMPPROOFING AND CAULKING FILED SUB-BID REQUIREMENTS.
2. Section 07 11 13 – BITUMINOUS DAMPPROOFING
3. Section 07 13 53 – ELASTOMERIC SHEET WATERPROOFING
4. Section 07 16 16 – CRYSTALLINE WATERPROOFING
5. Section 07 92 00 - JOINT SEALANTS.

D. The work to be completed by the Filed Subcontractor for the work of this Section is shown on the following listed Drawings, not just those pertaining particularly to this Sub-Trade, unless specifically called out otherwise, regardless of where among the Drawings it appears:

General Drawings: G.00 through G2.00 inclusive.
Civil Drawings: C-1 through C-6 inclusive.
Structural Drawings: S0.01 through S2.02 inclusive.
Architectural Demolition Drawings: AD1.00 through AD8.01 inclusive.
Architectural Drawings: A1.00 through A12.01 inclusive, AI1.00.
Furniture Drawings: FP0.00 through F1.02
Plumbing Drawings: P0.00 through P1.01 inclusive.
Fire Protection Drawings: FP0.01 through FP1.03 inclusive.
Mechanical Drawings: M0.01 through M1.03 inclusive; MD1.01.
Electrical Drawings: E0.00 through E4.00 inclusive.
Fire Alarm Drawings: FA0.00 through FA0.10 inclusive.
Security Drawings : SC100 through SC101 inclusive

1. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract

Drawings above does not limit Filed Subcontractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

E. Alternates: Special attention is called to the fact that it shall be the responsibility of the General Contractor and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the General Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated General Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

F. Sub-bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in INVITATION TO BID and INSTRUCTIONS TO BIDDERS.

1. The following shall appear on the upper left hand corner of the envelope:

   NAME OF SUB-BIDDER: _____
   SUB-BID FOR TRADE: WATERPROOFING, DAMPPROOFING AND CAULKING

2. Each sub-bid submittal for work under this Section shall be on forms furnished by Awarding Authority, as bound herein, accompanied with the required bid deposit.

G. Sub-Sub Bid Requirements: NONE REQUIRED UNDER THIS SECTION.

1.2 EXAMINATION OF SITE AND DOCUMENTS

A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from General Contractor's or Filed-Subcontractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.3 PRE-INSTALLATION CONFERENCE

A. Installer of the Work of this trade is required to attend pre-installation conferences specified under the following specification sections:

1. Section 03 30 00 – CAST-IN-PLACE CONCRETE.

1.4 SEQUENCING

A. Coordinate work of this Filed-Subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed-Subcontract, have been received and approved by the Architect.

C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

A. General: Filed Sub-contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS and herein.

1. Scaffolding and staging required for use by this Filed Sub-contractor pursuant to requirements of Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-trade requiring such scaffolding.
2. Each Filed Sub-contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS and as additionally required for dust control).
3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Filed Sub-contractor.
4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.2 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Filed-Sub Contractor shall be furnished, installed, operated and maintained in safe conditions by this Filed-Sub Contractor, as referenced under Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

PART 3 - EXECUTION (Not Used)

END OF SECTION 07 00 01

SECTION 07 00 02
ROOFING AND FLASHING FILED SUB-BID REQUIREMENTS
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Work of this Section requires Filed Sub-bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law - Chapter 149, Sections 44A to 44J inclusive, as amended, and applicable Sections of the MGL, Public Contract Law - Chapter 30.

C. Specification requirements for the Filed Sub-bid "Roofing and Flashing" include all of the following listed Specification Sections: in their entirety:

1. Section 07 00 02 - Roofing and Flashing Filed Sub-bid Requirements.
2. Section 07 31 13 - Asphalt Shingles
3. Section 07 62 00 - Sheet Metal Flashing and Trim.
4. Section 07 71 00 - Roof Specialties.
5. Section 07 72 00 - Roof Accessories.

D. The work to be completed by the Filed Subcontractor for the work of this Section is shown on the following listed Drawings, not just those pertaining particularly to this Sub-Trade, unless specifically called out otherwise, regardless of where among the Drawings it appears:

Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the Work of this Filed Subcontract.

1. Refer to Section 01 23 00 - ALTERNATES, for Bid alternates which may affect the scope of Work of this Section.

F. Sub-Bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in INVITATION TO BID and INSTRUCTIONS TO BIDDERS.

1. The following shall appear on the upper left hand corner of the envelope:

NAME OF SUB-BIDDER: _____
SUB-BID FOR TRADE: ROOFING AND FLASHING

2. Each sub-bid submittal for work under this Section shall be on forms furnished by Awarding Authority, as bound herein, accompanied with the required bid deposit.

G. Sub-Sub Bid Requirements: NONE REQUIRED UNDER THIS SECTION.

1.2 EXAMINATION OF SITE AND DOCUMENTS

A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from General Contractor's or Filed Subcontractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

1.3 MEETINGS AND CONFERENCES

A. Pre-Bid Conference: Filed-Sub-Bidders are strongly encouraged to attend the Pre-Bid Conference; refer to INVITATION TO BID for date and time.

B. Pre-Installation Meeting for Roofing and Flashing Work: Conduct a pre-installation conference at the Project Site. Comply with requirements of Section 01 31 00 - PROJECT MANAGEMENT AND COORDINATION.

1. Meeting Scheduling: Coordinate time of meeting to occur not less than three (3) full weeks prior to commencement of on-site roofing and flashing work; coordinate with associated trades and general construction.
2. Required attendees:
   a. Owner's Project Manager (OPM).
   b. Architect.
   c. General Contractor's Project Manager and Job Superintendent.
   d. Roofing and Flashing Filed Subcontractor's Project Superintendent.
   e. Roof manufacturer's technical representative.
   f. Representatives of related trades as directed by the Architect or Contractor, and representatives for installers of related work specified under the following Sections:
      1) Section 05 30 00 - METAL DECKING.
      2) Section 07 31 13 - ASPHALT SHINGLES
      3) Section 07 62 00 - SHEET METAL FLASHING AND TRIM.
      4) Section 07 71 00 - ROOF SPECIALTIES.
      5) Section 07 72 00 - ROOF ACCESSORIES.
      6) Division 23 - HEATING, VENTILATING AND AIR CONDITIONING.
      7) Division 26 – Electrical.
3. Agenda:

a. Scheduling of roofing operations.
b. Review of staging and material storage locations.
c. Coordination of work by other trades.
d. Installation procedures for mechanical equipment.
e. Protection of completed roofing.
f. Establish weather and working temperature conditions to which Architect and Contractor must agree.
g. Emergency rain protection procedure.
h. Establish conditions for which a temporary roof will be provided by the Contractor.
i. Discuss process for manufacturer's inspection and acceptance of completed roofing and flashings.
j. Manufacturer's deck inspection to be performed.

1.4 SEQUENCING

A. Coordinate work of this Filed-Subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed-Subcontract, have been received and approved by the Architect.

C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 WOOD BLOCKING AND NAILERS FOR ROOFING AND FLASHING

A. Pressure preservative treated solid wood and plywood blocking required for all work of this Filed-Sub-bid 07 00 02 is specified under Section 07 53 23 – ETHYLENE PROPYLENE DIENE MONOMER (EPDM) ROOFING.

2.2 SCAFFOLDS AND STAGING

A. General: Filed Subcontractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.

1. Scaffolding and staging required for use by this Filed Subcontractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall

be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-trade requiring such scaffolding.

2. Each Filed Subcontractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Filed Subcontractor.
4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each work day to prohibit access to the scaffolding by unauthorized individuals.

2.3 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Filed-Sub Contractor shall be furnished, installed, operated and maintained in safe conditions by this Filed-Sub Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION (Not Used)

3.1 SITE MAINTENANCE

A. The Roofing and Flashing Filed Subcontractor shall furnish and maintain dumpsters as required to adequately control the disposal of all trash, construction debris, and waste materials resulting from the work of this Filed Sub-Trade.

1. The Roofing and Flashing Filed Subcontractor is responsible for all costs to obtain, maintain and disposal of dumpsters.
2. Disposal: Empty dumpsters on frequent regular basis as necessary to prevent overflow spillage. Legally dispose of waste off-site.

B. Daily clean work areas. Sweep and place into the dumpster(s) furnished by this trade, all removed existing roofing and flashing materials, pallets, construction debris, unused materials, and other waste materials resulting from the Work of this Filed-sub-trade.

C. After completion of the work of this Section, remove equipment, tools, and unused materials, remove all remaining waste materials and construction debris related to the work of this Filed Sub-trade. Clean all exterior finish materials completely free from adhesives, sealants, and other materials installed under this Section.

END OF SECTION

SECTION 07 11 26

SELF-ADHERING SHEET WATERPROOFING
(FILED SUB-BID REQUIRED AS PART OF SECTION 07 00 01)

PART 1 - GENERAL

1.2 SUMMARY

A. The work of this Section consists of waterproofing system(s) where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Blind side waterproofing: Sheet membrane vertical waterproofing at new below-grade concrete walls, pre-applied and cast directly against concrete.
2. Adhered vertical waterproofing: Self-adhesive sheet membrane vertical waterproofing applied to exterior surfaces of new and existing below-grade concrete walls.
   a. Prefabricated composite drainage board over membrane waterproofing system.
3. Below slab horizontal waterproofing: Sheet membrane horizontal waterproofing beneath new concrete slabs-on grade, pre-applied and cast directly against concrete.
4. All required fillets, counter flashing, primers and adhesives, applied to exterior surfaces of below grade slabs and foundation walls.

C. Install rigid insulation board over membrane waterproofing system furnished under Section 07 21 00 – THERMAL INSULATION.

D. Factory representative field inspections of installed waterproofing.

1.7 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. Field Supervised Work: Contractor shall notify Architect before beginning work of this Section. Obtain Architect's approval of Contractor's procedures before proceeding with the work.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of waterproofing system.

C. Qualifications:

D. Manufacturer's On-site Inspections: Make arrangements to have Manufacturer's representative (employed by manufacturer) be present on-site during the Work of this Section at key points, which include, but are not limited to:

1. Pre-installation conference.
2. Review of installation procedures (a minimum of 2 site visits are required).
3. Inspection of installation prior to flood testing.

E. Preconstruction Testing: Applicator's review statement that in-situ conditions are acceptable for application of waterproofing system.

1.8 MOCK-UPS

A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.

1. General horizontal waterproofing mockup at deck, minimum 50 square feet of horizontal waterproofing with a not less than a 6 foot length vertical transition. Mockup to represent finished work including internal and external corners, seam jointing, attachment method, and counter-flashing.

B. Workmen preparing mock-ups shall be same as those performing the work.

C. Accepted mock-up may remain as part of the work; the number of mock-ups shall not be restricted.

1. Mock-ups not approved shall be removed in their entirety down to substrate.

1.11 WARRANTY

A. General: Submit warranties under provisions of Section 01 77 00 - CLOSEOUT PROCEDURES, and in compliance with Section 01 78 39 – PROJECT RECORD DOCUMENTS.

B. Manufacturer's Warranty: Provide 5 year Manufacturer's warranty which shall include replacement of defective materials.

C. Special Warranty: Provide 3 year Applicator's warranty or performance bond which shall include removal and replacement of defective materials, and repairs or replacement of Owner's materials and products damaged due to failure of waterproofing installation to resist water or moisture penetration

D. Extended Correction Period: Membrane waterproofing shall be guaranteed for 3 years with the Contractor or water-proofing Subcontractor agreeing to repair or replace work which leaks or otherwise fails to perform as required due to failures of materials or workmanship. This shall include the removal and replacement of any work which conceals the membrane work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Carlisle Coatings and Waterproofing, Inc., Wylie, TX., ("Carlisle").
2. GCP Applied Technologies Inc., Cambridge MA., ("Grace").
3. Henry Company, El Segundo CA., ("Henry").
4. Polyguard Products Inc. Ennis, TX., ("Polyguard").
5. W.R. Meadows, Hampshire, IL., ("Meadows").

2.2 BLIND-SIDE VERTICAL WATERPROOFING

A. Basis of Design (specified system): GCP Applied Technologies Inc., Cambridge MA., ("Grace") product: "Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Preprufe 300R".

1. Acceptable Manufacturers/Products: Subject to compliance with the requirements specified herein, similar blind-side waterproofing products include the following:
   a. Carlisle product: "MiraPly V".
   b. Grace, product: "Preprufe 300R".
   c. Polyguard, product "Polyguard Blindside Waterproofing Membrane"

B. Pre-applied vertical sheet waterproofing membrane: nominal 1.2 mm (0.046 inch) thick composite sheet membrane comprising of 0.8 mm (0.030 inch) thick high density polyethylene film and synthetic adhesive. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Membrane shall comply with the following physical properties:

1. Low Temperature Flexibility tested per ASTM D 1970: Unaffected at -23°C (-10°F).
2. Elongation tested per ASTM D 412: greater than 300 percent.
   a. Modified testing: Elongation of membrane is run at a rate of 50 mm (2 inches) per minute.
3. Crack Cycling at -23°C (-10°F), 100 Cycles tested per ASTM C 836: Unaffected.
4. Tensile Strength, Film tested per ASTM D 412: 27.6 MPa (4,000 lbs/in.2).
5. Peel Adhesion to Concrete tested per modified ASTM D 903: 880 N/m (5.0 lbs/in.).
   a. Modified testing: Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion

of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.

6. Lap Adhesion tested per modified ASTM D 1876: 440 N/m (2.5 lbs/in.).
   a. Modified testing: The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).
7. Resistance to Hydrostatic Head tested per modified ASTM D 5385: greater than 70 m (231 ft).
   a. Modified Testing: Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is introduced to the membrane surface up to a head of 70 m (231 ft) of water which is the limit of the apparatus.
8. Puncture Resistance tested per ASTM E 154: 990 N (221 lbs).
9. Permeance tested per ASTM E 96 Method B: less than 0.6 ng/m2sPa (0.01 perms).
10. Water Absorption tested per ASTM D 570: less than 0.5%.

2.3 ADHERED VERTICAL WATERPROOFING

A. Basis of Design (Specified Product): GCP Applied Technologies Inc., Cambridge MA., ("Grace") product: "Bituthene 3000".
   1. Acceptable Manufacturers/Products: Subject to compliance with the requirements specified herein, similar sheet waterproofing products include the following:
      a. Carlisle, product "MiraDri 860/861".
      b. Grace, product "Bituthene 3000".
      c. Henry, product "Blueskin WP 200".
      d. Polyguard, product "Polyguard Underseal PRM".
      e. Meadows, product "Mel-Rol".

B. Sheet membrane: Prefabricated composite sheet, minimum of 60 mils thick, consisting of 56 mils thickness of rubberized asphalt and 4 mils thick cross-laminated polyethylene film, self-adhering after removal of release paper, and furnished in 36 or 48 inch wide rolls, formulated for anticipated ambient temperature, and meeting or exceeding the specified physical properties.

C. Waterproofing Membrane Physical Properties:
   1. Flexibility: Unaffected when tested by ASTM D 1970 at -25 degrees F.
   2. Tensile strength for membrane, as per ASTM D 412, modified: 300 pounds per square inch, minimum.

3. Tensile strength for film, as per ASTM D 412, modified: 5,000 pounds per square inch, minimum.
4. Elongation, as per ASTM D 412, modified: 300 percent, minimum.
5. Cycling over crack at minus 25 degrees Fahrenheit: No effect at 100 cycles.
6. Peel adhesion, when tested per ASTM D 903 (modified) for 7 days dry at 70 degrees Fahrenheit and 120 degrees Fahrenheit and for 7 days wet at 70 degrees Fahrenheit: 7.5 pounds per inch width, minimum.
7. Puncture resistance for membrane, (ASTM E 154): 40 pounds, minimum.
8. Resistance to hydrostatic head of water when tested per ASTM D 5385: 200 feet of water, minimum.
9. Exposure to fungi in soil for 16 weeks, as per GSA-PBS 07111: Unaffected.
10. Permeance as per ASTM E 96, Method B: 0.05 perms (grains/sq. ft./hr./in. Hg), maximum.
11. Water absorption, as per ASTM D 570: 0.2 percent by weight, maximum.

D. Primer: Rubber based low VOC content primer formulated with high solids content which shall comply with regulatory VOC requirements.

1. Carlisle:
   a. Conventional use: CCW-702.
   b. Low temperature: CCW-702LT.
   c. Green or damp concrete: CCW-715.
2. Grace:
   a. Conventional use: WP-3000.
   b. Low temperature: B2.
   c. Green or damp concrete: B2.
3. Henry:
   a. Conventional use: Aquatac.
   b. Low temperature: Blue Skin Adhesive.
   c. Green or damp concrete: No available product.
4. Polyguard:
   a. Conventional use: “Polyguard 650 LT Liquid Adhesive” or “Polyguard California Sealant”.
   b. Low temperature: “Polyguard 650 LT Liquid Adhesive”.
   c. Green or damp concrete: No available product.
5. Meadows:
   a. Conventional use: Mel-Prime.
   b. Low temperature: Mel-Prime VOC.
   c. Green or damp concrete: No available product.

2.4 BELOW-SLAB HORIZONTAL WATERPROOFING

A. Basis of Design (Specified system): GCP Applied Technologies Inc., Cambridge MA., ("Grace") product: "Pre-applied Integrally Bonded Sheet Waterproofing Membrane: Preprufe 300R".

1. Acceptable Manufacturers/Products: Subject to compliance with the requirements specified herein, similar blind-side waterproofing products include the following:
   a. Carlisle product: "MiraPly H"
   b. Grace, product: "Preprufe 300R".
   c. Polyguard, product "Polyguard Underseal Underslab Waterproofing Membrane"

B. Pre-applied horizontal sheet waterproofing membrane: nominal 1.2 mm (0.046 inch) thick composite sheet membrane comprising of 0.8 mm (0.030 inch) thick high density polyethylene film and synthetic adhesive. The membrane shall form an integral and permanent bond to poured concrete to prevent water migration at the interface of the membrane and structural concrete. Membrane shall comply with the following physical properties:

1. Low Temperature Flexibility tested per ASTM D 1970: Unaffected at -23°C (-10°F).
2. Elongation tested per ASTM D 412: greater than 300 percent.
   a. Modified testing: Elongation of membrane is run at a rate of 50 mm (2 inches) per minute.
3. Crack Cycling at -23°C (-10°F), 100 Cycles tested per ASTM C 836: Unaffected.
4. Tensile Strength, Film tested per ASTM D 412: 27.6 MPa (4,000 lbs/in.2).
5. Peel Adhesion to Concrete tested per modified ASTM D 903: 880 N/m (5.0 lbs/in.).
   a. Modified testing: Concrete is cast against the protective coating surface of the membrane and allowed to cure (7 days minimum). Peel adhesion of membrane to concrete is measured at a rate of 50 mm (2 in.) per minute at room temperature.
6. Lap Adhesion tested per modified ASTM D 1876: 440 N/m (2.5 lbs/in.).
   a. Modified testing: The test is conducted 15 minutes after the lap is formed as per manufacturer's instructions and run at a rate of 50 mm (2 in.) per minute at -4°C (25°F).
7. Resistance to Hydrostatic Head tested per modified ASTM D 5385: greater than 70 m (231 ft).
   a. Modified Testing: Hydrostatic head tests are performed by casting concrete against the membrane with a lap. Before the concrete sets a 3 mm (0.125 in.) spacer is inserted perpendicular to the membrane to create a gap. The cured block is placed in a chamber where water is

introduced to the membrane surface up to a head of 70 m (231 ft) of water which is the limit of the apparatus.

8. Puncture Resistance tested per ASTM E 154: 800 N (180 lbs).
9. Permeance tested per ASTM E 96 Method B: less than 0.6 ng/m2sPa (0.01 perms).
10. Water Absorption tested per ASTM D 570: less than 0.5%.

2.5 ACCESSORIES

A. Drainage Composite Board: Prefabricated geocomposite drainage mat consisting of a formed polystyrene or PVC hollow-studded core with one side bonded with a woven or non-woven polypropylene filter fabric, which is compatible to waterproofing manufacturer. Drainage composite shall be designed to promote positive drainage while serving as a protection course.

1. Carlisle, product series "CCW MiraDRAIN" drainage composites.
   a. Vertical applications: Carlisle "CCW MiraDRAIN 6200", with polymeric backing.
      1) Thickness: nominal 0.40 inch thick [10.16 mm].
      2) Compressive Strength: 15,000 psi (tested per ASTM D1621).
      3) Maximum flow rate: 16 gallons per minute per square foot flow (tested per ASTM D 4716).
2. Grace, product series "Hydroduct" drainage composites:
   a. Vertical applications, Grace product: 220.
      1) Thickness: nominal 7/16 inch thick [11 mm].
      2) Compressive Strength: 15,000 psf (tested per ASTM D1621).
      3) Maximum flow rate: 17 gallons per minute per square foot flow (tested per ASTM D 4716).
3. Henry, product series "DB" drainage composites.
   a. Vertical applications, Henry product: "DB 520", with polymeric backing.
      1) Thickness: nominal 7/16 inch thick [11 mm].
      2) Compressive Strength: 15,000 psi (tested per ASTM D1621).
      3) Maximum flow rate: 16 gallons per minute per square foot flow (tested per ASTM D 4716).
4. Polyguard, product series "Polyflow" drainage composites:
   a. Vertical applications, Polyguard product: Polyflow 15P Drainage Mat". (1/2 inch thick, 16 gallon per minute flow).
   b. Horizontal applications, Polyguard product: 18 Drainage Mat.
      1) Thickness: nominal 1/2 inch thick [13 mm].
      2) Compressive Strength: 18,000 psf (tested per ASTM D1621).
      3) Maximum flow rate: 21 gallons per minute per foot flow (tested per ASTM D 4716).
5. Meadows, product series "Mel-Drain" drainage composites.

a. Vertical applications, Meadows product: "5035-B", with polymeric backing.
   1) Thickness: nominal 7/16 inch thick [11 mm].
   2) Compressive Strength: 15,000 psi (tested per ASTM D1621).
   3) Maximum flow rate: 16 gallons per minute per square foot flow (tested per ASTM D 4716).

B. Primers, Sealants, crack filler, mastics, liquid detailing compound, tape, and adhesives: As recommended by the waterproofing manufacturer.
   1. Primer, as recommended for substrate conditions by waterproofing manufacturer: Rubber based low VOC content primer formulated with high solids content which shall comply with regulatory VOC requirements.

PART 3 - EXECUTION

3.3 INSTALLATION – GENERAL

A. Apply waterproofing system in strict accordance the manufacturer's installation specifications, Contract Document details, approved shop drawings and the recommendations of Manufacturer's on-site technical representative, and as additionally specified herein.

3.4 INSTALLATION BLIND-SIDE VERTICAL WATERPROOFING

A. Substrates shall be smooth and sound.

B. Strictly comply with installation instructions in manufacturer's published literature, including but not limited to, the following:
   1. Apply membrane with the HDPE film facing the prepared soil retention system. Remove the release liner and fasten membrane along uncoated edge to Hydroduct drainage composite with large head nails or to plywood with large head nails or staples.
   2. Apply succeeding sheets by overlapping the previous sheet 3 inches along the uncoated edge of the membrane. Side laps must be firmly rolled to ensure a tight seal.
   3. Overlap the ends of the membrane 3 inches. Apply manufacturer's recommended seam tape centered over the end lap and roll firmly to ensure a tight seal. Remove release liner.

3.5 INSTALLATION ADHERED VERTICAL WATERPROOFING

A. Primer: Where sheet membrane is to be applied, apply primer as recommended by manufacturer at a rate of 250 to 350 square feet per gallon; areas not covered with membrane in 24 hours must be reconditioned.

B. General: Perform the application of the sheet membrane waterproofing system in strict accordance with the manufacturer's installation specifications, details, and recommendations, and as specified herein.

1. At all external and internal corners, apply a continuous strip of sheet membrane, at least 12 inches wide, centered on the axis of the corner, before the general application of the membrane.
2. Apply 8 inch wide strips of the sheet membrane over all cracks greater than 1/16 inch in width.
3. Apply a double layer of the sheet membrane around all penetrations in the surface. Apply a bead of compatible sealant between the top layer of membrane and the clamping rings of penetrating items and at all terminations.
4. Apply the sheet membrane in strips of 8 feet in length or less, overlapping edge seams at least 2-1/2 inches. Stagger all end laps. Roll the entire surface of the membrane firmly and completely, as soon as possible after application thereof. Seal all tee joints at the end of each working day. Seal all daily terminations, and permanent terminations with manufacturer's recommended sealant material.

C. After application of membrane is completed, carefully inspect the entire waterproofed surface for defects therein. Patch tears and inadequately lapped seams with membrane material. Slit fishmouths, repair with a patch extending at least 6 inches in all directions from the slit, and seal all edges of the patch with manufacturer's recommended sealant.

D. Arrange for inspection of waterproofing system by representative of waterproofing manufacturer, prior to installation of insulation and backfill. Schedule and sequence manufacturer’s inspection in manner to prevent delays in construction schedule.

3.6 INSTALLATION BELOW-SLAB HORIZONTAL WATERPROOFING

A. Earth and stone substrates shall be well compacted to produce an even, solid substrate. Remove loose aggregate or sharp protrusions. Concrete substrates shall be smooth or broom finished and monolithic. Fill gaps or voids greater than 1/2 inch. Remove standing water prior to membrane applications.

B. Strictly comply with installation instructions in manufacturer’s published literature, including but not limited to, the following:

1. Apply membrane with the HDPE film facing the prepared substrate. Remove the release liner during application.
2. Apply succeeding sheets by overlapping the previous sheet 3 inches along the uncoated edge of the membrane. Lap area must be firmly rolled to ensure a tight seal.
3. Overlap the ends of the membrane a minimum of 3 inches and apply manufacturer’s recommended seam tape centered over the lap and roll firmly to ensure a tight seal.

3.7 INSTALLATION OF INSULATION

A. Insulation beneath slabs-on-grade and exterior of foundation walls: 2 inch thick rigid insulation.

1. Place insulation boards at the exterior perimeter of foundation walls and beneath slabs-on grade.
   a. At exterior perimeter of foundation walls, extend insulation from 2 inches below grade to base of foundation walls.
   b. Beneath slabs-on-grade, extend insulation beneath slab as indicated on Drawings.
2. Butt edges and ends tight to adjacent boards. Bevel insulation to allow snug fit at cants.
3. Place soil as a perimeter restraint to minimize movement of insulation.

3.8 INSTALLATION OF ACCESSORIES

A. Application - Drainage Composite Board (Vertical Application).

1. Apply drainage composite board in an manner acceptable by the membrane manufacturer and as recommended by the composite board manufacturer and following the general guidelines specified herein.
2. Install composite drainage board on same day sheet membrane waterproofing is applied.
3. Apply first row of drainage composite board horizontally starting at base of foundation, peel fabric back approximately 12 inches from the lower edges, tuck exposed drain core behind perimeter subdrainage pipe installed under Section 33 46 00 - SUBDRAINAGE and wrap fabric over pipe.
4. Adhere drainage composite to membrane as recommended by membrane manufacturer.
5. Apply subsequent rolls of drainage composite butted tightly to previous row, overlapping fabric over next lowest row.
6. At inside corners, cut backing but not fabric. At outside corners cut backing and fabric and overlay with second layer of fabric, adhered.
7. Terminate composite board system at 6 inches below finish grade.
8. Patch or replace any damage to fabric prior to backfilling.

END OF SECTION 07 11 26

SECTION 07 16 13
CEMENTITIOUS WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Prepare surfaces and repair cracks in substrate scheduled to receive waterproofing.

B. Furnish and install cementitious waterproofing at walls and floor of elevator pits.

1.5 QUALITY ASSURANCE

A. Waterproofing applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

B. Make all necessary arrangements with the respective waterproofing systems manufacturer to provide qualified supervision at the site, commencing immediately prior to the first application of materials, and continuing until completion of the application all waterproofing materials. Perform all preparation, mixing, and application procedures as recommended by each manufacturer's representative. Bear all costs in conjunction with such supervision.

1.8 WARRANTY

A. Provide 2 year Applicator’s warranty or bond which shall include removal and replacement of defective materials, and repairs or replacement of Owner’s materials and products damaged due to failure of waterproofing installation to resist water or moisture penetration.

PART 2 - PRODUCTS

2.1 CEMENTITIOUS WATERPROOFING

A. Manufacturer: Products which may be considered by the Architect, include the following:

1. Five Star Products, Inc., Fairfield CT., product Five Star Cementitious Waterproofing.
2. Silpro Masonry Systems, Inc., Ayer MA., product Sealcoat.
3. Thoro System Waterproofing, Inc., Folcroft, PA., product “Thoroseal”.

B. Cementitious waterproofing system meet the following minimum requirements:

Properties	Test	Results
Bond Strength:	ASTM C 882	2,000n psi
Tensile Strength:	ASTM C 190	7 day: 250 psi (17.6 kg/cm^2) 28 day, 440 psi (30.9 kg/cm^2)

Flexural Strength	ASTM C 348	7 day: 360 psi (25.3 kg/cm^2) 28 day, 1030 psi (72.4 kg/cm^2)
Modulus of Elasticity	ASTM C 469	2.72 x 10^6 psi
Adhesion strength	Tensile bond	418 psi. (29 kg/cm^2)
Compressive Strength	ASTM C 109	1 day: 4000 psi (280.8 kg/cm^2) 7 days, 6300 psi (442.4 kg/cm^2)
Coefficient of Thermal Expansion	ASTM C 531	6.99 x 10^{-6} in/in˚F
Accelerated Weathering	ASTM G 26	5000 hours, pass with no change
Fungus Growth Resistance	FS TT-P-29B	meets all requirements
Abrasion Strength	FS TT-P-141b	passed
Permeability	ASTM E 96	7.8 perms
Water Absorption	ASTM C 67	3.6 percent (24 hours boiling test)
Salt spray resistance	ASTM B 117	no deterioration or loss of adhesion

C. Joint filler, and other installation accessories: As recommended by the waterproofing manufacturer.

D. Portland cement plaster to be mixed with waterproofing: As recommended by the waterproofing manufacturer.

E. Water: Clean and fresh without contaminates.

PART 3 - EXECUTION

3.3 APPLICATION AT INTERIOR LOCATIONS

A. Dampen substrate to prevent surface drag of application.

B. Apply waterproofing material in accordance with manufacturer's instructions by brush or broom to substrate surfaces. Ensure first coat is well brushed into substrate.

1. Apply a minimum of two thick coats to a total thickness of 1/16 inch.
2. Allow first coat to set a minimum of 4 hours prior to application of second coat. Moisten first coat with fine spray of water before applying second coat.

C. Ensure there are no pinholes, voids or uncovered areas.

D. Apply extra thickness of waterproofing material at corners, intersections, and angles.

E. Seal watertight, items projecting through waterproofing.

END OF SECTION 07 16 13

SECTION 07 21 00
THERMAL INSULATION

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of building insulation where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following scope.

B. Furnish and install the following:

1. Rigid insulation beneath interior concrete slabs.
2. Rigid insulation at perimeter foundation walls.
3. Semi-rigid mineral wool insulation board at exterior walls.
4. Low pressure, low expansion polyurethane foamed-in-place insulation / air barrier sealant: applied to seal gaps, cracks, cavities and joints in the building envelope, at door frames, perimeter of window frames, and other similar penetrations in exterior walls.

C. Furnish rigid insulation board for installation under Section 07 13 53 – ELASTOMERIC SHEET WATERPROOFING.

1.5 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.7 WARRANTIES

A. General: Submit warranties under provisions of 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Rigid insulation board (extruded polystyrene):
   a. Dow Chemical Corp., Midland MI.
   b. Owens Corning Commercial Insulation, Toledo OH.
   c. Pactiv Building Products, Atlanta, GA
   d. DiversiFoam Products, Rockford, MN
2. Mineral fiber insulation:

a. Johns Manville, Inc., Denver CO.
b. Roxul, Inc., Milton, Ontario. (Roxul).
c. Thermafiber Inc., Wabash IN. (Thermafiber)

3. Low pressure polyurethane foamed-in-place insulation / air barrier sealant:
   a. Fomo Products, Inc., Norton OH.
   b. Dow Chemical Company, Midland, MI.
   c. Premier industrial Supply, Phoenix AZ.
   d. Convenience Products, Division of Clayton Corp., Fenton MO.
   e. Henry Company, El Sequndo CA.

2.2 MATERIALS

A. Under-slab, and foundation insulation, rigid extruded polystyrene insulation: Closed cell foam board, square edge, self-extinguishing, conforming to ASTM C 578, Type IV, with a compressive strength of 25 pounds per square inch when tested in accordance with ASTM D 1621.
   1. Panel size: 48 by 96 inches beneath slab, and 24 by 96 inches at verticals.
   2. Minimum R-value: 5 per inch thickness.
   3. Thickness as indicated on Drawings.
   4. Acceptable products include but are not limited to:
      a. Dow Chemical Corp., product, Styrofoam Brand “Square Edge”
      b. Owens Corning, product “Foamular 250”.
      c. Pactiv, Corp. product “GreenGuard Type IV 25 PSI Insulation Board”.
      d. DiversiFoam Products, product “CertiFoam 25 SE”.

B. Wall insulation between framing: Semi-rigid mineral wool insulation for exterior wall cavities: dual density mineral wool fiber insulation board, conforming to ASTM C612, Type IVB having a nominal density of 4.4 pounds per cubic foot.
   1. Non-Combustible as tested per ASTM E-136.
   2. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723), with flame spread rating of 0 and smoke developed rating of 0.
   3. Thickness: 5.5 inches, having thermal resistance, R-value of 23.
   4. Size: As required for framing cavities.
   5. Acceptable products include the following or approved equal:
      a. Roxul, Inc., Milton, Ontario, product “Roxul ComfortBatt”
      b. Thermafiber Inc., Wabash IN. product “Thermafiber UltraBatt.”
      c. Johns Manville, Inc., Denver CO. product: “TempControl”.

C. Foamed-in-place insulation for air barrier sealant: Low Pressure Polyurethane foam sealant. Acceptable products include the following or approved equal:

1. Fomo Products, Inc., product: "Handi Foam" or "Handi-Seal".
2. Dow Chemical Company, product: "Great Stuff Pro".
3. Premier industrial Supply, product: "XtraFoam".
4. Convenience Products, Division of Clayton Corp., product: "Touch 'n Foam No Warp".
5. Henry Company, product: "NailTite NT-100".

2.3 ACCESSORIES

A. Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each insulation type.

B. Setting adhesive for rigid insulation: Conforming with ASTM C-557.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Insulation beneath slabs-on-grade, cavity walls and exterior of foundation walls:
   1. Place insulation boards at the exterior perimeter of foundation, walls and beneath slabs-on grade.
      a. At exterior perimeter of foundation walls, extend insulation from 2 inches below grade to top of footing.
      b. Beneath slabs-on-grade, extend insulation to provide 100 percent coverage beneath slab.
   2. Butt edges and ends tight to adjacent boards. Bevel insulation to allow snug fit at cants.
   3. Place soil as a perimeter restraint to minimize movement of insulation.

B. Mineral Fiber insulation in exterior wall cavities:
   1. Install boards, friction fit, horizontally between wall reinforcement.
   2. Install full thickness of insulation over the entire surface to be installed as indicated. Ensure tight fit around penetrating elements and abutting construction. All voids and gaps shall be filled. Minimize potential for thermal bridging.
   3. Install insulation hold-down clips as per the manufacturer’s recommendations, and in conformance with the Building Code.
   4. At completion of each days’ work, protect all exposed edges. Seal edges or lap over with a moisture retardant barrier.

C. Foamed-in-place insulation / air barrier sealant: Apply insulation in method to a uniform monolithic density without voids, in accordance with manufacturer's instructions.

1. Apply application of foam for air barrier seal includes, but is not limited to:
    a. Door frames, window frames, and similar penetrations in exterior walls.
    b. Gaps, cracks, cavities and joints in the building envelope, not sealed with other forms of air boots, including electrical boxes and conduit, ducts, fans, and piping.
    c. Where additionally indicated on Drawings.

END OF SECTION 07 21 00

SECTION 07 25 00
WEATHER BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. General: The work of this Section consists of air barrier membrane system where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Furnish and install:

1. Spunbonded nonwoven sheet air infiltration barrier system.
   a. Self-adhesive transitions to window and door units.

1.5 QUALITY ASSURANCE

A. Applicator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

B. Make arrangements to have Manufacturer's representative (employed by manufacturer) on-site during work of this Section to periodically review installation procedures. A minimum of 3 site visits are required.

1.6 MOCK-UPS

A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.

B. Provide mock-up areas using air and vapor membrane system, minimum 200 square feet, demonstrating the minimum standard for the Work.

C. Locate mock-ups where directed and include all materials which are part of the air and vapor membrane system. Incorporate as part of the mock-up area, substrate, window frame, attachment of insulation, and showing air and vapor barrier membrane application details.

D. Allow 24 hours for inspection of mock-up by Architect. before proceeding with air/vapor barrier work. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. DuPont Company, Wilmington, DE, product "Tyvek CommercialWrap".

2. Fiberweb, Inc., Old Hickory, TN, product: "Typar MetroWrap".
3. Pactiv Building Products, Atlanta, GA, product "GreenGuard MAX Building Wrap".
4. Raven Industries, Sioux Falls, SD, product: "Fortress Pro HL6W".

2.2 MATERIALS

A. Air Infiltration Barrier:

1. Description: Sheet air infiltration barrier fabricated from spunbonded polyolefin, non-woven, non-perforated complying with the following performance characteristics:
   a. Thickness: 12.1 mils minimum.
   b. Weight: 2.7 oz/yd^2 minimum when tested in accordance with TAPPI T-410 or ASTM D 3776..
   c. Tensile Strength: 30/30 lbs/inch minimum when tested in accordance with ASTM D 882, Method A.
   d. Tear Strength: 12/10 lbs minimum when tested in accordance with ASTM D 1117.
   e. Flame Spread and Smoke Developed Rating: Flame Spread <10, Smoke Developed <70 maximum, Class A when tested in accordance with ASTM E 84-05.
   f. Water Vapor Transmission: 10 perms minimum when tested in accordance with ASTM E-96, Method B.
   g. Air Retarder: Type I when tested in accordance with ASTM E 1677.
   h. Air Permeance: Not to exceed 0.0047 cubic feet per minute per square foot under a pressure differential of 0.3 inches water (1.57 psf) (0.02 L/m^2 @ 75 Pa.) when tested according to ASTM E 2178.
   i. Air Leakage: 0.04 at 25 mph (75 Pa) cfm/ft^2 @ 75 Pa when tested in accordance with ASTM E 2357.
   j. Hydrostatic Pressure Resistance (Water Resistance): of 250 cm minimum when tested in accordance with AATCC-127.
   k. UV Resistance: 6 months minimum.

2.3 ACCESSORIES

A. Seam Tape: 3 inch (75 mm) wide tape as recommended or approved by the manufacturer including but not limited to the following:

1. Typar Construction Tape.
2. Pactive GreenGuard Contractor Tape
3. DuPont Tyvek Tape.

B. Fasteners:

1. No. 4 nails with a 1-inch (25 mm) plastic cap fasteners, or 1-inch plastic cap staples with leg length sufficient to achieve a minimum penetration of 1/2-inch into the wood stud.
    a. Tyvek® Wrap Caps, as distributed by DuPont or approved equal.

C. Sealants:
1. Provide sealants to maintain watertight conditions as recommended by the air infiltration barrier manufacturer.
    a. One-part medium modulus, natural cure, synthetic sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, use NT, G, A, M, O with a minimum movement capability of ±50 percent, equal to the following:
        1) Dow Corning Corporation, Midland MI.; product, "791".
        2) General Electric Company (GE Silicones) Waterford NY.; product, "Silpruf".
        3) Pecora Corporation, Harleysville PA.; product, "895".
        4) Sika Corp, Lyndhurst NJ.; product, "Sika Sil-C 995".
        5) Tremco, Beachwood OH.; product, "Spectrem 2".

D. Adhesives: As recommended or approved by the manufacturer including but not limited to the following:
1. Liquid Nails®, Strongsville, OH, product "Heavy Duty Construction Adhesive LN-901".
2. Denso North America, Inc., Houston, TX, product "Denso Flashing Tape".
3. 3M Corporation, St. Paul, MN, product "High Strength Spray Adhesive 90".
4. Henkel North America, Rocky Hill, CT, product "Permagrip 107".
5. Henkel North America, Rocky Hill, CT, product "Macrospray SIA 680".
6. ITW TACC, Rockland, MD, product "STA'PUT SPH".

E. Primers: Provide primer to assist in adhesion between substrate and flashing as recommended by the flashing manufacturer including but not limited to the following:
1. Denso North America, Inc., Houston, TX, product "Butyl Primer".

F. Flashings:
1. Flexible membrane flashing materials for window openings and penetrations as recommended by the air infiltration barrier manufacturer.
    a. Typar Flashing Flex, Typar Peel & Stick Flashing and Flashing RA as distributed by Fiberweb, Inc., or approved equal.
    b. DuPont™ FlexWrap™, FlexWrap™ NF, as distributed by DuPont, or approved equal.
2. Straight flashing membrane materials for flashing windows and doors and sealing penetrations

a. DuPont™ StraightFlash™, StraightFlash™ VF, as distributed by DuPont or approved equal.

3. Through-wall flashing membrane materials for flashing at changes in direction or elevation (foundations) and at transitions between different assembly materials.

   a. DuPont™ Thru-Wall Surface Adhered Membrane with Integrated Drip Edge or approved equal.

4. Preformed three-dimensional shapes to complete the flashing system used in conjunction with through-wall flashing.

   a. Preformed Inside and Outside Corners and End Dams as distributed by DuPont: or approved equal.

PART 3 - EXECUTION

3.2 APPLICATION

A. General: Perform the application of the sheet membrane air barrier system in strict accordance with the manufacturer's installation specifications, details, and recommendations, and as specified herein.

B. Install air barrier membrane over exterior sheathing in using continuous lengths as practical.

C. Flash and seal All window and door penetrations per manufacturer instructions.

D. Seal joints and penetrations through weather resistive barrier with specified tape and fasteners prior to installation of finish material. Air infiltration barrier shall be air tight and free from holes, tears, and punctures.

END OF SECTION 07 25 00

SECTION 07 26 00
VAPOR RETARDERS

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of vapor retarders (vapor barriers) where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Vapor barriers and in walls, floor assemblies and roof assemblies.
2. Sheet membrane vapor barriers (vapor retarders) under concrete slabs-on-grade including seam tape, and pipe boots.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section for each type of vapor retarder shall be from a single manufacturer, and the related accessories as recommended by the prime manufacturer of the vapor retarder.

PART 2 - PRODUCTS

2.1 VAPOR BARRIERS WITHIN BUILDING ASSEMBLIES

A. Sheet plastic vapor barrier: Clear polyethylene film, 0.006 inches (6 mil) thick provided in full-wall length and width pieces, without joints, wherever possible.

B. Membrane vapor barrier: Flexible self-sealing, self-healing, fully adhering composite flexible membrane consisting of .8 mm (32 mils) of self adhesive rubberized asphalt integrally bonded to .2 mm (8 mils) of cross-laminated, high-density polyethylene film to provide a min. 1 mm (40 mil) thick membrane. Membrane shall be interleaved with silicone-coated release paper until installed. Provide with manufacturer recommended surface conditioners and termination mastics.

1. Acceptable Products include:
   a. Grace Construction Products, product: “Perm-A-Barrier Wall Flashing”.
   b. Carlisle Waterproofing, product: “CCW-705”.
   c. W.R. Meadows, product: “Air-Shield Thru-Wall Flashing”.
2. Minimum performance characteristics.
   a. Water Vapor Transmission: ASTM E 96, Method B – 0.05 perms maximum
   b. Water Absorption: ASTM D 570 – Max. 0.1% by weight

c. Puncture Resistance: ASTM E 154 – 40 lbs.

d. Tear Resistance:

1) Initiation – ASTM D 1004 – minimum 58 N (13.0 lbs.) M.D.

2) Propagation – ASTM D 1938 – minimum 40 N (9.0 lbs.) M.D.

e. Lap Adhesion at -4ºC (25ºF): ASTM 1876 – 880 N/M (5.0 lbs./in.) of width

f. Low Temperature Flexibility – ASTM D 1970 – Unaffected to -43ºC (-45º F)

g. Tensile Strength: ASTM D 412, Die C Modified – Minimum 5.5 MPa (800 psi)

h. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D 412, Die C – Min. 200%

3. Surface primer: Latex based, water dispersed liquid for substrate as recommended by membrane manufacturer.

4. Termination mastic: Rubberized asphalt-based mastic with 200 grams/liter max VOC content for use in sealing flashing membrane terminations and punctures, as recommended by wall flashing manufacturer.

2.2 UNDER SLAB VAPOR BARRIERS

A. Manufacturers and products:

1. Specified Product (Basis of Design): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Stego Industries LLC company, Product: "Stego Wrap (15 mil)".

2. Acceptable manufacturers: Subject to compliance with the requirements specified herein, products which may be incorporated in the work include, but are not limited to, the following:

a. Stego Industries LLC, San Juan Capistrano, CA, product: "Stego Wrap (15 mil)".

b. W.R. Meadows, Hampshire, IL, product: "No. 723 Perminator (15 mil)".

c. Reef Industries, Houston, TX, product "Griffolyn -15 Mil Green".

d. Insulation Solutions Inc., East Peoria IL, product "Viper II, 15 mil vapor barrier".

B. Characteristics:

1. Minimum thickness: 15 mils.

2. Permeance complying with ACI 302.2R.

3. Permeance after conditioning when tested in accordance with ASTM E 1745 (where applicable): Less than 0.01 perms (gr/ft^2/hr/in-Hg).

4. Water vapor barrier tested by ASTM E-1745: Meets or exceeds Class A.

2.3 ACCESSORIES

A. General: Staples, tape, adhesives and fasteners required for the proper and complete installation for work of this Section shall be as recommended by each respective manufacturers of each type of vapor barrier.

1. Double-stick tape for attachment of vapor barrier: Double coated acrylic closed-cell foam tape, as manufactured by 3M Industrial Specialties Division, St. Paul MN, product "Scotch VHB - 4952" or approved equal, having a thickness of 0.045 inches and a width of 1 inch.

B. Air seal boot: PVC or EDPM premolded pipe and seal for penetrations at ceiling vapor barrier.

C. Seam Tape: High Density Polyethylene Tape or HDPE Tape as recommended by vapor barrier manufacturer, with pressure sensitive adhesive. Minimum width 4 inches.

D. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

PART 3 - EXECUTION

3.2 INSTALLATION - VAPOR BARRIERS WITHIN BUILDING ASSEMBLIES

A. Place vapor and air barrier on warm side of all thermal insulation. Attach using commercial grade double stick tape. Lap and seal all sheet joints.

B. Extend vapor and air barrier tight to full perimeter of adjacent window and door frames and other items interrupting the plane of membrane. Tape seal in place.

3.3 INSTALLATION - BELOW-SLAB VAPOR BARRIERS/RETARDERS

A. General: Install Vapor Barrier in accordance with manufacturer's instructions and ASTM E 1643. Place vapor barrier beneath all floor slabs

B. Unroll Vapor Barrier with the longest dimension parallel with the direction of the pour.

C. Lap Vapor Barrier over footings and seal to foundation walls.

D. Overlap joints a minimum of six inches with top lap in direction of spreading concrete. Turn up layer at slab edges abutting walls. Seal with manufacturer's recommended tape or secure edge with non-corrosive termination bar.

E. Seal all penetrations (including pipes, reinforcing steel, and permanent utilities) with manufacturer's pipe boot or vapor barrier manufacturer's recommended detail.

F. Do not puncture vapor barrier. No punctures or unsealed penetrations are permitted.

G. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION 07 26 00

SECTION 07 31 13

ASPHALT SHINGLES
(FILED SUB-BID REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.2 SUMMARY

A. Furnish and install:

1. Asphalt shingle roof.
2. Moisture shedding underlayment, eave, valley and ridge protection.
3. Continuous ridge vents.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with NRCA Steep Roofing Manual.

1.9 WARRANTY

A. Furnish shingle manufacturer's limited lifetime product warranty under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

B. The Contractor shall provide the Owner with a copy of the Bill of Sale for the shingles clearly indicating the product, quantity, purchase date, and a note indicating the project for which the product is intended.

C. Warranty:

1. The Contractor shall supply the Owner with a minimum two-year workmanship warranty. In the event any work related to the roofing, flashing, or metalwork is found to be defective within two years of substantial completion, the Contractor shall remove and replace such at no additional cost to the Commonwealth. The Contractor's warranty obligation shall run directly to the Building Owner (User Agency), and a copy the roofing signed warranty shall be sent to the roofing system's manufacturer.

1.10 EXTRA MATERIALS

A. Deliver to Owner 150 square feet (6 bundles) of extra shingles of color and type installed.

PART 2 – PRODUCTS

2.1 ROOFING MATERIALS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, the following roofing products which may be incorporated in the work include the following or approved equal:

1. GAF-Elk Corporation, Wayne NJ.
2. Certainteed Corporation, Valley Forge, PA.
3. Owens-Corning Roofing and Asphalt, LLC, Toledo OH.

B. Asphalt shingles: UL Class 'A' and wind resistant label up to 110 miles per hour, self-sealing, laminated, mineral granule surfaced, glass fiber mat base shingle roofing, in color as selected by Architect, conforming to ASTM specifications: D 3018 Type I and D 3462, UL 790 Class A, and furnished with a limited lifetime manufacturers product warranty. Acceptable products include the following or approved equal:

1. GAF-Elk Corporation, product “Timberline Ultra HD”.
2. Certainteed, product “Landmark Premium”.
3. Owens-Corning Roofing and Asphalt, LLC, product “TruDefinition”.

C. Ridge tiles: Furnish manufacturer’s nominal 12 by 12 inch compatible hip and ridge shingles in color match roof shingles.

2.2 PROTECTION MEMBRANE

A. Membrane for ice-dam and wind-blown rain protection: Sheet barrier of rubberized membrane bonded to sheet polyethylene, minimum 40 mil (1.00 mm), total thickness, with strippable treated release paper in compliance with ASTM D1970; having the following minimal characteristics:

1. Minimum tensile strength: 250 pounds per square inch (tested in accordance with ASTM D 412, Die C modified).
2. Minimum elongation to ultimate failure: 100 percent elongation tested in accordance with ASTM D 412, Die C modified.
3. Unaffected pliability when tested per ASTM D 1970 over 180 degree bend at minus 20 degrees Fahrenheit (-29ºC.).
4. Minimum adhesion of 3 pounds per inch width (528 N/m), tested per ASTM D903 to plywood.

5. Maximum permeance when tested in accordance with ASTM D96, 0.05 perms (2.9ng/m^2sPa).

6. Subject to conformance with the above requirements, acceptable products include the following or approved equal:

   a. W.R. Grace Company, Cambridge MA, product "Ice & Water Shield".

      1) Manufacturer's recommended primer is required for application over orientated strand board (OSB) sheathing: Grace product "Perm-A-Barrier WB Primer".

   b. Carlisle Coatings and Waterproofing Inc., Wylie, TX, product "WIP 400".

      1) Manufacturer's recommended primer is required for application at temperatures below 40 degrees F. and for substrates as recommended by manufacturer: Carlisle product "CCW-702".

   c. Henry Company, Huntington Park, CA., product "Ice & Water Barrier, RF200".

      1) Manufacturer's recommended primer is required for application at temperatures below 40 degrees F. and for substrates as recommended by manufacturer: Henry product "Blueskin Primer".

2.3 ACCESSORIES

A. Synthetic Underlayment: UV stabilized polypropylene, slip resistant, breathable, synthetic roof underlayment, mechanically attached (non-self-adhered), Class A rated and complying with ASTM D 226 and D 4869.

   1. Acceptable products include the following, or approved equal:

      a. Atlas Roofing Corp., Atlanta, GA, product "Summit Synthetic Underlayment"

      b. Certainteed Corporation (Saint-Gobain), Valley Forge, PA, product "Diamond Deck".

      c. Epilay, Carson, CA, product "Protectite Platnum."

      d. GAF-Elk Corporation, Wayne NJ, product "Deck Armor".

      e. InterWRap, Inc., Vancouver BC, Canada, product "Titanium UDL50"

      f. Owens-Corning Fiberglas Corp, Toledo OH, product "Deck Defense."

      g. W.R. Grace Company, Cambridge MA, product "Grace Tri-Flex."

B. Ridge and hip vent: Rigid, UV stabilized polypropylene, low profile continuous type, providing a minimum of 18 square inches of air flow area per linear foot of vent, designed for use with cap shingles.

1. Subject to conformance with the above requirements, acceptable products include the following or approved equal:

a. Air Vent Inc. (Certainteed), Dallas, TX, product “Shinglevent II”.

b. Cor-A-Vent, Mishawaka, IN., product “V600”.

C. Ridge vent at vertical walls: Continuous type formed metal, with internal air baffles, providing at least 9 square inches of air flow area per linear foot of vent.

1. Subject to conformance with the above requirements, acceptable products include the following or approved equal:

a. Air Vent Inc. (Certainteed), Dallas, TX, product “Flash Filter Vent FV162”, color as selected by Architect.

D. Nails, to install roofing: Standard round wire shingle type, hot dipped zinc coated steel, minimum 13/64 inch head diameter and 0.080 inch shank diameter, of sufficient length to penetrate through roof sheathing.

E. Nails, to install flashing: Standard round wire roofing type, hot dipped zinc coated steel, minimum 19/64 inch head diameter and 0.104 inch shank diameter, of sufficient length to penetrate 1/2 inch into wood substrate.

F. Tape, plastic cement, fibrated lap cement, bituminous paint or other accessories required for the proper and complete installation for Work shall be as recommended by roofing manufacturer and eave protection manufacturer.

PART 3 - EXECUTION

3.3 INSTALLATION OF PROTECTION MEMBRANE

A. Preparation:

1. New substrate: Remove all dust, dirt, loose nails and other protrusions from the deck/sheathing.

2. Concrete substrate: Prime surfaces with manufacturer’s recommended water-based primer.

B. General: Apply protection membrane in accordance with manufacturer's instructions, starting application at low point and working upwards. At ridges and valley, start a center and work outwards. Lap sides a minimum of 3-1/2 inches (90 mm) and lap ends 6 inches (150 mm).

1. Extend eave protection membrane minimum of 6 feet up-slope beyond interior face of exterior wall, or extending minimum 6 feet from eave line, whichever is greater.
2. At valleys, install protection membrane using 6 feet width sheets centered on valley center line.
3. At ridges, install protection membrane using cut 18 inch width sheets centered on peak.

3.4 INSTALLATION OF UNDERLAYMENT

A. Place on ply of underlayment over area not protected by eave protection, with ends and edges weather lapped a minimum of 4 inches. Stagger end laps of each consecutive layer. Nail in place.

B. Install protective underlayment perpendicular to slope of roof and weather lap a minimum of 4 inches over eave protection.

C. Weather lap and seal watertight with plastic cement, items projecting through or mounted on roof.

3.5 INSTALLATION OF METAL FLASHING

A. Weather lap joints a minimum of 2 inches and seal weather tight with plastic cement.

B. Secure flange with nails spaced 6 inches on center, conceal fastenings.

C. Flash and seal work projecting through or mounted on roofing with plastic cement, weather tight.

3.6 INSTALLATION OF RIDGE VENT

A. Cut slotted opening in roof sheathing at peak, 1-1/2 inches wide (3/4 inch wide on both sides of peak). Slot shall be continuous to gable ends, maintaining a minimum of 12 inches of sheathing at gable ends.

B. Install ridge vent continuous along ridges indicated, in accordance with manufacturer's instructions. Mitre joints in vents at intersecting ridges, for continuous visual line. Top ridge vent with cap roofing. Secure ridge vents using minimum 2-1/2 inch length roofing nails, nailing through baffle. Provide not less than 4 nails per ridge vent unit, one per corner.

3.7 INSTALLATION OF ASPHALT SHINGLES

A. General: Install shingles in accordance with manufacturer's written instructions and NRCA - Steep Roofing Manual, latest edition.

B. Install shingles over building felt, with 5 inch exposure and 2 inch headlap. Provide 4 nails per shingle, nails shall be 3/4 inch length so as not to protrude through roof sheathing.

1. Install manufacturer's standard starter strip.
2. Place shingles in straight coursing pattern.
3. Project first course of shingles 3/4 inch beyond fascia boards.
4. Install rain diverters above all doors and walkways.
5. Coordinate installation of roof mounted components or work projecting through roof with weather tight placement of counter flashings.
6. Install ridge cap shingles over ridge vent as recommended by vent manufacturer, and trim shingles flush with edge of vent.
7. Install closed cut shingle at valleys, weaving of shingles will not be permitted.
8. Ensure roofing shingles cover protection membrane at valleys; protection membrane is not a permanent weathering surface.
9. Complete installation to provide weather tight service.

END OF SECTION 07 31 13

SECTION 07 46 23
WOOD SIDING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install:

1. Factory primed clapboard siding.
2. Air infiltration barrier.

1.4 QUALITY ASSURANCE

A. Discard lengths of material which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements, or which are of defective manufacture with respect to surfaces, sizes or patterns.

1.5 FIELD SAMPLES

A. Provide field sample panel for illustrating applied finishes on wood clapboards.

1. Fabricate panel from 3/4 inch plywood; mount clapboard on one side and trim on two edges with 1 by 4 inch #2 common pine.
2. Application of final finishes shall be performed under Section 09 91 00 - PAINTING.

1.7 WARRANTY

A. Deliver to the Owner upon completion of the work of this Section, an unconditional warranty or bond on the work of this Section, agreeing to remove defective stain and primer on new clapboards and composition board siding, as defined below, to prepare and repaint same defective areas. This warranty shall include all labor and materials to correct such defective work for a period of not less than 3 years from Date of Substantial Completion.

1. Provide 10 year primer and finish manufacturer's warranty. Warranty shall include replacement materials required due to failure of applied stain and primer in the form of cracking, peeling or blistering.

PART 2 - PRODUCTS

2.1 SIDING

A. Clapboards: Plain bevel siding, nominal 1/2 by 6 inch, Western Red Cedar, vertical grain WWPA "Grade A", Factory primed.

1. Moisture content: Wood clapboards shall have a moisture content between 9 to 14 percent, when delivered. Test at least 10 percent of stock and take average; average moisture content cannot exceed 12 percent.

2. Clapboards shall be factory (shop) primed, machine applied, equal to Cabot Factory Finish™ Alkyd Primer #1573 White, #1572 Gray and #1575 Neutral (color appropriate to final finish custom color selected by Architect).
    a. Acceptable manufacturers for this are listed below. Substitutions will only be considered if they can provide equal performance warranty to the following manufacturers. Priming shall be performed strictly by manufacturer's trained, authorized and licensed applicators only.
        1) (Olympic Stain) PPG Architectural Finishes, Inc., Bellevue WA.
        2) Samuel Cabot, Inc., Newburyport MA.

2.2 ACCESSORIES

A. Air infiltration barrier: Vapor permeable, water-resistant, spun bonded polyethylene fabric, 6 mils thick, equal to Tyvek Commercialwrap as manufactured by Dupont.

B. Building Paper: ASTM D226, No. 15 perforated asphalt saturated felt.

C. Nails: 7d stainless steel or high tensile strength aluminum nails. Staples or steel nails may not be used.

2.3 FACTORY PRIME FINISHING

A. Surface Preparation:
1. Apply to dry surfaces.
    a. Do not apply over wood with a moisture content exceeding 15 percent. Test using an electronic moisture meter within 24 hours of first application.
2. Prepare substrate in accordance with Manufacturer's printed instructions.
3. Remove dirt, dust, and other foreign matter.
4. Spot clean wood blemishes.

B. Application
1. Seal knots, pitch streaks and sappy sections with a high-quality knot sealer.
2. Allow sealer to dry prior to application of prime coat.
3. Machine apply (factory coat under controlled environment conditions by a modified vacuum coat method) one coat of primer in strict accordance with Manufacturer's application instructions.
    a. Allow at least two hours drying time between acrylic primer and additional coats.
    b. Allow at least 48 hours drying time between oil-based primer and additional coats.

PART 3 - EXECUTION

3.3 INSTALLATION

A. Examine sheathing, do not install clapboards if sheathing is wet. Allow sheathing to thoroughly dry before installing clapboards.

B. Install clapboards with evenly spaced weather exposure of 4 inches. Double clapboards at first course above foundation.

1. Make all joints tight.
2. Scribe and cut work to fit adjoining work closely. Refinish cut surfaces in prefinished items.
3. Except where abutting trim, Vertical joints in any given course shall not be less than 1-1/2 inches away from vertical joints above and below.

C. Install clapboards with specified nails by hand; use of pneumatic nailers is prohibited. In general, nail each board independently, do not nail through two overlapping pieces of siding. Nail through siding into plywood sheathing with a maximum spacing of 24 inches on center. Nails shall be driven flush and snug, but not so that the nail head crushes or splits the wood. Predrill holes for nails near ends of boards.

END OF SECTION 07 46 23

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SECTION 07 53 23
LOW SLOPE ROOFING
(FILED SUB-BID REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.2 SUMMARY

A. Furnish and install the following:

1. Pressure preservative treated solid wood and plywood blocking required for all work of this Filed-Sub-bid 07 00 02.
2. Ethylene propylene diene monomer (EPDM) single ply membrane roofing system.
3. Tapered and flat insulation beneath the roofing work of this Section.
4. Vapor barrier beneath roofing insulation.
5. Overlayment board above insulation.
6. Thermal barrier below insulation.
7. Flashing at all penetrations through the roofing system and at all materials which abut roofing system.
8. Walkway pads leading from roof access point to each rooftop mechanical unit and at work areas surrounding rooftop units.
9. Splash pads for downspouts from high roof.

B. Provide field testing of fasteners.

C. Provide Infrared survey of completed roof assembly, performed by independent third party testing agency hired by the Contractor.

D. Provide manufacturer's pre-construction and final inspection as specified herein. These inspections are to be included in the base bid; additional inspections, or work incurred as a result of the final inspection shall be without additional cost to the Owner.

1. Work of this Section additional includes providing Owner assistance in the preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended insurance coverage of roofing and associated work.

1.7 QUALIFICATIONS

A. Roofing manufacturer, with a minimum of 10 years documented experience demonstrating previously successful work of the type specified herein.

B. Roofing Subcontractor/installer's supervisor/foreman: minimum of 5 years documented experience of the type specified herein, and trained by product manufacturer.

1. Installer to maintain a full-time supervisor/foreman on the job site for all phases of roofing work and at all times when roofing work is in progress.

1.8 QUALITY ASSURANCE

A. Single source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of roofing system membrane.

1. All roofing materials shall be provided and approved by the roof system manufacturer. Any materials not manufactured or provided by manufacturer shall have written approval from the manufacturer stating the materials are acceptable and are compatible with the other materials and systems required.

B. Manufacturer's On-site Inspections: Make arrangements to have Manufacturer's representative (employed by manufacturer) be present on-site during the Work of this Section at key points at no additional cost to the Owner, which include, but are not limited to:

1. Pre-installation conference.
2. Review of installation procedures (a minimum of 2 site visits are required).
3. Final inspection at the completion of the project to insure, that the project has been completed in accordance with the manufacturer's requirements. Upon approval and acceptance of the project, then a manufacturer's warranty certification shall be written, executed and furnished to the Owner.

C. Submit Manufacturer's field quality control reports of field inspections, including, revised "as-built" shop drawings and manufacturer's final punch list.

D. UL listing: Provide labeled materials which have been tested and listed by UL in "Building Materials Directory" for application indicated, with "Class A" rated materials/system for roof slopes shown.

E. Fire performance characteristics: Provide insulation materials which are identical to those whose fire performance characteristics, as listed for each material or assembly of which insulation is a part, have been determined by testing, per methods indicated below, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction:

F. The roof system manufacturer's Technical Specifications shall be considered a part of this specification and should be used as a reference for specific application procedures and recommendations. Where a conflict does exist between the manufacturer's written specifications and those procedures specified in this Section, the more stringent requirements meeting the Manufacturer's minimum requirements for the provided warranty shall apply.

1. Roofing subcontractor shall provide at no additional cost to this contract, all additional labor and materials to conform to manufacturer's required installation procedures which are necessary to provide a total roofing system which is in full compliance with manufacturer's warranty requirements, including additional materials, installation procedures, manufacturer's inspections, sample testing and other requirements.
2. Maintain clean and easily accessible copy of the roof system manufacturer's Technical Specifications on-site at all times during roofing work.

1.11 WARRANTY

A. Deliver to the Owner upon completion of the work of this Section, an unconditional warranty, on the work of this Section agreeing to promptly repair the roofing as necessary to prevent penetration of water through it.

1. Warranty shall cover product quality, performance, and workmanship for a period of 30 years.
2. Warranty shall cover total roofing system including membrane, insulation, adhesives, sealant, fasteners, membrane flashings, and other materials furnished and installed under this Section.
3. Warranty shall provide coverage for uplift created by maximum wind speed of 100 miles per hour (measured 10 meters above grade).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Carlisle Syntec, Carlisle PA.
2. Firestone Building Products Co., LLC, Indianapolis, IN.
3. Johns Manville Roofing Systems, Denver, CO.
4. Mule-Hide Products Company, Inc., Beloit WI.

2.2 SYSTEM DESCRIPTION

A. Fully adhered Ethylene propylene diene monomer (EPDM) roofing system, including insulation and substrate, shall meet Underwriters Laboratories, Inc. Fire Hazard Classification “Class A” roof.

B. Mechanically attached Ethylene Propylene Diene Monomer (EPDM) roofing system, including insulation and substrate, shall meet Underwriters Laboratories, Inc. Fire Hazard Classification “Class A” roof.

C. Performance Requirements

1. Wind Loading: Panels and installation shall be designed to conform to Massachusetts State Building Code, Ninth Edition, (780 CMR 1609) for basic wind speed requirements (3 second gust).
   a. Additional Wind Uplift Performance Requirements: Design and construct roofing to in accordance with requirements of FM 1-28 for Roof System Approval Rating of FM 1-90.
2. Above-deck roof components shall be designed and installed in accordance with requirements of FM 1-29 for performance requirements specified above.

D. Regulatory Requirements

1. Roofing system, including insulation and substrate, shall meet Underwriters Laboratories, Inc. Fire Hazard Classification “Class A” roof.
2. Refer to applicable building codes for roofing system installation requirements and limitations. When a conflict exists, the more restrictive document will govern.

2.3 ROOFING MATERIALS

A. EPDM membrane: Ethylene propylene diene monomers formed into uniform, flexible sheets, complying with ASTM D4637, with a nominal thickness of 60 mils.

B. Sheet seaming system: Manufacturer's standard materials for sealing lapped joints, including edge sealer to cover exposed spliced edges.

C. Cant strips, tapered edge strips and flashing accessories: Types recommended by manufacturer of EPDM material, provided at locations indicated and at locations recommended by manufacturer, including adhesive tapes, flashing cements, and sealant.

D. Flashing material: Manufacturer's standard system compatible with flexible sheet membrane.

E. Membrane adhesive: As recommended by EPDM membrane manufacturer for particular substrate and project conditions, formulated to withstand min. 60 psf uplift force.

2.4 INSULATION MATERIALS

A. General: Insulation shall be approved by the roof manufacturer, and shall be UL listed and FM approved.

1. Roof insulation is included as a system component under the specified “Total System” warranty and therefore shall either be furnished by the roofing manufacturer or be otherwise in compliance with the requirements of the roof system warranty

B. Acceptable manufacturers: Subject to acceptance of roofing manufacturer and the following specification requirements:

1. Atlas Roofing Corporation, Atlanta, GA.
2. The Dow Chemical Co., Midland, MI.
3. Hunter Panels, Portland ME.
4. Johns Manville Roofing System, Denver, CO.
5. Carlisle Syntec, Carlisle PA.
6. Firestone Building Products Co., LLC, Indianapolis, IN.

C. Polyisocyanurate foam insulation manufactured with HCFC-free blowing agent and bonded to glass fiber reinforced facers on top and bottom surfaces during the manufacturing process. Insulation shall conform to property requirements of ASTM C1289, Type II.

1. Long Term Thermal Resistance (LTTR) R-value per inch (as determined by ASTM C1289-14a, or later): R = 5.6 per inch.
2. Thickness as indicated on Drawings.
3. Density: 2.0 pounds per cubic foot (ASTM D-1622).
4. Compressive strength: 20 psi (ASTM D1621).
5. Moisture vapor transmission: Less than 1 perm (ASTM E-96).
6. Water absorption: Less than 1 percent per volume (ASTM C209).

7. Provide factory-tapered insulation system as required to meet elevations and slopes shown on drawings or as required by membrane manufacturer, which ever is more stringent. Provide cants and crickets at drains as necessary.

D. Overlayment (recovery) board: 1/2 inch thick complying with ASTM C 1177 and FM 4450, Class I, non structural glass mat faced, noncombustable, water-resistant treated gypsum core panel.

1. Acceptable manufacturers and products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

a. CertainTeed Corporation, Valley Forge PA., product: “GlasRoc Roof Board”

b. Georgia-Pacific Building Products, Atlanta, GA, product: “DensDeck Prime Roof Board”.

c. United States Gypsum Company, Chicago, IL, product: “Securock Glass-Mat Roof Board”.

E. Thermal barrier: 4 by 4 foot, by 1/2 inch thick, square edged, nonstructural, glass mat faced panel with water-resistant core complying with ASTM C1177 and FM 4450 for Class 1 insulated steel roof decks.

1. Georgia-Pacific Corporation (G-P), product Dens-Deck Roof Guard.

2.5 WOOD BLOCKING AND NAILER MATERIALS

A. Pressure preservative treated solid lumber for blocking, nailers and curbs as indicated or required: Hem Fir, Douglas Fir, Eastern Spruce, Eastern Hemlock, or Southern Pine, surfaced dried stud or utility grade. Wood members shall be of sizes indicated on the Drawings or of the same size as the members being braced.

1. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

B. Pressure preservative treated plywood for unspecified exterior applications (including plywood blocking, nailers, and backing for roofing and flashing work) : APA graded B-C, Exposure 1, EXT, Group 1 species, 5 ply/5 layer plywood, touch-sanded, thickness as indicated on approved shop drawings.

C. Pressure Preservative Treatment (PT):

1. General: Treated wood products shall be produced by a single treatment plant, fully licensed by the chemical manufacturers, and conforming to the requirements specified herein.

a. Toxicity and Environmental Quality:

1) Products containing chromium will not be permitted.

2) Products containing arsenic will not be permitted.

b. Kiln dry all treated lumber and plywood to the following maximum moisture content after treatment.

1) Lumber: 19 percent.

2) Plywood 15 percent.

3) Discard pieces with defects which might impair quality of work.

c. Quality marks: Each piece of lumber and plywood shall be permanently affixed with a quality mark, containing the following information:
   1) Identification of the inspection agency.
   2) Standard to which material was treated.
   3) Identification of the treating plant.
   4) Preservative treated wood shall include: Retention and end use for which product is suitable.

2. Pressure preservative treated wood. Designated as “PT”
   a. Chemical Manufacturer: Subject to compliance with the requirements specified herein, Products which may be incorporated in the work include:
      1) Osmose, Inc., Griffin GA., product “NatureWood”.
      2) Universal Forest Products, Inc., Grand Rapids MI., product “ProWood ACQ”.
      3) Viance, LLC., Charlotte, NC., product “Preserve”
   b. Treatment: Ammoniacal Copper Quaternary Compound (ACQ), arsenic-free and chromium-free chemical “ACQ Preservative” in accordance with AWPA Standards. Apply the preservative in a closed cylinder by pressure process in accordance with AWPA Standard C15.
      1) Minimum preservative retention for floor plates, framing, lumber and plywood above ground use: 0.25 pounds per cubic foot (4.0 kg/m^3) of ACQ chemical, in accordance with AWPA UC1, UC2, UC3A, and UC3B, or NER-643 as appropriate.
      2) Minimum preservative retention for framing, lumber and plywood in contact with water, ground, concrete and masonry: 0.40 pounds per cubic foot (6.4 kg/m^3) of ACQ chemical, in accordance with AWPA UC4A, UC4B, UC4C, or NER-643 as appropriate.
      3) Minimum preservative retention for lumber and plywood in permanent wood foundations: 0.60 pounds per cubic foot (9.6 kg/m^3) of ACQ chemical, in accordance with AWPA UC4B, or NER-643.
   c. Fixation of Chemical: Treated wood shall not be shipped from treatment plant until fixation of the preservative has occurred in the wood.

2.6 ACCESSORIES

A. Vapor Barrier: Polymeric air/vapor barrier membrane protected by release paper on cross-laminated polyethylene carrier film with exposed polymeric membrane strips on both sides protected by pull-off release strips.
   1. Water Vapor Permeance (free film), ASTM E 96, Procedure B: 0.035 Perms.
   2. Acceptable products include the following or approved equal:
      a. Carlisle Syntec, product: 725TR vapor retarder.
      b. Firestone, products “V-force” membrane.
      c. Johns-Manville, Denver Co., product “”JM Vapor Barrier SA.”
      d. Substitutions: Roofing manufacturer’s proprietary vapor barriers will be considered as acceptable alternative.

B. Bonding adhesive shall be as recommended by manufacturer. Adhesive shall be compatible with all materials to which the elastomeric membrane is to be bonded.

C. Splicing cement and inseam sealant shall be as recommended by membrane manufacturer.

D. Lap sealant for sealing the exposed edge of the splices shall be trowel on gun consistency as recommended by membrane manufacturer.

E. Water cutoff mastic shall be as recommended by membrane manufacturer.

F. Night sealer shall be as recommended by membrane manufacturer.

G. Pourable sealer for penetration pockets, preparation of decking and wall substrates shall be as recommended by membrane manufacturer.

H. Prefabricated elastomeric accessories (pipe seals, inside and outside comers) shall be as manufactured and recommended by membrane manufacturer.

I. Walkway pads: Manufacturer's standard 3/8 inch thick black molded rubber walkway pad with factory rounded corners, nominally sized 30 by 30 inches.

J. Termination bars: Minimum 1/8 inch thick extruded aluminum, of channel profile with 1/4-inch legs and minimum 1 inch width. Termination bar shall be factory punched to accept fasteners 4 inches on-center. Install with stainless steel screw fasteners.

K. Fasteners: Austenitic stainless steel or steel fastener with fluorocarbon coating. Minimum thread diameter 0.22 inches and minimum shank diameter of 0.172 inches. The fastener must have 11 threads per inch and a 30° spade.

L. Miscellaneous materials: Best grade or quality approved by the roofing manufacturer for the specific application.

PART 3 - EXECUTION

3.4 INSTALLATION - GENERAL

A. The entire work of this Section shall be performed in accordance with the best standards of practice relating to trades involved.

B. Follow local, state and federal regulations, safety standards and codes. When a conflict exists, the more restrictive document shall govern.

C. Follow insurance underwriter's requirements acceptable for use with specified products or systems.

D. Review all special conditions, such as at projections, at connections to sheet metal gravel stops, flashings with the Roofing Manufacturer, submit the Roofing Manufacturer's recommendations and details to the Engineer for approval.

E. Special Cautions:

1. Do not use oil-based or plastic roof cement.
2. Do not subject elastomeric materials to contact with petroleum, grease, oil, solvents, vegetable or mineral oil, nor animal fat. Prevent contact with hot pipes, and ducts.

3. Cements and bonding adhesive contain petroleum distillates and are extremely volatile and flammable. Avoid breathing vapors and do not use near fire or flame.
4. Ensure that splicing and bonding surfaces are dry during installation.

End of Section

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM
(FILED SUB-BID REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.2 SUMMARY

A. Furnish and install the following:

1. Aluminum flashings and running sheet metal work.
2. Cap flashings and edge metal conditions, except where provided under Section 04 20 00 – UNIT MASONRY at new masonry work.
3. Formed aluminum brake-metal work.
4. Sealant in conjunction with sheet metal work specified herein.

1.7 QUALITY ASSURANCE

A. Company specializing in fabrication and installation of sheet metal flashing work with minimum 5 years documented experience.

B. Flashing and sheet metal applicator, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

1.9 WARRANTY

A. Provide the following warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

1.10 EXTRA MATERIALS

A. Provide sufficient quantity of each color finish coat material, for field touch-up work after erection, and pack the additional coating materials with the components to be furnished hereunder.

B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum flashing: FS QQ-A-250d sheet aluminum, PVDF finish, having a minimum thickness as specified herein below, for applications where indicated:

1. Exposed to weather flashings, downspouts, straps, and trim: 0.050 inch thick

B. Cap flashings: Factory fabricated, two piece cap flashings fabricated from 0.040 inch thick aluminum, mill finished.

1. Acceptable Manufacturers/Products: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. Litsco (Long Island Tinsmith Supply Corp.), Glendale NY, product: "Lit-Lok". (Basis of Design).
   b. Keystone Flashing Company Inc., Philadelphia, PA, product: "Two piece cap flashing".
   c. Fry Reglet Corp., Alpharetta GA, product "Springlok."

2.2 FINISHES

A. Shop-applied, fully oven cured Polyvinylidene Flouride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 1.6 mils and conforming to AAMA 2605, NAAMM - Metal Finishes Manual, and the following:
   1. Resin base of 70 percent PVDF by weight.
   2. Surface Preparation: Properly clean metal substrate with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating.
   3. Primer: Corrosion resistant, polyvinylidene flouride based primer compatible with finish coating, averaging 0.8 mils dry film thickness on exterior and interior surface of panels.
   4. Finish Coat: Polyvinylidene flouride enamel 0.8 mils dry film thickness on exterior side of panels.

B. Color: Match Garland Company "Dark Sage CR".

2.3 ACCESSORIES

A. Flashing cement: Trowel grade, composed of selected asphalt, solvents, and non-asbestos fillers, conforming to FS SS-C-153 Type 1, ASTM D 2822, Type 1 and ASTM D 4586, Type 1 (Non-asbestos) as manufactured by Karnak Chemical Corporation, product Nº. 19 "Flashing Cement", or equal as manufactured by Koch Materials Company, J & P Petroleum Products Company or other approved manufacturer.

B. Dampproofing mastic: Trowel grade, self-priming type composed of selected asphalt, solvents, fibers and non-asbestos fillers, conforming to ASTM D 2822, Type 1 and ASTM D 4586, Type 1 (Non-asbestos) as manufactured by Karnak Chemical Corporation, product Nº. 86 "Fibrated Trowel Mastic", or equal as manufactured by Koch Materials Company, J & P Petroleum Products Company or other approved manufacturer.

C. Nails shall not be smaller than Nº.2 of 12 stub gauge (1.109 inches), with large flat heads, and of sufficient length to penetrate the wood nailers a minimum of 7/8-inch. Nails shall be stainless steel.

D. Screws: Stainless steel wood screws, of sizes most appropriate for the specific application, and equipped with soft neoprene washers.

E. Joint Sealer Type SE (Silicone, Exterior construction): One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, FS TT-S-001543A, Type, Class A with a minimum movement capability of +100 percent and -50 percent, equal to the following:

1. Dow Corning, product, “790”.
2. GE Silicones, product, “SCS9000 SilPruf NB”.
3. Sika, product “Sika Sil-C 990”.
4. Tremco, product “Spectrem 1”.

F. Sealant Accessories:

1. Compressible joint bead back-up: Compressible closed cell polyethylene, extruded polyolefin or polyurethane foam rod complying with ASTM C 1330, Type C, 1/3 greater in diameter than width of joint. Shape and size of compressible back-up shall be as recommended by manufacturer for the specific condition used. Provide one of the following, or equal.
   a. Nomaco, Inc., Zebulon, NC, product “Green Rod”.
   b. Industrial Thermo Polymers Ltd., Brampton, Ontario CN, product “ITP Standard Backer Rod”.
   c. BASF Sonneborn Building Products Inc., Minneapolis MN, product "Sonolastic Closed Cell Backer Rod".
   d. W.R. Meadows Inc., Hampshire, IL, product “Sealtight Kool-Rod”.
2. Primers: Furnish and install joint primers of the types, and to the extent, recommended by the respective sealant manufacturers for the specific joint materials and joint function.

G. Bond-breaker tape, and temporary masking tape: Of types as recommended by the manufacturer of the specific sealant and caulking material used at each application, and completely free from contaminants which would adversely affect the sealant and caulking materials.

H. Plastic cement as recommended by roofing manufacturer and eave protection manufacturer.

2.4 FLASHING FABRICATION - GENERAL

A. Form flashings as required, or to profiles indicated on the Drawings, to protect materials from physical damage and shed water.

B. Form sections square and accurate to profile, in maximum possible lengths, free from distortion or defects detrimental to appearance or performance. To the greatest extent applicable, fabricate sheet metal components in shop, and thoroughly clean all joints on both sides of the sheet metal work.

C. Fabricate cleats and starter strips of same material as sheet.

D. Form pieces in longest practical lengths, with flat lock seams. Hem exposed edges on underside 1/4 inch, miter and seam corners.

E. Fabricate corners from one piece with minimum 18 inch long legs, solder for rigidity, seal with sealant.

PART 3 - EXECUTION

3.3 FLASHING INSTALLATION - GENERAL

A. Except as otherwise shown on the reviewed shop drawings or specified herein, the workmanship of sheet metal work, method for forming joints anchoring, cleating, provisions for thermal movement, shall conform to the standard details and recommendations of the sheet metal producer and those of producer organizations and research institutions and associations concerning the sheet metal used, in addition to the standards and details set forth in the referenced materials specified this Section.

B. Face nailing will not be permitted, concealed cleating or other concealed method must be used to attach sheet metal work to structure.

C. Ensure that fastenings do not exceed 8 inches on centers. Use flat head fasteners throughout, and seal all fastener heads after installation thereof.

D. Fill all slip joints and overlapping surfaces in the assembly with specified sealant material, removing all excess sealant material from the prefinished surfaces immediately, to prevent staining the finish.

3.4 INSTALLATION - CAP FLASHINGS

A. Provide cap flashing in connection with all base flashings.

1. At new masonry Cap flashings are provided under Section 04 20 00 – Unit Masonry.

B. Install sealant and backing materials using type “SE” sealant (specified herein).

END OF SECTION 07 62 00

Section 07 71 00

ROOF ACCESSORIES
(FILED SUB-BID REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Filed Sub-Bid Requirements: As provided under Section 07 00 02 - ROOFING AND FLASHING FILED SUB-BID REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.

1. Work of this Filed Sub-Bid includes all individual specification sections listed in Section 07 00 02.

1.2 SUMMARY

A. The work of this Section consists of pre-fabricated and pre-finished metal roof specialties where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Factory fabricated and finished roof edging, including sumps, conductor heads, and downspouts.
2. Factory fabricated and finished parapet coping.
3. Cap flashings, in conjunction with roofing system sheet membrane base flashings.
4. Snow guards.
5. Sealant in conjunction with sheet metal work specified herein.

1.7 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Company specializing in fabrication and installation of sheet metal flashing work with minimum 5 years documented experience.

C. Qualifications:

1. Flashing and sheet metal applicator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.

D. Factory fabricated roof edge shall be certified by roof edge manufacturer to meet the following design criteria:

1. SPRI Test Method RE-1 Test for Roof Edge Termination of Single-ply Roofing Membranes: The fascia system shall be tested to secure the membrane to

minimum 100 lbs/ft in accord with SPRI Test Method RE-1. Use current edition of 'Wind Resistance Guide for Edge Systems Used with Low Slope Roofing Systems'.

2. SPRI Test Method RE-2 Pull-Off Test for Fascia: The fascia system shall be tested in accord with SPRI Test Method RE-2. Use current edition of 'Wind Resistance Guide for Edge Systems Used with Low Slope Roofing Systems'.
3. FMRC Loss Prevention Data Sheet 1-49 "Perimeter Flashing". The fascia product shall be listed in current Factory Mutual Research Corporation "Approval Guide for Zone 1 - 60 PSF uplift.

1.10 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 39 - CLOSEOUT SUBMITTALS.

B. Manufacturer Warranty:

1. Furnish 15 year warranty for fascia edging. Warranty shall include the replacement of gravel stop due to blow-off, leakage or membrane failure due to any form of weather with wind conditions up to 110 miles per hour.
2. Furnish manufacturer's 20 year coating warranty for custom colors, covering film integrity, chalk resistance and color change, assigned to project. Warranty shall be pro-rated after 10 years.

1.11 EXTRA MATERIALS

A. Provide sufficient quantity of each color finish coat material, for field touch-up work after erection, and pack the additional coating materials with the components to be furnished hereunder.

B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Manufacturers and products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work are limited to the following:

1. Sika Sanarfil Corporation, Canton MA, Product: "Edge-Tite Fascia".
2. W.P. Hickman Company, Asheville NC, Product: "Econosnap".
3. Peterson Aluminum, Elk Grove Village IL, Product: "Pac-1-Ply Gravel Stop".
4. Metal ERA, Waukesha WI, Product: "Anchor-Tite AF".
5. Firestone Building Products, Wausheka, WI, Product: "AnchorGard SP Fascia".

2.2 FACTORY FABRICATED FASCIA TRIM/ROOF EDGE

A. Manufacturers and products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work are limited to the following:

1. Sika Sanarfil Corporation, Canton MA, product "Edge-Tite Fascia".
2. Firestone Building Products, Wausheka, WI, Product "AnchorGard SP/Fascia.
3. Metal ERA, Waukesha WI, Product: "Anchor-Tite AF".

B. Fascia trim/ roof edge: Multi-component aluminum system, Factory Mutual Inc. certified Class I-90, and shall conform to the following additional requirements:

1. Performance characteristics:
   a. Fascia shall freely thermal cycle on extruded bar substrate.
2. Fascia trim, nominal 8.5 inch height, formed aluminum alloy 6063, temper T5 0.050 inch thick, 12 feet 0 inches lengths.
3. Fascia corners: Factory fabricated, welded fascia, shop finished to exactly match running fascia. Minimum leg length 12 inches.
4. Extruded bar: Shall be continuous 6063-T6 alloy aluminum at 12 feet 0 inches standard lengths with pre-punched slotted holes.
5. Fascia trim/scupper assembly: Downspout scupper flat extended fascia type fabricated from 0.050 inch thick aluminum as fabricated by the manufacturer and finished to match the roof edge.
   a. Downspout scupper flat type near stair penthouse door C400.
   b. Spillout scupper tapered type at door B163A and B170C roof canopies

C. Fasteners: As recommended by fascia manufacturer for particular substrate encountered. No exposed fasteners permitted.

D. Finish, exposed aluminum:

1. Polyvinylidene Fluoride (PVDF), Kynar 500 shop applied three coat resin based, high performance thermoplastic organic coating in custom non-standard metallic finish color to match Architect's sample, conforming to AAMA 605.2, NAAMM - Metal Finishes Manual, and the following:
   a. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".
   b. Finish Coating shall be manufactured as one of the following products:
      1) Glidden Company; product "Visulure".
      2) Morton International; product "Fluoroceram CL".
      3) P.P.G. Industries Inc.; product "Duranar XL".
      4) Valspar Corp., product: "Flurothane".
   c. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.

d. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.

e. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.

f. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.

g. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness.

2.3 FACTORY FABRICATED PARAPET COPING

A. Manufacturers and products: Subject to compliance with the requirements specified herein, products which may be incorporated in the work are limited to the following:

1. W.P. Hickman Company, Asheville NC., Product: "Permasnap" Parapet Wall Coping, Product PC1600.
2. Peterson Aluminum, Elk Grove Village IL., Product: "Pac-Loc Coping".
3. Metal ERA, Waukesha WI., Product: "Anchor-Tite Coping".
4. Firestone Building Products, Product: "Firestone Coping System".

B. Parapet: Multi-component aluminum cant dam system, Factory Mutual Inc. certified Class I-90, and shall conform to the following additional requirements:

1. Performance characteristics:
   a. Edging shall lock membrane, preventing wind pullback.
   b. Fascia shall freely thermal cycle on spring cant substrate.
   c. Fascia may be factory modified for true radius application.
   d. Fabricate assembly such that the fascia may be field installed without fastener penetration of roofing membrane.
2. Coping cap, nominal 4 inch height, formed aluminum alloy 6063, temper T5 0.050 inch thick.
3. Corners: Factory fabricated mitered and welded, shop finished to exactly match running cap trim. Minimum leg length 24 inches.
4. Cant waterdam: G90 galvanized steel, minimum 24 gage, 10'-0" lengths.
   a. Provide galvanized fasteners securing cant dam in place, spaced not greater than 24 inches on center on back edge, and 12 inches on center on roofing side.

C. Finish, exposed aluminum:

1. Polyvinylidene Fluoride (PVDF), Kynar 500 shop applied three coat resin based, high performance thermoplastic organic coating in custom non-standard color to match Architect's sample, conforming to AAMA 605.2, NAAMM - Metal Finishes Manual, and the following:

a. Resin base of 70 percent PVDF by weight, Atochem North America, Inc., product "Kynar 500" or Ausimont USA. product "Hylar 5000".

b. Finish Coating shall be manufactured as one of the following products:

1) Glidden Company; product "Visulure".

2) Morton International; product "Fluoroceram CL".

3) P.P.G. Industries Inc.; product "Duranar XL".

4) Valspar Corp., product: "Flurothane".

c. Surface Preparation: Properly clean aluminum with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating, in accordance with Aluminum Association method AA-C12C42.

d. Primer: Corrosion resistant, epoxy or urethane based primer compatible with finish coating, averaging 0.2 to 0.3 mils dry film thickness.

e. Barrier Coat: Epoxy-based primer compatible with finish coating, averaging 0.70 to 0.80 mils dry film thickness.

f. Finish Coat (Color Coat): Polyvinylidene fluoride enamel averaging 0.70 to 0.80 mil dry film thickness.

g. Top Coat: Polyvinylidene fluoride enamel clear top coat averaging 0.45 to 0.55 mils dry film thickness.

2.4 SNOW GUARDS (INDIVIDUAL TYPE)

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Snow guards: Zaleski Inc., Model Number 8; as manufactured by Zaleski Inc., 11 Alden Street, New Britain CT. (203) 225-1614.

2.5 ACCESSORIES

A. Sealant in conjunction with metal work: Custom colored sealant, multi-component non-sagging gun-grade polyurethane sealant, conforming to FS TT-S-000227E, Type II, Class A, and ASTM C 920, Type M, Class 25, Grade NS, use NT,M, A and O with a minimum movement capability of ±50 percent, equal to the following:

1. Tremco, product "Dymeric 240 / Dymeric 240FC".

2. Sonneborn, product "Sonolastic NP2".

3. Pecora, product "Dynatrol II".

4. Sika, product "Sikaflex 2CNS".

PART 3 - EXECUTION

3.3 FLASHING INSTALLATION - GENERAL

A. Except as otherwise shown on the reviewed shop drawings or specified herein, the workmanship of sheet metal work, method for forming joints anchoring, cleating, provisions for thermal movement, etc., shall conform to the standard details and

recommendations of the sheet metal producer and those of producer organizations and research institutions and associations concerning the sheet metal used, in addition to the standards and details set forth in the referenced materials specified this Section.

B. Face nailing will not be permitted, concealed cleating or other concealed method must be used to attach sheet metal work to structure.

C. Ensure that fastenings do not exceed 8 inches on centers. Use flat head fasteners throughout, and seal all fastener heads after installation thereof.

D. Fill all slip joints and overlapping surfaces in the assembly with specified sealant material, removing all excess sealant material from the prefinished surfaces immediately, to prevent staining the finish.

3.4 INSTALLATION – ROOF EDGE / FASCIA

A. Coordinate with roofing installer prior to installation. Verify site conditions and manufacturer's roof edging details. Comply with roof edging manufacturer's installation instructions and recommendations.

B. Nail galvanized spring clip in continuous manner to vertical face of wood nailers. Locate fasteners 3/4 inch below roof edge and 12 inches on center using a minimum 1-1/2 inch galvanized roofing nail. Allow 1/4 inch gap between sections of spring clip.

C. Lay roofing membrane over the spring clip allowing it to extend down the face to the drip edge. Locate and hang joint covers at all joints between corners and straight sections.

D. Hook each fascia section over the top of the spring clip and membrane. Press down on the fascia until the drip edge is engage. Allowed 1/8 to 1/4 inch gap for expansion (as recommended by manufacturer).

END OF SECTION 07 71 00

SECTION 07 72 00

ROOF SPECIALTIES
(FILED SUB-BID REQUIRED AS PART OF SECTION 07 00 02)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Sub Bid Requirements: As provided under Section 07 00 02 - ROOFING AND FLASHING FILED SUB-BID REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.

1. Work of this Filed Sub-Bid includes all individual specification sections listed in Section 07 00 02.

1.2 SUMMARY

A. Furnish and install the following:

1. Prefabricated equipment curbing.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with NRCA details.

1.10 WARRANTY

A. Provide 5 year warranty under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS. Warranty shall include repair or replacement of roof accessories which exhibit defects in materials or workmanship. Defects is defined as abnormal aging or deterioration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Prefabricated Curbs:

a. Custom Curb, Inc.

b. The Pate Company

c. S&L Manufacturing

d. ThyBar Corporation, Addision IL.

2.2 PREFABRICATED CURBS

A. Prefabricated support curbs: Provide custom units, fabricated from minimum 14 gage galvanized steel, minimum 3 feet high, sized as necessary To coordinate with elevator vent being supported. Provide units with welded corners and as follows:

1. Curb type: Insulated, double wall, minimum 36 inches high with treated wood nailer at top of entire curb perimeter.
2. Counter-flashing: Provide counter-flashing coordinated with roofing system.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section.

B. Beginning of installation means acceptance of existing site conditions.

3.2 INSTALLATION

A. Perform the installation in strict accordance with the manufacturer's installation specifications. Install units plumb, level in alignment and plane without warp or rack.

3.3 ADJUSTING

A. Test operation of vents and hatches upon completion of the installation. Make any and all adjustments necessary to ensure proper operation.

B. Touch up damaged coatings and finishes.

END OF SECTION 07 72 00

SECTION 07 84 13
PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install fireproof firestopping, firesafing materials, smoke seals and related accessories required for this Project for all penetrations through fire resistance rated construction, including, but not limited to, penetrations for elevators, plumbing, fire suppression, heating, ventilating and air conditioning, electrical systems, and specialized equipment.

1. Fire resistance rated construction requiring firestopping includes, but is not limited to: floors, rated partitions, smoke barriers, smoke partitions, partitions in rated corridors, passageways and stairs, shaft partitions, shaft wall (vertical and horizontal), area separation fire walls, party wall systems, and temporary fire resistant rated partitions and barriers.
2. Provide removable temporary firestopping (pillows) as required to maintain fire integrity prior to Owner's final acceptance, to permit installation of electrical, telephone, data and sound system wiring. Replace temporary firestopping with permanent, after wiring systems are completed.

B. Furnish and install firestopping/smoke seals at construction joints occurring at tops of fire resistance rated partitions, smoke partitions, and temporary partitions between top of partition and underside of deck above.

C. Furnish and install all firestopping, firesafing, and smoke seals at perimeter of floor/roof construction and exterior wall systems, as indicated and where required by applicable codes.

D. Furnish and install all firestopping, firesafing, and smoke seals at expansion joints in chase walls where expansion joints are not exposed to view.

E. Furnish and install all firestopping, firesafing, and smoke seals at masonry partition infills for acoustical sealant.

F. Furnish and install all firestopping, firesafing, and smoke seals where required by applicable codes and as additionally required by authorities having jurisdiction at no additional cost to the Owner.

1.4 PERFORMANCE REQUIREMENTS

A. Provide materials and work to conform to Building Code Requirements in fire resistant wall and floor assemblies.

B. Manufacturer's certified product test requirements:

1. All firestop/smokeseal material shall be tested by a recognized, independent testing agency and shall conform to both Flame (F-rating) and Temperature (T-rating) requirements of ASTM E-814.
2. Conform to UL Fire Hazard Classification Requirements.
3. Tested and classified non-combustible per ASTM E-84.

C. Firestops in place shall be of sufficient thickness, width, and density to provide a fire resistance rating at least equal to the floor, wall, or partition construction into which it is installed.

D. Non-combustible dams shall be constructed:
1. As necessary to achieve fire rating as tested and rated.
2. In conformance with installation requirements for type of floor, wall, and partition construction.
3. As recommended by firestop/smokeseal manufacturer.

E. Combustible damming materials, if used, must be removed after proper curing.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain firestop and smokeseal products from a single manufacturer, except as otherwise approved by Architect.

C. Environmental Requirements for Volatile Chemicals: Use firestopping caulks that comply with the following limits for VOC content:
1. Firestopping caulks: VOC not more than 250 g/L.

D. Special Inspections: Allow for 3 percent of each type of firestopping system to be removed and inspected for conformance with approved submittals.
1. All firestopping shall be inspected prior to installation of suspended ceilings or concealed by other materials.

E. Qualifications:
1. Installer: a specialized subcontractor having not less than 3 years documented experience demonstrating previously successful work of the type specified herein.
   a. The manufacturer of the firestop material shall submit written certification that the firm to be used for the firestop products has been trained in the application of the products by the manufacturer.

1.7 MOCK-UPS

A. Provide mock-ups under provisions of Section 01 45 00 - QUALITY CONTROL for purpose of verifying quality of firestop installation.

B. Provide firestop samples and locate as directed. Accepted samples may remain as part of the work.

1.9 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering similar products include the following, or approved equal:

1. Bio Fireshield (A Division of Rectroseal), Houston TX.
2. Dow Corning Corporation, Midland MI.
3. Hilti, Inc. Tulsa OK.
4. 3M Company, Saint Paul MN.
5. Specified Technologies, Inc., Somerville NJ.
6. Metacaulk, (A Division of Rectroseal), Houston TX.
7. Tremco, Inc., Beachwood OH.

2.2 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire resistance ratings and surface burning characteristics.

B. Obtain certificate of compliance from authority having jurisdiction indicating approval of combustibility.

2.3 MATERIALS

A. Firestop mortar: asbestos free, cementitious mortar, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM/UL1479.

1. Acceptable products, or approved equal:
   a. Bio Fireshield, product “Novasit K-10”.
   b. Specified Technologies, Inc., product “Spec Seal Mortar”.
   c. Tremco Inc., product “Tremstop M”.

B. Silicone Firestop sealant: Single component, non-combustible silicone elastomer firestop sealant, U.L. classified as a "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E-814/UL1479.

1. Acceptable products, or approved equal:

a. Bio Fireshield, product product “Biotherm 100" (Gun Grade) or “Biotherm 200" (Self Leveling).

b. Specified Technologies, Inc., product “Spec Seal Pensil 300 Sealant (gun grade)” or “Spec Seal Pensil 300SL" (Self Leveling).

c. 3M Company, product “Fire Barrier Silicone Sealants”.

d. Tremco Inc., product product “Tremsil" (Gun Grade) or “Tremsil S/L" (Self Leveling).

2. Sealants will not dissolve in water.

C. Intumescent firestop sealant and caulks: Acrylic based, water resistant sealant, which will not re-emulsify after drying.

1. Acceptable products, or approved equal:

a. Bio Fireshield, product “Biostop 500".

b. Specified Technologies, Inc., product “Spec Seal Triple-S Sealant".

c. 3M Company, product “Fire Barrier Caulk CP25WB+".

d. Tremco Inc., product “Tremstop 1A".

D. Firestop putty: sticks or pads.

1. Acceptable products, or approved equal:

a. Bio Fireshield, product “Moldable Putty”.

b. Specified Technologies, Inc., product “Spec Seal Putty Bars and Pads”.

c. 3M Company, product “Fire Barrier Moldable Putty”.

d. Tremco Inc., product “Flowable Putty”.

E. Firestop collars: Pre-manufactured fire protective pipe sleeve, UL classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E-814/UL1479.

1. Provide separated (two piece) firestop collar for application when plastic pipe system is already in place. Provide non-separated firestop collar for application prior to installation of plastic pipe system.

2. Acceptable products, or approved equal:

a. 3M Company, Inc., product “Fireshield Firestop Sleeve”.

b. Specified Technologies, Inc., product “Spec Seal Collars”.

c. 3M Company, product “Fire Barrier PPD’s”.

d. Tremco Inc., product “Fyrecan sleeve”.

F. Firestop pillows: UL Classified as "fill, void, or cavity material" for through penetration firestop system when tested in accordance with ASTM E-814/UL1479.

1. Acceptable products, or approved equal:

a. Bio Fireshield, product “Fireshield Firestop Pillows”.

b. Specified Technologies, Inc., product “Spec Seal Pillows”.

c. Tremco Inc., product “Tremstop P.S”.

G. Wrap strips:

1. Acceptable products, or approved equal:

a. Bio Fireshield, product “FS-195”.

b. Specified Technologies, Inc., product “Spec Seal Wrap Strip”.

c. 3M Company, product “Fire Barrier FS195 Wrap Strip”.

d. Tremco Inc., product “Tremco W.S”.

H. Mineral wool fiber / ceramic wool non-combustible insulation (fire safing): Conforming to ASTM C665, Type 1, ASTM C612, and ASTM C553 with a minimum density of 4 pounds per cubic foot.

1. Flame Spread Classification: Material shall be classified non-combustible per ASTM E-814.

2. Recycled content of slag:: Use maximum available percentage of material (slag). Mineral wool insulation products incorporated into the work shall contain not less than 75 percent of recycled material (slag) by weight.

3. Acceptable products include:

a. Fibrex Insulations Inc. Sarnia Ontario, Canada, product: “Fibrex FBX” Industrial board.

b. Rock Wool Manufacturing Company, Leeds, AL, product: “Delta Safing Mineral Wool”.

c. Roxul, Inc., product “Roxul Safe”.

d. Thermafiber, Inc. product “Safing 4.0 pcf”.

4. Accessories: Provide galvanized steel safing clips as required for installation of insulation.

I. Elastomeric Firestopping: Non halogenated latex based elastomeric coating applied by airless spray.

1. Acceptable products, or approved equal:

a. Specified Technologies, Inc., product “Spec Seal Elastomeric Firestop Spray”.

b. Bio Fireshield (A Division of Rectroseal), product “Flamesafe FS900+”

c. Hilti, Inc., product “CP 601S.”

2.4 ACCESSORIES

A. Forming and damming materials: Mineral fiberboard or other type as recommended by firestopping manufacturer.

B. Primer, sealant and solvents: As recommended by manufacturer.

C. Woven wire mesh: Galvanized 20 gage woven wire mesh “chicken wire” or “poultry fencing”, 1 inch spacing.

PART 3 - EXECUTION

3.3 INSTALLATION

A. General

1. Installation of firestops shall be performed by applicators/installers qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, and manufacturer's recommendations. Meet building code requirements.
3. Coordinate with plumbing, mechanical, electrical, and other trades to assure that all pipe, conduit, cable, and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops. Schedule and sequence the work to assure that partitions and other construction which would conceal penetrations are not erected prior to the installation of firestops.
   a. Ensure that all firestopping is inspected prior to installation of suspended ceilings or concealed by other finished materials.

B. Dam construction

1. Install dams when required to properly contain firestopping materials within openings and as required to achieve required fire resistance rating. Combustible damming material must be removed after appropriate curing. Incombustible damming material may be left as a permanent component of the firestop system.
2. Placement of dams shall not interfere with function or adversely affect the appearance of adjacent construction.

C. Installation of single component silicone firestop

1. Apply with manual or powered caulking gun.
2. Apply minimum 1/2 inch thickness for 2 hour rating. Apply 1/2 inch to both sides of wall penetrations; one side only in floor penetrations.
3. Use incombustible insulation as required to achieve fire resistance rating.
4. Surface of gun grade silicone firestop may be tooled using clean, potable water.
5. Clean excess material off of adjacent surfaces and tools within 10 minutes using either water or Xylol where the use of such would not be hazardous.

D. Installation of cementitious firestop mortar.

1. Add dry powder to water and mix with mechanical mixer or hand mixing tools as recommended by firestop mortar manufacturer. Allow a average mixing

time is 3 minutes and provide a average wet density of 70 pounds per cubic foot, plus or minus 5 PCF.

2. Do not apply if ambient or substrate temperature is less than 35 degrees Fahrenheit during 24 hours after application.
3. Wet all surfaces prior to application of firestop mortar.
4. Mortar may be hand applied or pumped into the opening.
5. Exposed surfaces shall be finished using conventional plastering tools prior to curing.
6. When installation around layered cables, it is recommended to increase the fluidity of the firestop mortar to provide a better fill around the cables. Vibrate or move the cables slightly to prevent voids from forming between the cables.
7. Allow 48 hours for initial cure prior to form removal. For full cure allow 27 days.
8. Wet material may be cleaned with water. Dry material may require scraping or chipping.

E. Installation of firestop collars (plastic pipe only)

1. Firestop collars may be surface mounted to a slab or wall or imbedded in Firestop Mortar to a maximum depth of 2 inches.
2. For wall penetrations with ABS pipe firestop collars must be installed on both sides of the penetration to provide a 2 hour F and T Rating. All other applications required installation on one side only to provide a 2 hour F and T Rating.

F. Firesafing insulation: Install firestopping safing insulation on safing clips spaced as needed between each stud and floor slab, leaving no voids. Secure safing clips to slab using fasteners recommended by insulation manufacturer. Install sealant over mineral wool in accordance with test requirements.

G. Conclusion of work day: Wherever work is performed in areas which abut or are adjacent to Owner occupied areas, at the conclusion of the work day ensure that all penetrations and perimeter construction joints are firestopped and that there are no openings, penetrations or construction joints left unprotected.

3.6 SCHEDULE

A. General: Typical penetrations are indicated below with list of standard firestopping/smokeseal approaches. Actual firestopping materials and combination of materials will vary with size of penetration and with individual firestopping manufacturer's approved UL Design System Requirements. Use only UL Design System materials for each penetration that best matches the wall and floor construction.

1. Where penetrations occur for which no listed UL or WH Design System test exists, obtain from the firestop system manufacturer an engineered system acceptable to the authorities having jurisdiction for firestopping such

penetrations. Engineered system from manufacturer shall include a detail drawing showing the engineered system and shall contain no disclaimers.

B. Single metal pipe (non-insulated) and conduit penetrations through floors:
   1. Firestop mortar.
   2. Silicone Firestop sealant.
   3. Intumescent firestop sealant.
   4. Firestop putty, sticks or pads.
   5. Mineral fiber / ceramic wool non-combustible insulation (fire safing) in conjunction with a firestop sealant.

C. Single metal pipe (non-insulated) and conduit penetrations through walls:
   1. (masonry and concrete walls only) Firestop mortar and putty.
   2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
   3. Intumescent firestop sealant with wrap strips.

D. Multiple metal pipe and conduit penetrations through floors:
   1. Firestop mortar and wrap strips.
   2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

E. Multiple metal pipe and conduit penetrations through walls:
   1. Firestop mortar and putty.
   2. (through masonry walls only) Firestop pillows with woven wire mesh.
   3. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

F. Insulated metal pipe penetrations through floors:
   1. Firestop mortar and wrap strips.
   2. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
   3. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
   4. Silicone Firestop sealant over wrap strip.
   5. Mineral fiber / ceramic wool non-combustible insulation (fire safing) in conjunction with a firestop sealant.

G. Insulated metal pipe penetrations (single and multiple) through walls:
   1. Firestop mortar with wrap strips.
   2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

3. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) and Wrap strips.
4. (multiple penetrations through masonry walls only) Firestop pillows with woven wire mesh.

H. Duct penetrations through floors or walls:
1. Rectangular and square ducts: Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing), and steel flanges provided under Division 15.
2. Round ducts: Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

I. Combustible plastic pipe and conduit penetrations through floors:
1. Firestop mortar with wrap strips.
2. Firestop mortar with firestop putty and firestop collars.
3. Silicone firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
4. Silicone firestop sealant and firestop collars.
5. Intumescent firestop sealant and firestop collars.
6. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) with firestop collars.
7. (maximum pipe size 2 inches) Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) with wrap strips.

J. Combustible plastic pipe and conduit penetrations through walls:
1. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
2. Intumescent firestop sealant with firestop collars.

K. Cable penetrations through floors:
1. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

L. Cable penetrations through walls:
1. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).
3. (single penetrations only) Firestop putty.
4. (electrical boxes) Firestop pads.

5. Firestop putty over mineral fiber / ceramic wool non-combustible insulation (fire safing).

M. Bus ducts through floors:

1. Firestop mortar and wrap strips.
2. Intumescent firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing) and 28 gage (minimum) steel cover plate.

N. Blank openings:

1. Firestop mortar.
2. Silicone Firestop sealant over mineral fiber / ceramic wool non-combustible insulation (fire safing).

O. Fire rated joints:

1. Silicone Firestop sealant over backer rod or bond breaker.

P. Construction joints at head of wall/floor assemblies:

1. Silicone Firestop sealant/mastic over mineral fiber / ceramic wool non-combustible insulation (fire safing).
2. Elastomeric spray over mineral fiber / ceramic wool non-combustible insulation (fire safing).

Q. Smoke barrier sealant for dampers, fire door frames:

1. Silicone Firestop sealant.

R. Temporary sealing of openings and penetrations:

1. Firestop putty, sticks or pads.
2. Firestop pillows.

END OF SECTION 07 84 13

SECTION 07 92 00

JOINT SEALANTS
(FILED SUB-BID REQUIRED AS PART OF SECTION 07 00 01)

PART 1 - GENERAL

1.2 SUMMARY

A. General: The work of this Section consists of sealants and backing materials where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

1. This Section specifies general requirements, definition of joint sealer types, and application requirements for sealant work specified within other individual specification sections.

B. Prepare sealant substrate surfaces.

C. Furnish and install sealant and backing materials.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Provide sealants from a single manufacturer for all work of this Section to the greatest extent possible. Each individual type of sealant installed in the Work shall be from a single manufacturer.

C. Qualifications:

1. Testing Agencies: To qualify for acceptance, an independent testing laboratory must demonstrate to Architect's satisfaction that it has the experience and capability to conduct satisfactory testing indicated without delaying progress of the Work.

D. Preconstruction Compatibility and Adhesion Testing: Submit samples of all materials that will contact or affect joint sealers to joint sealer manufacturers for compatibility and adhesion testing, as indicated below:

1. Use test methods standard with manufacturer to determine if priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealers to joint substrates.

   a. Perform tests under normal environmental conditions that will exist during actual installation.

2. Contractor shall submit for testing, and sealant manufacturer shall test at least 9 pieces of each type of material, including joint substrates, shims, and joint backer rods.

3. Schedule testing so that it does not delay the work.

4. Investigate materials failing these tests and obtain joint sealer manufacturer's written recommendations for corrective measures, including use of specially formulated primers.
5. The Architect may waive part or all of these specific testing requirements if the sealant manufacturer is able to provide written certification, demonstration to the Architect's satisfaction, that sealant and substrates are compatible and that sealant performance and adhesion will not be compromised by project conditions.

E. Product Testing: Provide comprehensive test data for each type of joint sealer based on tests conducted by a qualified independent testing laboratory on current product formulations within 24-month period preceding date of Contractor's submittal of test results to Architect.
1. Test elastomeric sealant for compliance with requirements specified by reference to ASTM C920. Include test results for hardness, stain resistance, adhesion and cohesion under cyclic movement (per ASTM C719), low-temperature flexibility, modulus of elasticity at 100% strain, effects of heat aging, and effects of accelerated weathering.
2. Include test results performed on joint sealers after they have cured 1 year.

F. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:
1. Locate test joints where indicated or, if not indicated, as directed by Architect.
2. Conduct field test for each type of elastomeric sealant and joint substrate indicated.
3. Arrange for tests to take place with both Architect and joint sealer manufacturer's technical representative present.
4. Test Method: Test joint sealers by hand pull method described below:
a. Install joint sealant in 5-feet joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealant to cure fully before testing.
b. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2 inch cuts. Place a mark 1 in. from top of 2 inch piece.
c. Use fingers to grasp 2 inch piece of sealant above 1 in. mark; pull firmly down at 90 degree angle or more while holding a straightedge along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
5. Evaluation of field test results:
a. For sealant evidencing adhesive failure, determine if primer is required. If so, re-test using primer.

b. Sealant not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory.

c. Do not use sealant which fails to adhere to joint substrates during testing.

6. Submit report to Architect with description of test, results, and recommended installation procedures to obtain proper adhesion.

a. Report whether or not sealant in joint connected to pull-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.

1.9 WARRANTY

A. Provide 5 year warranty under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS. Warranty shall include coverage of installed sealant and accessories which fail to achieve air tight and watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturers and Products: To establish a standard of quality, design and function desired, Drawings and specifications have been based on the products specified under this section for each individual sealant type, for the applications scheduled at the end of Section, and as may be additionally identified on the Drawings.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Pecora Corporation, Harleysville PA.
2. Sika Corp, Lyndhurst NJ.
3. Sonneborn Building Products Inc., Minneapolis MN.
4. Tremco, Inc., Beachwood OH.

2.2 SEALANT MATERIALS

A. Sealant Materials, General Requirements:

1. Only use sealant and primers that comply with the following limits for VOC content:

a. Architectural Sealants: 250 g/L.

b. Roofing Sealants: 450 g/L.

c. Roadway Sealants: 250 g/L.

d. Sealant primer: 250 g/L.

2. Sealants containing PCB's, aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds or asbestos are not permitted.

B. Joint Sealer Type AA (Acrylic acoustical): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable.

1. Tremco, product "Acoustical Sealant".
2. USG, product "USG Acoustical Sealant".
3. Pecora, product " AC-20 FTR".

C. Joint Sealer Type AP (Acrylic painters caulk): One component acrylic latex caulking compound, conforming to FS 19-TP-21M and ASTM C 834, paintable within 24 hours after application, with a minimum movement capability of ±12.5 percent, equal to one of the following:

1. Sonneborn, product, "Sonolac".
2. Tremco, product, "Tremflex 834".
3. Bostik, product, "Chem-Calk 600".
4. Pecora, product " AC-20+".

D. Joint Sealer Type HL2 (Horizontal-self-Leveling, 2-component): Pouring grade self-leveling multi-component urethane sealant, conforming to FS TT-S-000227E, Type I, Class A, and ASTM C 920, with a minimum movement capability of ±25 percent, equal to the following:

1. Sika, product, "Sikaflex 2CSL".
2. Sonneborn, product, "SL2".
3. Tremco, product, "THC-900 / THC-901".

E. Joint Sealer Type HT (Horizontal-Trowel): Trowel grade multi-component modified-urethane or neutral-cure silicone paste sealant, conforming to FS TT-S-000227E, Type I, Class A, and ASTM C 920, with a minimum movement capability of ±25 percent, equal to the following:

1. GE silicones, product "Tosseal 811" (silicone).
2. Pecora, product "Dynatred" (urethane).
3. Sika, product "Sikaflex 2CTG" (urethane).
4. Sonneborn, product "SL2 (slope grade)" (urethane).
5. Tremco, product "THC-901" (urethane).

F. Joint Sealer Type SC (Silicone, general construction): One-part medium modulus, natural cure, synthetic sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, use NT, G, A, M, O with a minimum movement capability of ±50 percent, equal to the following:

1. Dow Corning, product, "791".
2. GE Silicones, product, "Silpruf".

3. Pecora, product, “895”.
4. Sika, product, “Sika Sil-C 995”.
5. Sonneborn, product, “Sonolastic - OmniSeal”.
6. Tremco, product, “Spectrem 2”.

G. Joint Sealer Type SE (Silicone, Exterior construction): One-part low modulus, moisture curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 25, FS TT-S-001543A, Type, Class A with a minimum movement capability of +100 percent and -50 percent, equal to the following:

1. Dow Corning, product, “790”.
2. GE Silicones, product, “SCS9000 SilPruf NB”.
3. Sika, product “Sika Sil-C 990”.
4. Tremco, product “Spectrem 1”.

H. Joint Sealer Type SF (Silicone, Food contact): one component silicone rubber, acceptable to local health officials, conforming to U.S. Food and Drug Administration regulation 21 CFR 175.105 and 175.300, FS TT-S-001543A, Type Non-Sag, Class A, and ASTM C 920, Type NS, Class 25, Use NT, G, O and A with a minimum movement capability of ±25 percent, and a Shore A minimum hardness of 20, equal to the following:

1. Dow Corning, product, "732".
2. GE Silicones, product "Series SCS1000".

I. Joint Sealer Type SM (Silicone, Mildew-resistant): USDA approved one component acetoxy silicone rubber, mildew resistant, acceptable to local health officials, conforming to U.S. Food and Drug Administration regulation 21 CFR 177.2600, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Class 25, Grade NS, use NT,G and A with a minimum movement capability of ±25 percent, and a Shore A hardness of 20, equal to the following:

1. Dow Corning, product "786".
2. GE Silicones, product "Sanitary 1700".
3. Sonneborn, product "Sonolastic - OmniPlus".
4. Tremco, product "Tremsil 200".
5. Pecora, product "898".

J. Joint Sealer Type SX (Silicone, Exterior construction): One-part low modulus, neutral curing, low to no bleed silicone, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, NS, Class 50, FS TT-S-00230C, Type II, Class A with a minimum movement capability of +50 percent and -50 percent, equal to the following:

1. Dow Corning, product, “790”.

2. GE Silicones, product, “SCS2700 SilPruf LM”.
3. Sika, product “Sikasil-WS-290”.
4. Tremco, product “Spectrem 4TS”.

2.3 ACCESSORIES

A. Compressible joint bead back-up: Compressible closed cell polyethylene, extruded polyolefin or polyurethane foam rod complying with ASTM C 1330, Type C, 1/3 greater in diameter than width of joint. Shape and size of compressible back-up shall be as recommended by manufacturer for the specific condition used. Provide one of the following, or equal.

1. Nomaco, Inc., Zebulon, NC, product “Green Rod”.
2. Industrial Thermo Polymers Ltd., Brampton, Ontario CN, product “ITP Standard Backer Rod”.
3. BASF Sonneborn Building Products Inc., Minneapolis MN, product "Sonolastic Closed Cell Backer Rod".
4. W.R. Meadows Inc., Hampshire, IL, product “Sealtight Kool-Rod”.

B. Primers: Furnish and install joint primers of the types, and to the extent, recommended by the respective sealant manufacturers for the specific joint materials and joint function.

C. Bond-breaker tape, and temporary masking tape: Of types as recommended by the manufacturer of the specific sealant and caulking material used at each application, and completely free from contaminants which would adversely affect the sealant and caulking materials.

PART 3 - EXECUTION

3.3 INSTALLATION

A. General: Conform to SWRI requirements, and sealant manufacturer’s written requirements for installation.

B. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.

1. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
2. Do not stretch back-up material into joints.

C. Install bond breaker in joints where shown in the Drawings and wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.

D. Apply masking tape or other precautions to prevent migration or spillage of materials onto adjoining surfaces.

E. Apply urethane sealant and latex caulking materials into joints in accordance with manufacturer's instructions, using mechanical or power caulking gun equipped with nozzle of appropriate size, with sufficient pressure to completely fill the joints.

1. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
2. Maintain the outer edge of the sealant and caulking materials, where side faces of joints are in the same plane, back 1/8-inch from the faces.
3. Apply sealant in continuous beads without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length.
4. After placement of the sealant and caulking materials, concave-tool the surfaces to uniform density, using a water-wet tool. Do not use detergents or soapy water for the tooling operations.
5. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

F. Take care not to block-off weep tubes or any through wall opening constructed to allow weeping of accumulated water.

G. Apply pouring self-leveling urethane sealant (Sealant designation HL) into horizontal joints in accordance with manufacturer's instructions, to a level approximately 1/16 inch below adjacent surfaces.

1. Apply sealant without open joints, voids or air pockets so as to provide a watertight and airtight seal for the entire joint length.
2. After placement of the sealant and caulking materials, concave-tool the surfaces to uniform density, using a water-wet tool. Do not use detergents or soapy water for the tooling operations.
3. Remove the temporary masking tape immediately after tooling, and before the sealant has taken initial set.

3.6 SCHEDULE

A. General: Seal joints indicated and all interior and exterior joints, seams, and intersections between dissimilar materials.

B. Sealant Colors:

1. Colors for Sealant Types “HL2”: Match colors furnished by the Architect, or match other building materials as directed. Should such custom colors not be available from the approved manufacturer, except at additional charge, provide all such colors at no change in Contract Sum.
2. Colors for Sealant Types “BP2”, “HT”, ” “SC”, “SE”, and “SM”: As selected by the Architect from manufacturer’s standard colors.

3. Color for Sealant Types “AA” and “AP”: White.
4. In concealed installation, and in partially or fully exposed installation where so approved by the Architect, standard gray or black sealant may be used.

C. Specialty Joint Conditions:

3.7 SCHEDULE

A. General: Seal joints indicated and all interior and exterior joints, seams, and intersections between dissimilar materials.

B. Sealant Colors:

1. Colors for Sealant Types “HL2”: Match colors furnished by the Architect, or match other building materials as directed. Should such custom colors not be available from the approved manufacturer, except at additional charge, provide all such colors at no change in Contract Sum.
2. Colors for Sealant Types “HT”, “SC”, “SE”, “SM” and “SX”: As selected by the Architect from manufacturer’s standard colors.
3. Color for Sealant Types “AA” and “AP”: White.
4. In concealed installation, and in partially or fully exposed installation where so approved by the Architect, standard gray or black sealant may be used.

C. Specialty Joint Conditions:

D. Exterior joints (Listed by primary building material abutting sealant joints):

1. Concrete:

Joint Condition	Sealant Type
a. Concrete to concrete, vertical control joints:	SE
b. Concrete foundation walls to abutting concrete, and other non-bituminous pavements, steps, platforms, and ends of ramp, (horizontal joints):	HL2
c. Concrete slabs on grade to abutting non-bituminous pavements (horizontal joints, including pedestrian traffic surfaces):	HL2
d. Concrete to concrete saw cut and tooled control and isolation joints in horizontal surfaces including pedestrian traffic surfaces:	HL2
e. Concrete and non-bituminous sloped (5% to 12%) pavement ramps (horizontal joint) at abutting concrete or masonry foundation walls:	HT
f. Concrete to all items which penetrate exterior concrete walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SE

2. Exterior Masonry:

Joint Condition	Sealant Type
a. Masonry to masonry, expansion and control joints:	SE
b. Masonry to abutting masonry or concrete:	SE
c. Masonry to abutting non-porous materials (painted metals, anodized aluminum, mill finished aluminum, PVC, glass, and similar materials):	SE or SX
d. Masonry to all items which penetrate exterior masonry walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SE

3. Exterior Metal:

Joint Condition	Sealant Type
a. Metal to metal:	SX
b. Metal to glass:	SX

E. Interior joints (Listed by primary building material abutting sealant joints):

1. Interior Concrete:

Joint Condition	Sealant Type
a. Concrete to concrete, vertical joints:	SC
b. Concrete to concrete: horizontal walkable surfaces:	HL2
c. Concrete and non-bituminous pavement ramps (5 to 12 Percent) horizontal joints at abutting vertical concrete or masonry surfaces:	HT
d. Concrete to all items which penetrate concrete walls, including, but not necessarily limited to, door frames, louver frames, pipes, vents, and similar items:	SC
e. Precast concrete to abutting materials (vertical joints):	SC

2. Interior Masonry:
* Includes interior side of exterior masonry walls.

Joint Condition	Sealant Type
a. Masonry to masonry control joints*:	SC
b. Masonry* to gypsum board:	SC
c. Masonry to all items which penetrate masonry walls, including, but not necessarily limited to, window frames, door frames, louver frames, and similar items:	SC
d. Masonry to all pipes, conduit and vents which penetrate non-rated masonry walls*:	SC

3. Gypsum Board:

Joint Condition	Sealant Type

a.	Gypsum board to metal or wood trim:	AP
b.	Gypsum board to abutting surfaces at exposed tops and bottoms partitions and walls:	AA
c.	Gypsum board to masonry:	SC
d.	Gypsum board to interior door and window frames, penetrating conduits and piping, light-fixtures, electrical cover plates, building specialty items, ductwork, grilles, supply diffusers, faucets, piping, escutcheon plates and similar items:	AP
e.	Gypsum board to plumbing fixtures:	SM

4. Architectural millwork and casework:

	Joint Condition	Sealant Type
a.	Casework to abutting materials, kitchens, toilet rooms and similar "wet spaces":	SM
b.	Casework to abutting surfaces (except in "wet" spaces):	AP
c.	Countertops to abutting wall surfaces and to abutting casework:	SM
d.	Countertops to plumbing fixtures and fittings:	SM

5. Interior metal:

	Joint Condition	Sealant Type
a.	Metal to metal:	SC

6. Interior floor drains:

	Joint Condition	Sealant Type
a.	Floor drains to concrete slab:	SE
b.	Floor drains to resilient sheet flooring:	SE

7. Acoustical ceilings:

	Joint Condition	Sealant Type
a.	Acoustical ceiling edge angle to irregular wall surface	AP

8. Tile:

	Joint Condition	Sealant Type
a.	Tile to tile vertical, and horizontal non-traffic joints:	SM
b.	Tile to tile, horizontal pedestrian traffic joints:	HL2

9. Interior Wood:

	Joint Condition	Sealant Type
a.	Wood to wood (natural or stained finishes)	SC
b.	Wood to wood (painted opaque finishes)	AP
c.	Wood to metal	SC

d. Wood base to wall surfaces SC

END OF SECTION 07 92 00

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish the following products to be installed under the designated Sections:

1. Hollow metal frames for doors, UL-Labeled and non-labeled, complete with internal reinforcing; installed under Section 06 10 00 - ROUGH CARPENTRY.
2. Hollow metal frames for fixed-glazed window conditions, complete with internal reinforcing installed by: Section 06 10 00 - ROUGH CARPENTRY.
3. Hollow metal frames for display case doors, non-labeled, complete with internal reinforcing; installed under Section 06 41 16 – ARCHITECTURAL WOODWORK AND FINISH CARPENTRY.
4. Flush UL-Labeled and non-labeled steel doors, complete with internal reinforcing, hardware cut-outs; and provided with glazing openings, where so indicated; installed by Section 06 41 16 – ARCHITECTURAL WOODWORK AND FINISH CARPENTRY.
5. Glazing beads, loosely attached to hollow metal frames and doors, where so indicated, for removal and permanent installation during glazing operations; installed by: Section 08 80 00 - GLAZING.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain doors and frames specified in this Section from a single manufacturer.

1.8 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Amweld Building Products, Inc., (A Division of Amweld International, LLC), Coppell TX.
2. Ceco Door Products (A Division of Assa Abloy Group Company), Milan TN.
3. Curries Company A Division of Assa Abloy Group Company), Mason City IA.

4. Essex Industries, Inc. New Haven CT.
5. Republic Doors and Frames, McKenzie TN.
6. Steelcraft (A Division of Ingersoll-Rand Company), Cincinnati OH.

B. Unless otherwise specifically accepted by Architect, all doors and frames shall be of one manufacturer.

2.2 DOORS

A. General: Refer to the Drawings for design of doors, sizes, glazing cut-outs in doors, and details.

B. Construction: Full flush commercial type, 1-3/4 inches thick, unless noted otherwise, meeting or exceeding the materials, gages, construction, and testing requirements of the referenced ANSI and SDI publications.

1. Exterior Door Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene or polyurethane core (at non-rated doors only). Fabricate exterior doors with specified R-value when tested according to ASTM C1363.
   a. Core construction:
      1) Manufacturer’s standard expanded polystyrene complying with ASTM C 591
   b. Thermal properties when tested in accordance with ASTM C 1363:
      1) R-value: 10.0 (polyurethane core).
      2) At all exterior doors, fabricate doors with specified R-value when tested according to ASTM C 1363.
2. Interior Door Core Construction: Manufacturer's standard polystyrene, core.
   a. Interior Fire Door Core: As required to provide fire-protection and temperature-rise ratings indicated.

C. Interior Doors 1-3/4 inch thick (44.4 mm): ANSI 250.8, Level 2, Model 1 (Full Flush), ANSI A250.4 Physical Performance Level B, (Heavy Duty) having 18-gage, minimum 0.042 inch (1.0 mm) steel faces, with a minimum STC rating of 52.

1. Fire-rated doors: Modify specified construction to meet all construction requirements required for fire-resistive rating.
   a. Affix appropriate UL, FM or Warnock Hersey labels to each rated door, indicating applicable rating.

D. Exterior Doors: ANSI 250.8, Level 3, Model 2 (Seamless), ANSI A250.4 Physical Performance Level B, (Extra Heavy Duty) having 16-gage, 0.058 inch thick (1.46 mm) galvanized steel faces.

E. Glazing stops: Rectangular channel sections, not less than 20 gage; pre-drilled and loosely attached within the glazing cut-outs with countersunk tamper-resistant stainless steel screws; sized to properly accommodate the designated thicknesses

of glass and glazing materials; and external edges set flush with, or slightly behind, door face. Modify glazing stops for UL Label doors to conform with UL fire rating requirements.

F. Hardware reinforcing: Welded in place steel reinforcement, hot rolled pickled and oiled steel per ASTM A569, with the following minimum gages:

1. Hinges, 8 gage, minimum 0.152 inch (3.8 mm) thick.
2. Kick plates, 18 gage, minimum 0.042 inch (1.0 mm) thick.
3. Closers, locks, and all other hardware: 10 gage, minimum 0.123 inch (3.1 mm) thick.
4. Locations for reinforcing shall be determined from information and templates provided under Section 08 71 00 - DOOR HARDWARE.

G. Fabrication

1. Fabricate exposed faces of door panels from cold-rolled steel only.
2. Fabricate concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel (at manufacturer's option).
3. Fabricate doors with hardware reinforcement welded in place.
4. Attach fire rated label to each door unit.
5. Close top and bottom edge of exterior doors with flush end closure. Seal joints watertight.

2.3 HOLLOW METAL FRAMES

A. General: Refer to the Drawings for various types of frames, sizes, and profiles, UL fire-resistive Label frames, and other characteristics of frames and related items.

1. Frame type: Shop welded frames with mitered joints arc-welded, reinforced and ground smooth.

B. Materials for frames, reinforcement, anchors, anchor clips and related items: commercial grade cold-rolled steel conforming to ASTM A109 or commercial grade hot-rolled and pickled steel conforming to ASTM A415.

1. Frame gage:
   a. Interior frames: 16-gage, 0.053 inch thick (1.3 mm), except as otherwise required for specific U.L. Label.
   b. Exterior frames: 14-gage, 0.067 inch thick (1.7 mm), with a zinc coating supplied by the hot-dip process conforming to ASTM A653, Grade 37, with coating applied in accordance with A 924.
2. Hinge, lock and strike reinforcement: 7 gage (4.4 mm) thick.
3. Door closer reinforcement: 12 gage, minimum 0.093 inch (2.3 mm) thick.
4. Floor clips: 16 gage (1.3 mm) thick.
5. Splice plates or channels: same gage as door frame.

6. Glazing stops: 16 gage, minimum 0.053 inch (1.3 mm) thick, except as otherwise required for specific U.L. Label.
7. Mortar guards: 26 gage, minimum 0.016 inch (0.4 mm) thick.

C. Frame construction:

1. Fire-rated frame assemblies: Modify specified construction to meet all construction requirements required for fire-resistive rating.
   a. Affix appropriate UL, FM or Warnock Hersey labels to each rated frame assembly, indicating applicable rating.
2. Shop-fabricate frames as whole single units per door opening, except when frame size is too large to ship as a single unit. Oversized frames may be shipped in large sections as practicable for field assembly with concealed splice plates or channels.
3. Frame corner construction: As specified in paragraph A, above.
4. Reinforcements, stiffeners, and base angle clips: Welded to interior surfaces of frames to provide a stable base and so as to not interfere with installation of hardware.
5. Provide mortar boxes, welded to frame, at back of hardware cut-outs where mortar or other materials may obstruct hardware operation.
6. Appearance of finished frames: Strong, rigid, completely free from warp and buckle, with miters well-formed and in true alignment, and with surfaces smooth and free from defects of any kind.
7. Silencer holes: Punch three holes in stop of strike jamb of door frames for application of silencers.
8. Glazing beads: Carefully place to properly accommodate the various thicknesses of glass and glazing materials, and loosely-attach to frames with flathead galvanized steel screws through pre-drilled holes having countersunk depressions.

D. Anchorage:

1. Anchor clips for frames in metal stud partitions: 16-gage steel z-shaped clips, 1-1/2 inch upturned and downturned legs, or equivalent type standard with the manufacturer, contained within the frames, for screw attachment to metal studs under Section 09 22 16 - NON-STRUCTURAL METAL FRAMING.
2. Anchor clips for frames in cold-formed metal framed exterior walls: 12-gage steel z-shaped clips, 1-1/2 inch upturned and downturned legs, or equivalent type standard with the manufacturer, contained within the frames, for screw attachment to metal studs under Section 05 40 00 - COLD-FORMED METAL FRAMING.
3. Anchors for frames in masonry walls: Adjustable, T-shaped, positively engaging the retainers on both flanges of each jamb member, when placed. The stem of the anchors shall be 2 inches wide by 12 gage, minimum,

corrugated or perforated for mortar bond, and extend 10 inches into the masonry, unless otherwise indicated.

4. Anchors for fire-resistive rated frames: Conform to all UL requirements for the specific fire-resistive ratings.
5. Typical frames: Provide not less than 3 anchors, clips, or bolts (as applicable), per jamb.
   a. Frames exceeding 3 feet in width, and cross corridor frames: Provide not less than 4 anchors, clips, or bolts (as applicable), per jamb.

2.4 FABRICATION TOLERANCES

A. Maximum variation for doors and frames: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

2.5 FACTORY FINISHING

A. Preparation: Pressure-sand all surfaces of all doors, frames, accessory items, anchors, and related items, to remove blemishes and foreign matter and provide paint grip. Spot-fill imperfections with metallic filler, and sand smooth. Thoroughly clean the surfaces by applying hot or cold phosphate treatment standard with the manufacturer.

B. Following cleaning apply one dip or spray coat of rust-inhibitive metallic oxide, zinc chromate, or synthetic resin primer to all surfaces, including those which will be concealed after erection. Bake, or oven dry, the primer at time and temperature recommended by the manufacturer for developing maximum hardness and resistance to abrasion.

PART 3 - EXECUTION

3.1 ERECTION AND INSTALLATION

A. Installation of frames and doors, including all accessories and related items furnished hereunder, will be performed under Section 06 10 00 - ROUGH CARPENTRY, and Section 06 20 23 – INTERIOR FINISH CARPENTRY.

1. Section 06 10 00 - ROUGH CARPENTRY shall place frames in correct position within specified tolerances, and provide temporary bracing at locations where frames are indicated to be built-into masonry. Section 04 20 00 - UNIT MASONRY shall build and grout frames into masonry work.

B. Final installation of loosely attached glazing stops will be performed under Section 08 80 00 - GLAZING.

END OF SECTION 08 11 13

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SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish the following products to be installed under the designated Sections:

1. Flush solid core wood doors, complete with necessary blocking, hardware cut-outs; and provided with openings for glazing and louvers, where so indicated, for installation under: Section 06 20 00 - FINISH CARPENTRY.

2. Glazing beads, loosely attached to glazing cutouts in doors for removal and permanent installation under: Section 08 80 00 - GLAZING.

1.5 QUALITY ASSURANCE

A. All materials and workmanship shall conform in all respects to the specified grades of the Window and Door Manufacturer's Association (WDMA) Industry Standard IS 1-A-11, except as modified herein.

B. Sole Source: Obtain doors specified in this Section from a single manufacturer.

1.9 WARRANTY

A. Provide the following warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS. Warranties shall include delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction, all as defined by AWI Quality Standards.

1. Warranty length:

a. Interior doors: Manufacturer's lifetime warranty.

2. Warranty coverage shall include all labor and material costs of delivery, re-hanging, re-finishing, glass and glazing to produce a complete installation of replaced or repaired doors.

PART 2 - PRODUCTS

2.1 FLUSH FACED DOORS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Algoma Hardwoods, Inc., Algoma WI.

2. Marshfield DoorSystems™, Inc., Marshfield WI.
3. Eggers Industries, Architectural Door Division, Two Rivers WI.
4. Lambton Doors, Lambton Quebec Canada.
5. VT Industries Inc., Holstein IA.

B. General Description: Flush wood doors conforming to the requirements set forth in the designated Sections of the Architectural Woodwork Standards, (WDMA) Industry Standard IS 1-A-11, and the applicable requirements of U.S. Commercial Standard CS 171, as amended. Refer to the Drawings for sizes, locations of each type door, glazing cut-outs in doors, and other characteristics of doors to be furnished hereunder.

1. Door Grade: Premium.
2. Door Facing:
   a. Face veneer: WDMA Industry Standard, "A' Grade veneer minimum 1/50 inch (0.6 mm) thick, mechanically splice TBD, Plain Sliced, Grade A with slip matched grain, end matched transoms. No heartwood will be accepted.
      1) Matching of adjacent pieces of veneer: Book matched.
      2) Panel face assembly: Balanced.

C. Regulatory Requirements:

1. Fire rated door construction shall conform to UL publications 10B (neutral pressure testing) and 10C (positive pressure testing).
2. Install doors in compliance with NFPA publication 80.
3. Corridor door assemblies shall be tested and listed per UL 1784.

2.2 FIRE-RESISTANCE RATED 45, 60 AND 90 MINUTE LABEL DOORS

A. General Construction: WDMA Industry Standard I.S. 1-A-11, S-21 Veneer, Fire Rated Mineral Core, Premium Grade Door.

1. Door thickness: 1-3/4 inches, unless indicated otherwise.
2. WDMA Specification Descriptions.
   a. 90 minute "B" label doors: Type"FD-90 MIN-5, HPDL".
   b. 60 minute label doors: Type"FD-60 MIN-5, HPDL".
   c. 45 minute "C" label doors: Type"FD-45 MIN-5, HPDL".

B. Door facing: As specified herein above under Article – "Flush Faced Doors".

C. Core construction:

1. Core: Fire resistant Non-combustible asbestos free, mineral composite material per label listing requirements. Positive pressure fire doors shall include intumescent when required, meeting UL Category A requirements..

2. Stiles: multiple-ply stiles with 1/4 inch solid hardwood outer ply matching face veneers for species and color.

3. Top and bottom rails: Maple, birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements.

4. Blocking: Provide blocking as required to meet WDMA Extra Heavy Duty performance for securing surface applied hardware without the use of through bolts.

a. For doors scheduled to receive screw-mounted surface closers, provide top rail blocking.

b. For doors scheduled to receive surface mounted fire exit devices or vertical rods, provide top, intermediate and bottom rail blocking for screw mounting.

c. Provide additional blocking for all other surface mounted hardware.

D. Adhesives: Type 1 (waterproof) for both face and core assembly.

E. Accessories: For all fire-rated doors installed in pairs with both leaves active, provide 20-gage formed steel edges, without astragal, wrapped with veneer matching faces of doors.

2.3 FIRE-RESISTANCE RATED 20 MINUTE LABEL DOORS

A. General Construction: WDMA Industry Standard I.S. 1-A-11, S-21 Veneer, Fire Rated Mineral Core, Premium Grade Door.

1. Door thickness: 1-3/4 inches, unless indicated otherwise.

2. WDMA Specification Description: "FD-20 MIN".

B. Door facing: As specified herein above under Article – "Flush Faced Doors".

C. Core construction:

1. Core: Particleboard complying with ANSI A208.1 Type 1, Grade 1-LD-2 having a density of 33 pounds per cubic foot.

a. Provide only no added urea-formaldehyde particleboard. Furnish certification of formaldehyde free products.

2. Stiles: Stile construction that meets or exceeds WDMA Extra Heavy Duty performance. Structural composite lumber with minimum 1/2" hardwood outer stile of same specie as face veneer, minimum overall 1 inch after trimming

3. Top and bottom rails: Maple, Birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements, minimum 7/8 inch width, after trimming.

D. Adhesives: Type 1 (waterproof) for both face and core assembly.

E. Accessories: For all fire-rated doors installed in pairs with both leaves active, provide 20-gage formed steel edges, without astragal, wrapped with veneer matching faces of doors.

2.4 NON-RATED SOLID-CORE DOORS

A. General Construction: WDMA Industry Standard I.S. 1-A-97, S-9 Veneer, Particleboard Core Bonded, Premium Grade Door.

1. WDMA Specification Description: “PC-5”.

2. Door thickness: 1-3/4 inches, unless indicated otherwise.

B. Door facing: As specified herein above under Article – “Flush Faced Doors”.

C. Core construction:

1. Core: Particleboard complying with ANSI A208.1 Type 1, Grade 1-LD-2 having a density of 33 pounds per cubic foot.

a. Provide only formaldehyde free particleboard, equal to Rodman Industries, Oconomowoc, WI. Furnish certification of formaldehyde free products.

2. Stiles: Laminated strand lumber or hardwood mill option for inner ply of styles, continuously bonded to core with adhesives and abrasively planed before veneering, minimum of 1-3/8 inches after trimming, with 1/4 inch solid hardwood outer ply matching face veneer.

3. Top and bottom rails: Maple, Birch, Structural Composite Lumber (SCL) or UL approved composite material to meet label requirements, minimum 1-1/8 inch width.

D. Adhesives: Type 1 (waterproof) for both face and core assembly.

2.5 GLAZING BEADS

A. Glazing beads for "B" and "C" fire rated doors, wood veneered bead:

1. Algoma's style number W-9, labeled, with 1/2 inch sight line.
2. Eggers #100 style.
3. Marshfield DoorSystems veneer clad light bead.
4. VT Industries Type: "Veneer Wrapped #110".

B. Glazing beads for 20 minute fire rated and non-fire rated doors:

1. Algoma's style number W-4 wood bead with 3/8 inch sight line.
2. Eggers style number 100, 5/8 inch sight line.
3. Marshfield DoorSystems style number W-6, 3/8 inch sight line.
4. VT Industries Type "V!-1"

2.6 LOUVERS

A. Louvers: Extruded aluminum louver, UL and Warnock Hersey International approved, maximum size 24 by 24 inches equal to Construction Specialties Inc., model Nº. "FL-138".

1. Fabricated from 6063-T5 alloy aluminum, 0.05 inches thick, furnished with adjustable trim.
2. Fasteners: High strength aluminum or stainless steel, countersunk into trim.
3. Finish: Factory primed with baked enamel ready to receive field-applied finish.

2.7 FABRICATION

A. Fabricate doors in accordance with specified manufacturer's requirements. Fabricated rated doors in compliance with WHI, or UL requirements as appropriate.

B. Laminate door facing, cross banding and assembled core in a hot press.

C. Bond stiles and rails to cores, sand for uniform thickness. Factory sand assembled door leaf.

D. Factory-machine doors to receive hardware from templates furnished under Section 08 71 00 - DOOR HARDWARE. Do not machine for surface hardware.

1. Provide inner blocks at lock edge and top of door for closer hardware reinforcement.

2. Cut and configure door edges to receive scheduled gasketing.

E. Factory fabricate doors for undercut where scheduled. Provide undercuts as required to ensure door clearance at finished flooring.

F. Factory cut all louver and glazed openings as scheduled. Field cutting of openings is prohibited.

G. Fabrication tolerances: Maximum diagonal distortion (warp): 1/4 inch (6 mm) measured with straight edge from corner to corner over a maximum 42 by 84 inch surface area.

2.8 FACTORY FINISHING

A. General: Factory finish to be to comply with EPA Title 5 guidelines for Volatile Organic Compound (VOC) emissions limitations.

B. Transparent finish: AWI Premium Grade Factory Finish System 9, having water based stain and ultraviolet (UV) cured polyurethane sealer and topcoat, with a satin sheen of 31° to 35° gloss units per ASTM D523.

1. Finish system shall include the following:

a. Finish sanding.

b. Stain application.

c. Stain curing.

d. Sealer application - first coat.

e. Sealer gel cure.

f. Sealer application - second coat.

g. Sealer gel cure

h. Sealer application - third coat

i. Sealer full cure

j. Sealer sanding

k. Topcoat application - first coat

l. Topcoat application - second coat

m. Topcoat full cure

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of wood doors, including all accessories and related items furnished hereunder, will be performed under Section 06 20 23 – INTERIOR FINISH CARPENTRY.

B. Final installation of loosely-attached glazing stops will be performed under Section 08 80 00 - GLAZING.

END OF SECTION 08 14 16

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SECTION 08 14 33
STILE AND RAIL WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish stile and rail wood doors, complete with sidelights, hardware cutouts and provided with openings for glazing where so indicated for installation under: Section 06 41 16 – ARCHITECTURAL WOODWORK AND FINISH CARPENTRY.

1. Reinstall stile and rail doors salvaged under Section 02 41 19 – SELECTIVE DEMOLITION.

1.5 QUALITY ASSURANCE

A. All materials and workmanship shall conform in all respects to the specified grades of the Architectural Woodwork Institute (AWI) publication *"Architectural Woodwork Standards"*, except as modified herein.

B. Subject to compliance with the requirements specified herein, fabricators offering stile and rail doors which may be incorporated in the work must be AWI members in good standing.

1.10 WARRANTY

A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. 3 year warranty for interior stile and rail doors.

B. Warranties shall include delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: To establish a standard of quality, design and function desired, specifications have been based on AWI Quality Standards. Acceptable manufacturers include the following or approved equal:

1. East Coast Custom Doors, South Portland ME.
2. Eggers Industries, Architectural Door Division, Two Rivers WI.
3. Enjo Architectural Millwork, Staten Island NY.
4. The Maimen Company, Springfield MO.
5. Marshfield Door Systems Inc., Marshfield WI.
6. Sun-Dor Company, Newton KS.

2.2 INTERIOR DOORS

A. Doors: Interior doors with non-glazed and non-rated, with inset veneered panels as scheduled on the Drawings to receive shop applied stain and transparent finish:

1. Construction: AWI Premium Quality Grade.
2. Wood: AWI Premium Quality Grade.
   a. Solid wood: White Oak (Quercus alba), Quartersawn.
   b. Face veneers: White Oak (Quercus alba), Quarter sliced, slip matched.
3. Stiles and rails: Veneered stave core with matching edgebands. Veneer 1/8 inch thickness before sanding.
   a. Verify height of lock rail with Architect.
4. Panels: Three ply laminated lumber, thickness no less than1-1/2 inch, with mitered rim, tongue and grooved into edge of panel. Miters reinforced with splines and glued under pressure.
5. Sticking: 3/8 inch quarter round.
6. Glue type: Type 1, PVA - waterproof.
7. Glass, as scheduled and as specified under Section 08 80 00 - GLAZING:
   a. Rated openings: Wire glass only.
8. Finishing: Refer to Article 2.4.

B. Glazed doors: Interior doors with non-glazed and non-rated, with inset veneered panels as scheduled on the Drawings to receive shop applied stain and transparent finish:

1. Construction: AWI Premium Quality Grade.
2. Wood: AWI Premium Quality Grade.
   a. Solid wood: White Oak (Quercus alba), Quartersawn.
   b. Face veneers: White Oak (Quercus alba), Quarter sliced, slip matched.
3. Stiles and rails: Veneered stave core with matching edgebands. Veneer 1/8 inch thickness before sanding.
   a. Verify height of lock rail with Architect.
4. Sticking: 3/8 inch quarter round.
5. Glue type: Type 1, PVA - waterproof.
6. Glass: Tempered safety glass, clear, 1/4 inch thick, factory installed.
7. Finishing: Refer to Article 2.4.

2.3 FABRICATION

A. Fabricate doors to in dimensions, and profiles indicated in the drawings.

1. Tolerances: Maximum diagonal distortion 1/16 inch measured with straight edge, corner to corner.

B. Factory machine doors for hardware specified and furnished under Section 08 71 00, obtain templates prior to fabricating doors.

2.4 FACTORY FINISHING

A. Transparent finish: Match stain and finish of existing doors. Submit to Architect for approval, a finished sample on specie of wood used for doors. Obtain written approval of finish system from Architect prior to application of finishes to doors.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Installation of wood doors, including all accessories and related items furnished hereunder, will be performed under Section 06 20 00 - FINISH CARPENTRY.

B. Final installation of loosely-attached glazing stops will be performed under Section 08 80 00 - GLAZING.

END OF SECTION 08 14 33

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Fire resistive rated and non-rated access panels and frames, as specified under this Section, furnished by Sections requiring the same and installed under the following Sections:

1. Section 04 20 00 – UNIT MASONRY: Installation of access panels into masonry assemblies.
2. Section 09 29 00 - GYPSUM BOARD: Installation of access panels into drywall assemblies.
3. Section 09 30 13 - CERAMIC TILING: Installation of access panels into tiled walls.

1.5 WARRANTIES

A. General: Submit warranties under provisions of 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Babcock-Davis, Brooklyn Park, MN.
2. Acudor Products Inc., Cedar Grove, NJ
3. Cesco Products, North Brooklyn Park MN.
4. J.L. Industries, Bloomington MN.
5. Karp Associates Inc., Maspeth NY.
6. Miami-Carey Corp., Monroe OH.
7. Nystrom Products Company, Minneapolis MN.
8. Milcor, Inc. Lima OH.
9. Larson Manufacturing Co., Brookings SD.
10. Williams Brothers Corporation of America, Front Royal, VA.

B. Single Source: All work of this Section shall be produced by a single manufacturer, unless otherwise approved by the Architect.

2.2 ACCESS PANELS - GENERAL

A. Access panels scheduled for placement in masonry: Furnish with masonry anchors attached to unit frames at factory.

B. Provide acoustical insulation and gasketing at all panels in Room 008 Studio Space.

2.3 ACCESS PANELS - FOR FIRE RESISTANCE RATED CONSTRUCTION

A. For fire-resistance rated wall and ceiling surfaces: Standard flush panel door (except recessed type at drywall) meeting the following requirements:

1. Panel and frame rating: UL "B" label for 90 minutes.
2. Frame type:
   a. For ceramic tile walls: 16 gage galvanized bonderized steel flanged frame, with flange exposed to view 1 inch or less.
      1) Acudor FW-5050 series
      2) Karp KRP-150FR series.
      3) Nystrom IT series.
      4) Williams WB-FRSS Regular series.
   b. For masonry walls: 16 gage galvanized bonderized steel flanged frame, with flange exposed to view 1 inch or less.
      1) Acudor FW-5050 series
      2) Karp KRP-150FR series.
      3) Nystrom IT series.
      4) Williams WB-FR series.
   c. For gypsum board walls and ceilings: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
      1) Acudor FW-5050DW
      2) Karp KRP-350FR series.
      3) Nystrom IW series.
      4) Williams WB-FR series.
3. Door: Insulated Flush panel door as follows:
   a. Typical wall types: Flush door, Sandwich construction with 2 inch thick mineral wool fiber insulation between two layers of 20 gage galvanized bonderized steel.
4. Hinge: Flush continuous piano hinge with stainless steel pin.
5. Closer: Spring closer.
6. Latch: Flush cam latch, operated by Allen or Torx head screwdriver.

2.4 ACCESS PANELS - FOR NON- RATED CONSTRUCTION

A. For non-rated gypsum board, walls and ceilings: Recessed door type meeting the following requirements

1. Manufacturer's types:
   a. Acudor DW-5015 series.
   b. Karp:
      1) Walls: Karp RDW series.
      2) Ceilings: Karp KATR series.
   c. Nystrom RW series.
   d. Williams WB-DW series.
2. Frame type: 16 gage galvanized bonderized steel frame, with 22 gage galvanized steel drywall bead.
3. Door: Recessed 16 gage galvanized bonderized steel door. with 22 gage galvanized steel drywall bead.
4. Hinge: Concealed pivot rod hinge.
5. Latch: Flush cam latch, (operated by Allen or Torx head screwdriver) with steel grommet welded to door.

2.5 FACTORY FINISHING

A. Panel assemblies fabricated from galvanized bonderized steel: Baked on rust inhibitive gray primer finish.

B. Panel assemblies fabricated from cold rolled steel: Phosphate dipped with baked on rust inhibitive gray primer finish.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Install access panels in accordance with manufacturer's instructions and direction from authorities having jurisdiction. Install miscellaneous specialties absolutely level and in true line, with units securely anchored to the surrounding construction.

B. Test each door and latching device, and make adjustments required to ensure a bind-free operation and proper latching.

END OF SECTION 08 31 00

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SECTION 08 52 00
WOOD WINDOWS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install shop fabricated, factory finished, wood windows complete with hardware, factory glazing, weatherstripping, sash ploughs, jamb extensions, and standard or specified anchorages, trim, attachments, and accessories. Work includes:

1. Double-hung/Single-hung and fixed metal clad wood windows.
2. Screens at all operable windows.

1.6 QUALITY ASSURANCE

A. Installer, with a minimum of 5 years documented experience demonstrating previously successful work of the type specified herein.

B. Perform Work in accordance with AAMA/WDMA/CSA 101/I.S.2/A440 - *Standard Specifications for Windows, Doors and Unit Skylights*.

C. Do not execute contract with fabricator or place order for windows without receiving Architect's approval of full size physical samples of each type of unit to be furnished.

1.10 WARRANTY

A. Provide the following manufacturer's written warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS:

1. Provide a one year warranty which shall include repair or replacement of any window assembly or component which leaks, or exhibits defects in materials, finish, or function.
   a. Warranty shall exclude glass breakage. and exclude damage resulting from abuse or misuse.
   b. Warranty shall include all labor and material costs to replace or repair defective window units, including cost of shipping of replacement units and components.
2. Provide 10 year written warranty for exterior factory applied finish, including wood preservative treatment, primer and finish. Warranty shall include film integrity, including cracking, peeling, flaking and similar defects in the applied finish.
3. Refer to Section 08 80 00 - GLAZING for warranty on glass including failure of seals and discoloration of Low E coating.
   a. Warranty shall exclude glass breakage resulting from any cause.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Marvin Windows, Warroad, MN, "Marvin NEXT GEN Series", non-standard window size..

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Metal clad wood windows:

a. Marvin Windows, Warroad, MN.

b. Kolbe & Kolbe Millwork Company Inc., Wausau, WI

c. Pella Corp., Pella, IA.

d. Eagle Windows & Doors, Dubuque IA.

e. LePage Millwork, Rivière-du-Loup, Quebec.

2.2 MATERIALS - GENERAL

A. Wood: Select Western Ponderosa pine or other clear western pine in compliance with ASTM 3110, kiln-dried to a moisture content of 6 to 12 percent at time of fabrication. Treat with water repellent preservative in accordance with WDMA I.S.4. All exposed wood to be Cherry.

B. Metal cladding (exterior surface): Extruded aluminum, pre-finished, shop fit to profile of wood members and exterior exposed surfaces.

1. Minimum thickness: 0.050 inch.

2.3 DOUBLE HUNG AND FIXED WINDOW UNITS

A. Materials and components:

1. Frame: Constructed of kiln-dried pine, with cherry interior stops and mull casings on mulled units, water repellent, preservative treated in accordance with ANSI/WDMA I.S. 4-2005. All exposed wood to be cherry.

a. Jamb thickness: 3/4 inch (19mm) at the side jambs and head.

b. Interior parting stop: Solid wood 13/16 inch (21mm).

c. Sill thickness: 1-3/16 inch (30mm) with 14° slope.

d. Exterior: All frame parts are clad with 0.050 inch (1.3mm) thick 6063 extruded aluminum alloy with accessory grooves and press fit onto wood frame. Extruded aluminum inboard and outboard jambliner covers are press fit into vinyl jambliner. Extruded aluminum outboard weatherstrip holder is mechanically fastened into blindstop.

e. Corner Construction: Head and side jambs have mitered corners and use internal corner keys with sealer. Sill end has a profile cut and utilizes an end key with sealer.

f. Prep for stool.

2. Sash: Constructed of kiln dried pine, water repellent, preservative treated in accordance with ANSI/WDMA I.S.4-2005.

a. Thickness: 1-23/32 inch (44mm).

b. Exterior: Sash parts are .050 inch (1.3mm) thick 6063 extruded aluminum alloy with kerf mount, press fit and mechanically fastened into the wood sash with coped ends.

c. Corner Construction: Wood mortise and tenon.

d. Interior glazed.

3. Hardware:

a. Latches and Locks: Top rail tilt latches are made of a nylon plunger and housing. Pick resistant sash lock and keeper constructed of high-pressure die-cast zinc with aluminum back plate. Operation of the sash lock will actuate polycarbonate latches that are housed in an internal hardware channel. Top check rail shall be fitted with a high impact polymer interlock which engages into the hardware channel on the bottom check rail.

b. Balancing system: Spring loaded block and tackle mechanical balancing system with polyester cord. Mill finish balance cases are hidden by the wood wrapped jambliner closure to the interior and by the extruded aluminum jambliner covers to the exterior. Zinc die-cast pins engage and release balance clutches allowing the sash to be tilted in and removed for cleaning.

c. Sash Lift Handles: Constructed of high-pressure corrosion resistant die-cast zinc for field application. Finish to be selected by the Architect from the manufacturer's full range of available colors.

1) Provide two per lower sash.

4. Weatherstripping:

a. Top rail: Rigid PVC weather seal holder with flexible fins installed with two rows of weatherstripping. The exterior row is a PVC bulb. The interior row is a pile weatherstrip.

b. Top sash stile: Rigid weatherable PVC and flexible PVC stile weatherseal.

c. Top check rail Interlock: One row of gray pile weatherstrip.

d. Bottom rail: Dual durometer polyolefin with arloc slipcoat bulb.

e. Sill: Rigid weatherable, UV resistant PVC water seal/weatherstrip. Passes drop dart test.

f. Head and sill pads: Closed cell PVC foam pads.

g. Jambliners: Weatherable, UV resistant PVC with foam filled bulb vertical weatherstrip and a center pile horizontal weatherstrip. Jambliner shall be hidden by the wood wrapped jambliner closure to the interior and an extruded aluminum jambliner cover to the exterior. Passes drop dart test.

5. Half-height, high-transparency exterior screens:
   a. Screen cloth: Manufacturer's standard "charcoal" fiberglass mesh 18x16.
   b. Screen framing: 0.024 inch (0.6mm) thick roll formed aluminum.
   c. Attachment: Spring loaded plungers.
   d. Corner construction and finish color: Channels are joined and reinforced with a corner key. Screen finish as selected by the Architect.
6. Simulated Divided Lites: Permanently adhered wood grille bar at interior and a permanently adhered aluminum grille bar at exterior glass.
   a. Material: Muntin is constructed of .050 inch (1mm) thick 6063 extruded aluminum alloy on exterior, pine on interior 5/8 inch (16mm) wide. Provide radius units with composite material where required.
   b. Grid between glass: Manufacturer's standard simulated divided lite.
      1) Pattern: As indicated on Drawings.
   c. Exterior surface finish: To match frame and sash exterior.
7. Glass: Factory sealed insulated glass (IG) units of clear float glass.
   a. Standard one-lite IG is 7/8 inch (23mm) with HºK LoE^2-270, argon filled.
   b. Design pressure of 50 psf (DP 50).
   c. All glass shall be select quality complying with FS-DD-G-451D.
   d. IG shall comply with IGCC and ASTM E774-97 and ASTM E2190-02.
   e. Glazing method: Operating units and fixed units shall have 3/16 inch (5mm) wide glazing tape and primary silicone on No. 1 surface along sight line paired with latex sealant on No. 4 surface at wood glazing bead.
   f. SHGC: 0.40 maximum.

2.4 ACCESSORIES AND TRIM:

A. Installation Accessories:
   1. Factory-installed vinyl nailing/drip cap.
   2. Installation brackets: 6-3/8 inch (162 mm), 9-3/8inch (283mm), 15-3/8 inch (390mm).
   3. Masonry brackets: 6 inch (152 mm), 10 inch (254 mm).

B. Aluminum Extrusions:
   1. Casing Profile: Brick Mould Casing (BMC).
   2. Finish: To match exterior aluminum clad finish.
   3. Exterior Clad Extension Jamb

a. Finish: To match exterior aluminum clad finish.

4. Sill Extension

a. Finish: To match exterior aluminum clad finish.

5. Finish: Fluoropolymer modified acrylic topcoat applied over primer. Meets AAMA 2605 requirements.

2.5 FABRICATION

A. Check dimensions of openings by accurate field measurement before fabrication.

B. Fabricate windows allowing for minimum clearances and shim spacing around perimeter of assembly, yet enabling installation.

2.6 FACTORY FINISHING

A. Exterior finish: Aluminum clad. Fluoropolymer modified acrylic topcoat applied over primer. Meets AAMA 2605 requirements.

1. Color: As selected by the Architect from manufacturer's full range.

B. Interior finish: All exposed wood to be Cherry. Factory-applied water-borne acrylic enamel clear coat, applied in two separate coats with light sanding between coats.

1. Color: As selected by the Architect from manufacturer's full range.

C. The following surfaces are to be primed:

1. The outer perimeter of the wood frame.
2. The concealed wood sides that interface with the sill, jamb and head.
3. All conditions that come into contact with membrane flashing.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Install wood windows and doors in accordance with the manufacturers' installation instructions, industry standards, and Parts 1 through 8 (inclusive) of ASTM E2112. Where conflicts occur within these requirements, the most restrictive requirements shall govern. Ensure that all joints are completely weatherproof.

B. Erect the wood windows and doors plumb and level, free of warp or twist. Provide shims at bearing locations, anchors, and latch points, install in a manner so they are not dislodged by subsequent operations. Test sash and hardware operation and their alignment prior to permanently anchoring units in place.

C. Maintain dimensional tolerances, aligning with adjacent work.

D. Windows are to be factory pre-drilled for jamb fastening as indicated on the drawings. Anchors are not to be used.

E. Install anchors through frame and beside shims. Anchor window and door frame units to wood blocking with wood screws and to metal framing with toggle bolts; countersink anchor heads. All anchors shall be concealed by closed sash, or in the case of fixed units, with plugs.

END OF SECTION 08 52 00

SECTION 08 80 00
GLAZING

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of glass and glazing where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Tempered or laminated glass in wood and hollow metal doors and frames.
2. Frameless mirrors.
3. Decorative glazing film.
4. Prefinished interior fire-rated glazed framing and glazing systems including all required integral reinforcing, bracing members and related accessories for the framing systems, and all angles, clips, and other items required to anchor the systems to the building structure, and as required for specified fire-resistance ratings.
5. All materials required to properly install glass furnished hereunder, including sealant, tapes, setting blocks, and spacers.

C. Work of this section includes installation of glazing beads furnished under related sections.

1. Work of this Section includes application of wood putty to fill all nail or screw holes in wood glazing beads and refinishing of glazing beads to provide a consistent appearance matching the original finish as supplied.

1.6 QUALITY ASSURANCE

A. General: Perform glazing work in accordance with GANA - Glazing Manual, FGMA Glazing Manual, SIGMA and LSGA standards for glazing and installations methods.

1. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Glass Labeling:

1. General: Manufacturer’s Label shall be, acid-etched, sandblasted, ceramic-fired, laser-etched, embossed, or other similar type which, once applied, cannot be removed without being destroyed.
2. Safety glass: Label tempered safety glass with permanent manufacturer's label on each light with the mark visible after installation.
   a. Furnish SGCC certification for safety glass in compliance with CPSC 16 CFR 1201 Cat 1 or Cat 11, or ANSI Z-97.1.

1.9 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

B. Manufacturer Warranty/Guarantee: All shall include replacement of defective glass, and delivery of replacement glass products furnished f.o.b. from point of manufacturer to project site.

1. Mirrors: Manufacturer's 5 year written guarantee covering against defects in materials and workmanship of reflective coatings on mirrors and replacement of the same.

   a. Provide coverage in Guarantee for manufacturing defects, including failure of reflective coatings as evidenced by peeling, cracking, discoloration, deterioration in metallic coating, or other visual indications of failure.

2. Tempered glass: Manufacturer's 4 year written guarantee covering against defects in materials and workmanship of laminated glass and replacement of the same. Warranty shall be effective from date of original factory shipment to site.

   a. Provide coverage in Guarantee for manufacturing defects, including failure of laminated glass units as evidenced by edge separation, delamination, or discoloration of inner layer.

PART 2 - PRODUCTS

2.1 GLASS - GENERAL

A. General requirements for glass: Of domestic and foreign manufacture, conforming to the referenced standards and with the additional requirements specified herein; factory labeled on each pane stating the strength, type, thickness and quality; with all labels remaining on glass until final cleaning.

1. Glass thickness shown and heat treatment specified are minimum requirements. Provide glass thickness and heat treatment as required to meet specified performance criteria, State and local codes and ordinances.
2. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.
3. Provide all insulated glass with black spacer bars as approved by the Architect.

B. Heat Strengthened Glass: Comply with ASTM C 1048 HS, heat strengthened, Class 1 clear, quality q3 glazing select.

C. Tempered Glass: Comply with ASTM C 1048 FT, fully tempered, Class 1 clear, quality q3 glazing select, conforming to ANSI Z97.1.

D. Low-Iron Glass: Low-iron soda-lime float glass, fully tempered safety glass, in 1/4 inch thickness, except as otherwise indicated.

1. Performance criteria for 1/4-inch (6mm) thickness glass:
    a. Visible Light Transmittance: minimum 90 percent.
    b. Reflectance Visible Light: 8 percent.
    c. U-V transmission: minimum 85 percent.
    d. Solar Heat Gain Coefficient (SHGC): 0.90.
2. Acceptable Products: Subject to compliance with requirements, provide one of the following, or approved equal:
    a. AGC Industries, product "Krystal Klear".
    b. Guardian Industries, product "Guardian Ultra White".
    c. UltraGlas Inc., product "Low-Iron Glass", formerly "Starphire".
    d. Pilkington North America, product "Optiwhite".
    e. PPG Industries, Inc., product "Starphire Ultra-Clear Glass".

E. Mirror glass: ASTM C 1036, type 1 transparent, flat Class 1 clear, quality q1 mirror select glass, and ASTM C 1503 electro-copper back-plated laminated to a concealed from view corrosion-resistant zinc-coated back, with all edges of the glass ground and polished.

2.2 GLASS – TYPES

A. Glass Type 2: Tempered low iron safety glass (for doors and elsewhere as indicated): 3/8 inch thick safety glass, ASTM C 1048 FT, fully tempered, complying with Class 1 clear, quality q3 glazing select, conforming to ANSI Z 97.1.
    1. Provide certification to Architect that glass complies with the specifications, do not label glass.

B. Glass Type 3: 8mm-9 mm thick (5/16 inch-3/8 inch) transparent wire-less fire rated ceramic glazing material with polished finish.
    1. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
        a. Nippon Electric Glass Co., Ltd., "Firelite Plus".
        b. Vetrotech Saint-Gobain, "SSG Keralite FR-L".
        c. SAFTI First, "Pyran Platinum L".
    2. For fire rated door assemblies, conform with latest edition of ASTM E152, ASTM E163, NFPA-80, NFPA 252, NFPA 257.
    3. Conforms to ANSI Z97.1 - Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
    4. Permanently identify each individual glazing unit with a listing mark visible after installation.

5. In accordance with manufacturer's specifications, Firelite Plus must be glazed into frames with a similar rating, using silicone glazing compound which shall be supplied with the Firelite Plus material.

C. Glass Type 4 - Frameless mirror glass, 1/4 inch thick:

1. Size: Provide sizes shown. If not shown, provide continuous one-piece mirrors from top of back splash to the underside of ceiling and extending in one piece the full length of the countertop. Extend mirrors wall to wall where countertop is in an alcove.
2. Prior to installation, field-apply 2 coats of mirror edge sealer to all four edges of each mirror, in accordance with the sealer manufacturer's recommendations.

2.3 FIRE-RESISTANCE RATED FRAMING AND GLAZING SYSTEMS

A. General requirements:

1. Labeling: Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory (Warnock Hersey or Underwriters Laboratory), fire rating period and safety glazing standards.
2. Glazing shall be installed in a rated framing system meeting ASTM E119.
3. Certification: Manufacturer’s certification that assemblies shall be tested to the acceptance criteria of ASTM E119, NFPA 251, UL 263 Standard Test Methods for Fire Tests of Building Construction and Materials.

B. Performance requirements:

1. Duration of Fire Rating: 120 minutes.
2. Fire Resistive Rating: Fire resistive assembly shall meet the radiant heat requirements of ASTM E119. Per ASTM E119 and UL 263 requirements temperature on the non-fire side of glazing and framing at conclusion of fire test exposure shall be below 250∞F above ambient room temperature.

C. Steel Framing System: 120 minute rated.

1. Steel Frame: Profiled steel tubing fully welded.
2. Insulation: Insulate framing system against effects of fire, smoke, and heat transfer from either side. Insulate profiled steel tubing using a shell construction that incorporates Promatect-H intermediate interlayer. Firmly pack perimeter of framing system to rough opening with mineral wool fire stop insulation or appropriately rated intumescent sealant.
3. Steel Glazing Beads: Extruded steel beads with dimensions recommended by manufacturer to securely hold glazing material in place.
4. Fasteners: Type recommended by manufacturer.
5. Glazing Accessories: Set glass using calcium silicate, or setting blocks.

6. Glazing Gaskets, Compounds and tapes: Glaze glass with approved EPDM glazing gaskets and pure silicone sealant.
7. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Technical Glass Products (TGP), Snoqualmie, WA, product: "Fireframes® Heat Barrier Series" frames.

D. Fire rated glazing composed of multiple sheets of glass equal to Pilkington "Optiwhite" low iron, high-visible-light transmission glass laminated with an intumescent interlayer.
1. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Technical Glass Products (TGP), Snoqualmie, WA, "Pilkington Pyrostop" glazing.
2. Insulation: Insulate framing system against effects of fire, smoke, and heat transfer from either side. Insulate profiled steel tubing using a shell construction that incorporates Promatect-H intermediate interlayer. Firmly pack perimeter of framing system to rough opening with mineral wool fire stop insulation or appropriately rated intumescent sealant.
3. Steel Glazing Beads: Extruded steel beads with dimensions recommended by manufacturer to securely hold glazing material in place.

E. Finish:
1. Color-Coated Finish: Apply manufacturer's standard powder coating finish system applied to factory-assembled frames before shipping, complying with manufacturer's written instructions for surface preparation including pretreatment, application, and minimum dry film thickness.
2. Color and gloss: As selected by the Architect from the manufacturer's full range of standard and premium colors.

2.4 FABRICATION

A. General: Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

B. Fabricate glass as required to openings with edge clearances and bite on glass as recommended by the manufacturer with clean-cut edges where concealed, and smooth-ground, polished and seamed edges where exposed to view. Do not cut, seam, nip or abrade glass after heat-tempering.
1. For non-tempered to be cut at site, provide glass larger than required so as to obtain clean cut edges without seaming or nipping.

C. Fabricate glass with the following edge treatments.
1. Exposed edges: Polished-finished radiused (penciled).
2. Concealed edges: Cut edges with minimum edge work.
3. Butt-joint edges: Flat round and finished with edges eased.

D. Shop Fabrication:

1. All vision panels and baffles shall be cut to size by manufacturer or by fabricator prior to delivery to site. All glass edges shall be ground smooth, polished and eased. Provide all necessary holes wherever required by the approved Shop Drawings, drilled and tapped to suite project requirements. Do all cutting and drilling prior to tempering.
2. Mirrors: All mirrors shall be cut to size by fabricator prior to delivery to site. Carefully coordinate and provide notches and holes for mirror installations which are indicated to receive ballet barres, handrails and other products specified in individual Specification Sections, which protrude through mirror installation.

2.5 GLAZING FILMS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. American Window Film
2. 3M Window Film, St. Paul, MN.
3. CP Films, Inc., Martinsville, VA.
4. Decorative Films, LLC, Frederick MD.

B. Glazing Film: 3M Window Film, St. Paul, MN., product: Fasara "Aerina", complying with the following criteria:

1. Ultraviolet Rejected (ASTM E 903): Not less than 99 percent.
2. Visible Light Transmittance (ASTM E 903, ASTM E308): Not more than 75 percent.
3. Visible Light Reflectance (ASTM E 903): Not less than 12 percent.
4. Solar Heat Reduction: Not less than 10 percent.
5. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): Not less than 0.86.

2.6 ACCESSORIES

A. Glazing tape: Preformed butyl-polyisobutylene rubber with 100 percent solids contained in extruded tape roll form and complying with AAMA 804.1; coiled on release paper; of sizes required for proper glazing equal to one of the following:

1. Protective treatments 3030 or 606.
2. Tremco Preshimmed 440.
3. Woodmont Chem-Tape 40.

B. Setting blocks: Neoprene, 80-90 shore A durometer hardness, certified to be "silicone compatible"; sized as follows:

1. Length: 0.1 inch per square foot of glass, but not less than 4 inches.

2. Width: equal to glazing rabbet space minus 1/16 inch.
3. Height to suit glazing method and pane weight and area.

C. Spacers: Neoprene, 60-80 shore A durometer hardness; sized as required.

D. Mirror mastic: Asphalt-based adhesive mirror mastic compatible with mirror backing for adhesive application to wall substrate. Provided mastic wall-board sealer as recommended by adhesive manufacturer.
1. Palmer Products Corporation, Louisville, KY., product: "Palmer Mirror Mastic".
2. Pecora Corporation, Harleysville PA, product "7hr4 Mirror-Tac".
3. Royal Adhesives and Sealants, South Bend, IL, "Gunther Brand" product "Ultra/Bond Mirror Mastic"

E. Mirror mounting clips: Chrome plated brass, nickel plated brass, 'Anachrome' brass, or stainless steel J-shape mirror clips designed for 1/4 inch mirrors, minimum 1 inch support width, equal to C.R. Laurence Co., Inc., Los Angeles CA., "Dallas Mirror Clip", model Nº. 778B.

F. Glazing sealant:
1. General glazing sealant: One-part medium modulus, neutral curing, synthetic rubber sealant, having a useful life expectancy of at least 20 years, conforming to ASTM C 920, Type S, grade NS, Class 25 for uses NT, G and A, FS TT-S-001543A, Type, Class A. Color as selected by Architect.
   a. Dow Corning Corporation, Midland MI; product, "Silicone Glazing Sealant".
   b. General Electric Company (GE Silicones) Waterford NY; product, "SilGlaze II SCS2800".
   c. Tremco, Beachwood OH; product, "Proglaze.

G. Slip solution: Composed of one capful of baby shampoo or dishwashing liquid to 1 gallon of water, or as otherwise recommended by glazing film manufacturer.

H. Bond-breakers and backing materials: Type recommended by manufacturer of sealants and gaskets.

I. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

J. Glazing Shoe: Equal to C.R. Laurence model "WU3B", U-Channel, 1 inch wide by 1 inch deep by length indicated on Drawings. Finish as selected by Architect from manufacturer's full range of available colors.
1. Gasketing: Clear.
2. Header Snap-In Filler: Equal to C.R. Laurence model "NHF12", length as indicated on Drawings, color as selected by Architect from manufacturer's full range of available colors.

K. Ceiling Glazing U-Channel: Equal to C.R. Laurence model "WU2S" 2 inch deep "U" channel, 31/32 inch wide by 2 inch deep by length indicated on Drawings.

1. Fasteners: Sex bolts, 2 minimum per glazing panel.
2. Gasketing: Clear.

2.7 SCAFFOLDS AND STAGING

A. General: Filed Subcontractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.

1. Scaffolding and staging required for use by this Filed Subcontractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-Trade requiring such scaffolding.
2. Each Filed Subcontractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Filed Subcontractor.
4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each workday to prohibit access to the scaffolding by unauthorized individuals.

2.8 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Filed Subcontractor shall be furnished, installed, operated and maintained in safe conditions by this Filed Subcontractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Inspect receiving surfaces and ensure that they are dry and free from dust, or other foreign materials before glazing. Clean all surfaces with cloth saturated with mineral spirits of high-flash naphtha as recommended by glazing tape manufacturer, before glazing.

B. Field Measurements: Verify that field measurements are as indicated on approved Shop Drawings.

1. Check all openings, prior to glazing, to make certain that the opening is square, plumb and secure in order that uniform face and edge clearances are maintained.
2. Determine the actual sizes required by measuring the receiving openings. Size glass and mirrors to permit required clearance and bite around full perimeter of glass, as set forth in the referenced FGMA standards, or as recommended by the glass manufacturer. Do not nip edges, to remove flares or to reduce oversize dimensions, under any circumstance.

C. Beginning of installation means acceptance of existing conditions.

3.2 GENERAL INSTALLATION OF GLASS HAVING PERMANENT LABELS

A. Install glass units so that appropriate manufacturer's permanent label for safety glass, and permanent label for fire-rated glass are visible.

3.3 INSTALLATION - WET GLAZING

A. Utilize wet glazing methods for field installation of glass in exterior storefront and window systems.

B. Place setting blocks at quarter points on web of sill receiving member. Set glass unit in place with equal spaces on all sides.

C. Install spacers at a spacing not exceeding 24 inches apart uniformly around perimeter, between interior face of glass unit and the fixed glazing rabbet.

D. Apply a continuous heel bead of specified sealant between the outer edges if the glass unit and the web of the receiving member, in sufficient quantity to engage the leg of the applied glazing stop, when installed.

E. As the glazing stop is being applied, install spacers between the outer face of the glass unit and the stop, locating the spacers directly opposite the previously installed interior spacers. Install the glazing stops, ensuring that all clearances around the perimeter of the glass unit conform to the requirements of the respective standards referenced herein.

F. Apply a continuous bead of sealant around the exterior and interior perimeters, between the glass unit and the fixed rabbet, and between the glass unit and the applied glazing stop, extending the sealant material slightly above the sight line to permit proper tooling thereof.

G. Tool all exposed sealant at a 45 degree angle away from the glass surface, leaving the sealant surface uniformly dense and smooth.

H. Immediately remove all excess sealant from surfaces of metal and glass.

3.4 INSTALLATION - DRY GLAZING

A. Utilize dry glazing methods for field installation of glass in interior doors and frames.

1. Install in vision panels in fire-rated doors and frames to requirements of NFPA 80.

B. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch (2 mm) above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape for full contact at perimeter of pane.

E. Place glazing tape on free perimeter of glazing in manner as described above.

F. Install removable stop without displacement of tape. Exert pressure on tape for full continuous contact.

G. Knife trim protruding tape.

3.5 INSTALLATION - MIRRORS

A. Examination: Verify that substrates to receive mirrors are plumb, true and of solid construction capable of supporting mirrors.

B. Secure clips at quarter points unless otherwise detailed on the Drawings.

C. Apply mirror mastic in accordance with manufacturer's instructions. Do not cover more than 25 percent of mirror back.

D. Carefully adjust mirrors for perfectly plumb installations and to assure that reflected vertical and horizontal images are parallel to axis of room, and that all mirrors in any gang reflect a true and consistent image across their entire collective face. Distortion of images within any mirror panel, shifting of images, and double joints shall be corrected.

E. Apply mirror into the clips and to the substrate so that areas not covered with mastic will remain open for ventilation with 1/8 inch minimum clearance from substrate. Secure the top edge of mirror with clips.

F. Provide temporary rigid support until mastic sets.

3.6 PROTECTION

A. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free of the glass. Do not apply warning markings directly to the glass.

B. Cover glass to protect it from activities that might abrade the glass surface.

3.7 CLEANING

3.8 CLEAN GLASS SURFACES PROMPTLY AFTER INSTALLATION, EXERCISING CARE TO AVOID DAMAGE TO THE SAME. REMOVE EXCESS GLAZING TAPE, LABELS, DIRT, AND OTHER CONTAMINANTS.

END OF SECTION 08 80 00

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SECTION 08 90 00
LOUVERS AND VENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Prefinished aluminum exterior fixed louvers, and blank panels, complete with aluminum wire mesh bird screens, and related items, for indicated locations.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with AMCA Certification for louvers. Mark units with AMCA Certified Ratings Seal.

1.7 WARRANTY

A. Provide the following warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS:

1. Louver manufacturer's standard warranty.
2. 10 year warranty on louver finish which shall include covering the applied finish against defects, including color fading, chipping, crazing, pitting, and delamination.
3. 10 year warranty on polyvinylidene fluoride enamel finish which shall include covering the applied finish against defects, including color fading, chipping, crazing, pitting, and delamination.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Airolite Company, Marietta OH.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Airolite Company, Marietta OH.
2. Construction Specialties, Inc., Cranford NJ.
3. Industrial Louvers, Inc., Delano MN.

2.2 ARCHITECTURAL LOUVERS

A. Louvers: Continuous blade, drainable architectural louvers in the arrangements and dimensions shown on the Drawings. Louvers shall be stationary, continuous blade, horizontal fixed, drainable louvers; equal to Airolite Model SCH601.

1. Nominal Louver depth: 6 inches (152.4 mm).
2. Framing: Heads, sills, jambs and mullions to be one piece structural members of 6063-T5 alloy minimum 0.081 thick (2.06 mm).
3. Blades: Chevron continuous design, minimum 0.081 inch thick with back lip.
   a. Fabricate louver with close-fitting, field made splice joints in blades designed to permit expansion and contraction without deforming blades or framework and with mullions recessed from front edges of blades so blades have continuous appearance.
4. Designed by louver manufacturer to sustain a wind load of not less than 25 pounds per square foot, and 40 pounds per square foot at the corners.
5. Screen: 1/2 inch mesh by 0.063 inch (1.6 mm) diameter bird screen secured within a extruded aluminum frame.
6. Performance criteria:
   a. Minimum Free Area: 47 percent (As determined in accordance with AMCA Standard 500, and certified by AMCA Standard 511).
   b. Free Area Velocity at beginning point of water penetration: 1,250 FPM.
      1) Water penetration shall not exceed 0.01 ounces of water per square foot of free area at a velocity of 1,250 FPM [6.35 m/s] when tested per AMCA Standard 500.
   c. Air volume delivered at beginning point of water penetration: 9,475 CFM 4.47 m3/s].
   d. Pressure Drop at beginning point of water penetration: 0.32 inches water [0.018 kPa].
7. Provide louvers with concealed vertical mullions.

2.3 MEMBRANE TRANSITION FLASHING

A. Transition flashing: Flexible self-sealing, self-healing, fully adhering composite flexible flashing, .8 mm (30 mils) of self adhesive rubberized asphalt integrally bonded to a heavy foil facer. Membrane shall be interleaved with poly release paper until installed. Provide with manufacturer recommended surface conditioners, termination mastics and pre-formed corners.

1. Product:
   a. Carlisle Waterproofing, product: “Aluma-GRIP 701”.
   b. W.R. Grace, product: “Perm-A-Barrier Aluminum Flashing”.
   c. Or approved equal.
2. Minimum performance characteristics.

a. Water vapor permeance when tested in accordance with ASTM E 96: 0.0876 perms.

b. Tensile strength when tested in accordance with ASTM D 412: 2,500 psi minimum.

c. Elongation when tested in accordance with ASTM D 412: 900 percent.

3. Surface primer: As recommended by wall flashing manufacturer for substrate conditions and materials.

4. Termination mastic: Rubberized mastic or silicone sealant for use in sealing flashing membrane terminations and punctures, as recommended by window manufacturer.

2.4 ACCESSORIES

A. Fasteners and Anchors: Stainless steel type.

B. Primer: Zinc chromate, alkyd type.

C. Metal Flashings: Of same material and finish as louver frame, minimum 0.050 inch thickness.

2.5 FACTORY FINISHING

A. Shop-applied, fully oven cured Polyvinylidene Flouride (PVDF) resin based, high performance thermoplastic organic coating applied to all exposed surfaces, including all exposed screws, fastenings, etc., having a minimum total film thickness of 1.5 mils and conforming to AAMA 2605, NAAMM - Metal Finishes Manual, and the following:

1. Resin base of 70 percent PVDF by weight.

2. Surface preparation: Properly clean metal substrate with inhibited chemical cleaner and pretreat with acid chromate-fluoride-phosphate conversion coating.

3. Primer: Corrosion resistant, polyvinylidene flouride based primer compatible with finish coating, averaging 0.8 mils dry film thickness on exterior and interior surface of panels.

4. Finish coat: Polyvinylidene flouride enamel 0.8 mils dry film thickness on exterior side of panels.

B. Custom color to match metal panels as approved by the Architect.

C. Concealed Steel Items: Galvanized in accordance with ASTM A386 to 2.0 ounces per square foot.

D. Isolation coating to cementitious and dissimilar materials: Apply one coat of bituminous paint or other acceptable coating to concealed aluminum surfaces in contact with cementitious and dissimilar materials

PART 3 - EXECUTION

3.2 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions. Erect louvers plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work.

1. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
2. Secure louvers in opening framing with concealed fasteners.
3. Install bird screen and frame to interior of louver. Hinge screens for access.

B. No permanent exposed to view labels of any kind will be permitted to remain on the louvers or frames.

END OF SECTION 08 90 00

Section 09 00 06

RESILIENT FLOORING FILED SUB-BID REQUIREMENTS
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law - Chapter 149, Sections 44A to 44J inclusive, as amended, and applicable Sections of the MGL, Public Contract Law - Chapter 30.

C. Specification requirements for the Filed Sub-Bid "RESILIENT FLOORING" include all of the following listed Specification Sections: in their entirety:

1. Section 09 00 06 - RESILIENT FLOORING FILED SUB-BID REQUIREMENTS
2. Section 09 65 13 - RESILIENT FLOORING AND ACCESSORIES
3. Section 09 65 43 – LINOLEUM FLOORING

D. The work to be completed by the Filed Subcontractor for the work of this Section is shown on the following listed Drawings, not just those pertaining particularly to this Sub-Trade, unless specifically called out otherwise, regardless of where among the Drawings it appears:

General Drawings: G0.00 through G3.00 inclusive.
Civil Drawings: C1.00 through C9.00 inclusive.
Landscape Drawings: LA.01 through LA.03 inclusive.
Structural Drawings: S0.01 through S3.02 inclusive.
Architectural Demolition Drawings: AD.01 through AD.01 inclusive.
Architectural Drawings: A1.01 through A12.00 inclusive.
Furniture Drawings: F1.01 through F1.02
Plumbing Drawings: P0.01 through P2.02 inclusive.
Fire Protection Drawings: FP0.01 through FP1.03 inclusive.
Mechanical Drawings: M0.01 through M3.03 inclusive
Electrical Drawings: E0.01 through E3.02 inclusive.
Fire Alarm Drawings: FA1.01 through FA1.02 inclusive.
Telecommunications Drawings : T1.00 inclusive

1. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Filed Subcontractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

E. Alternates: Special attention is called to the fact that it shall be the responsibility of the General Contractor and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the General Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated General Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

F. Sub-Bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in INVITATION TO BID and INSTRUCTIONS TO BIDDERS.

1. The following shall appear on the upper left hand corner of the envelope:

   NAME OF SUB-BIDDER: _____
   SUB-BID FOR TRADE: RESILIENT FLOORING

2. Each Sub-Bid submittal for work under this Section shall be on forms furnished by Awarding Authority, as bound herein, accompanied with the required bid deposit.

G. Sub Sub-Bid Requirements: NONE REQUIRED UNDER THIS SECTION.

1.2 EXAMINATION OF SITE AND DOCUMENTS

A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from General Contractor's or Filed Subcontractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.3 SEQUENCING

A. Coordinate work of this Filed Subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

B. Do not order or deliver any materials until all submittals, required in the listed Specification Sections included as part of this Filed Subcontract, have been received and approved by the Architect.

C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

A. General: Filed Subcontractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.

1. Scaffolding and staging required for use by this Filed Subcontractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-Trade requiring such scaffolding.
2. Each Filed Subcontractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Filed Subcontractor.
4. Scaffolding and staging required for use by this Filed Subcontractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-Trade requiring such scaffolding.
5. Each Filed Subcontractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
6. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Filed Subcontractor.

2.2 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Filed Subcontractor shall be furnished, installed, operated and maintained in safe conditions by this Filed Subcontractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION (Not Used)

END OF SECTION 09 00 06

SECTION 09 00 09

PAINTING FILED SUB-BID REQUIREMENTS
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law - Chapter 149, Sections 44A to 44J inclusive, as amended, and applicable Sections of the MGL, Public Contract Law - Chapter 30.

C. Specification requirements for the Filed Sub-Bid "PAINTING" include all of the following listed Specification Sections: in their entirety:

1. Section 09 00 09 - PAINTING FILED SUB-BID REQUIREMENTS
2. Section 09 91 00 – PAINTING
3. Document 09 91 13 - EXTERIOR PAINTING SCHEDULE
4. Document 09 91 23 - INTERIOR PAINTING SCHEDULE
5. Document 09 96 46 – INTUMESCENT PAINTS

D. The work to be completed by the Filed Subcontractor for the work of this Section is shown on the following listed Drawings, not just those pertaining particularly to this Sub-Trade, unless specifically called out otherwise, regardless of where among the Drawings it appears:

General Drawings: G.00 through G2.00 inclusive.
Civil Drawings: C-1 through C-6 inclusive.
Structural Drawings: S0.01 through S2.02 inclusive.
Architectural Demolition Drawings: AD1.00 through AD8.01 inclusive.
Architectural Drawings: A1.00 through A12.01 inclusive, AI1.00.
Furniture Drawings: FP0.00 through F1.02
Plumbing Drawings: P0.00 through P1.01 inclusive.
Fire Protection Drawings: FP0.01 through FP1.03 inclusive.
Mechanical Drawings: M0.01 through M1.03 inclusive; MD1.01.
Electrical Drawings: E0.00 through E4.00 inclusive.
Fire Alarm Drawings: FA0.00 through FA0.10 inclusive.
Security Drawings : SC100 through SC101 inclusive

1. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Filed Subcontractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

E. Sub-Bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in INVITATION TO BID and INSTRUCTIONS TO BIDDERS.

1. The following shall appear on the upper left hand corner of the envelope:

   NAME OF SUB-BIDDER: _____
   SUB-BID FOR TRADE: PAINTING

2. Each Sub-Bid submittal for work under this Section shall be on forms furnished by Awarding Authority, as bound herein, accompanied with the required bid deposit.

F. Sub Sub-Bid Requirements: NONE REQUIRED UNDER THIS SECTION.

1.2 EXAMINATION OF SITE AND DOCUMENTS

A. Bidders are expected to examine and to be thoroughly familiar with all contract documents and with the conditions under which work will be carried out. The Awarding Authority (Owner) will not be responsible for errors, omissions and/or charges for extra work arising from General Contractor's or Filed Subcontractor's failure to familiarize themselves with the Contract Documents or existing conditions. By submitting a bid, the Bidder agrees and warrants that he has had the opportunity to examine the site and the Contract Documents, that he is familiar with the conditions and requirements of both and where they require, in any part of the work a given result to be produced, that the Contract Documents are adequate and that he will produce the required results.

B. Pre-Bid Conference: Bidders are strongly encouraged to attend the Pre-Bid conference; refer to INVITATION TO BID for time and date.

1.3 SEQUENCING

A. Coordinate work of this Filed Subcontract with that of other trades, affecting or affected by this work, and cooperate with the other trades as is necessary to assure the steady progress of work.

B. Do not order or deliver any materials until all schedules and submittals, required in the listed Specification Sections included as part of this Filed Subcontract, have been received and approved by the Architect.

C. Before proceeding with installation work, inspect all project conditions and all work of other trades to assure that all such conditions and work are suitable to satisfactorily receive the work of this Section and notify the Architect in writing of any which are not. Do not proceed further until corrective work has been completed or waived.

PART 2 - PRODUCTS

2.1 SCAFFOLDS AND STAGING

A. General: Filed Subcontractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.

1. Scaffolding and staging required for use by this Filed Subcontractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-Trade requiring such scaffolding.
2. Each Filed Subcontractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).
3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Filed Subcontractor.
4. Scaffolding and staging required for use by this Filed Subcontractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-Trade requiring such scaffolding.
5. Each Filed Subcontractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).

2.2 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Filed Subcontractor shall be furnished, installed, operated and maintained in safe conditions by this Filed Subcontractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION (Not Used)

END OF SECTION 09 00 09

SECTION 09 01 23
PLASTER PATCHING AND REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Patch existing damaged, deteriorated and unsound lath, plaster and trim:

1. Patch all existing lath, plaster and trim disturbed by new construction.
2. Patch all cracks in existing plastered surfaces which are to remain and which are indicated or required to be painted or receive a wall covering.
3. Patching and replacement of missing plaster with three coat wet-plaster system where designated on the Drawings, as additionally identified and field, and as further directed by Architect. Work includes metal lath, plaster base coats and finish coat, trim accessories, and related items.
4. Resecuring unsound and loose existing plaster to lath.
5. Restoration of damaged ornamental plaster and decorative plaster molding; replace missing portions.

B. Furnish and install three coat wet-plaster system, installed over interior surfaces, where designated on the Drawings, including metal lath, plaster base coats and finish coat, trim accessories, and related items.

C. Furnish and install decorative plaster moldings as indicated on Drawings

D. Install access panels occurring in the work of this section, furnished under Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.

E. Repair methods: The exact repair procedures shall be reviewed in the field, based on the guidelines and materials specified herein. Review all procedures with the Architect and obtain acceptance prior to commencing the work. Repair methods selected shall take into account the total construction system of the existing building.

1.5 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Metal lath and accessories

a. United States Gypsum Company, Chicago IL.
b. National Gypsum Company, Gold Bond Products Division, Charlotte NC.
c. Georgia Pacific Corporation, Gypsum Division, Atlanta GA.

2. Plaster Materials:
   a. United States Gypsum Company, Chicago IL.
   b. National Gypsum Company, Gold Bond Products Division, Charlotte NC.
   c. Georgia Pacific Corporation, Gypsum Division, Atlanta GA.
3. Polyvinyl chloride trim and accessories:
   a. Plastic Components, Inc. (PC) Miami FL.
   b. Vinyl Corporation, Miami FL.
   c. Alabama Metal Industries Corporation, (AMICO)Birmingham, AL.

2.2 LATHING MATERIALS

A. Diamond mesh lath: Expanded metal lath with (small diamond) 5/16 inch wide diamonds, prime painted, weighing 3.4 pounds per square yard and complying with ASTM C 847.

B. 3/8 inch Rib lath: Expanded metal lath, with opposed 'U-shaped' 3/8 inch deep solid metal ribs at 1-15/16 inches on center, weighing 3.4 pounds per square yard, prime painted and complying with ASTM C 847, equal to Gold Bond product "3/8 inch Rib Lath"

2.3 PLASTER MATERIALS

A. Patching plasters: Gypsum plaster for patching work shall in general match existing plaster for texture and finish.

B. Portland cement: Conforming to ASTM C 150, Type I or II.

C. Lime: Pressure-hydrated finishing lime, conforming to ASTM C 206, Type S.

D. Sand: Clean, sharp, free from alkali, salt, and quicksand, containing not more than 5 percent loam or clay, graded from coarse to fine, and conforming to ASTM C 35.

E. Gypsum plaster for basecoats of gypsum gauging plaster finish: High strength gypsum plaster, conforming to ASTM C 28, USG Structo-Base Gypsum Plaster, or equal.

F. Gypsum gauging plaster for finish coat: High strength gypsum gauging plaster, conforming to ASTM C 28, USG Structo-Gauge Gauging Plaster, or equal.

G. Water: Clean, potable, and free from deleterious amounts of oils, salts, alkali, organic matter, and other foreign matter.

2.4 DECORATIVE PLASTER

A. Gypsum special plaster for molded cornices and trim: Fine grain gypsum gauging plaster, conforming to ASTM C 28, and FS SS-P-00402B, Type V, equal to USG product "Moulding Plaster".

2.5 ACCESSORIES

A. Galvanized steel accessories:
   1. Casings: 3/4 inch ground.
   2. Corner beads: Minimum 2 7/8 inch expanded flanges.
   3. Inside corner reinforcement: 4 inch strip of diamond mesh lath bent at the center to a 100 degree angle.
   4. Expansion joints: Double V with expanded flanges, 3/4 inch ground.

B. Polyvinyl chloride accessories conforming to ASTM standards D-1784, D3678, and D-4216, for interior plaster work:
   1. Casings:
      a. At patching work: PVC with depth of ground to match existing, 2 inch leg and 1/4 inch exposed flange.
      b. At new construction: Casings: 3/4-inch deep ground, with 2 inch leg and nominal 1/4 inch exposed flange.
         1) PC Model No. 1075X.
         2) Vinyl Corp.: Model No. 6675.
         3) AMICO Model No. AM66-750.
   2. "Arch" Casings for curved conditions:
      a. At new construction: Casings: 3/4-inch deep ground, with 2 inch leg and nominal 1/4 inch exposed flange.
         1) PC Model No. 1075A.
         2) Vinyl Corp.: Model No. 6675A.
         3) AMICO Model No. AM66-750.
   3. Straight Corner beads: PVC with 2-1/2 inch legs, or equal.
      a. PC Model No. 1A.
      b. Vinyl Corp.: Model No. 1.
      c. (AMICO) Model No. AMX-1 ARCH.
   4. Arched Corner beads (for curved conditions): PVC with 2-1/2 inch legs, or equal.
      a. PC Model No. 1A.
      b. Vinyl Corp.: Model No. 1ARCH.
      c. (AMICO) Model No. AMX-1.
   5. Expansion joints: PVC "M" profile, with depth to match existing plaster system.

a. PC Model No. 2175X.
b. Vinyl Corp. Model No. 1575.
c. AMICO Model No. AMCJM-750.

6. Expansion joints: PVC "V" profile, with removable tape, with depth to match existing plaster system. Provide with compatible control joint intersection trim pieces.
   a. PC Model No. 2075.
   b. Vinyl Corp. Model No. 1575X.
   c. AMICO Model No. AMCJX-750.

C. Wire for tying metal lath to itself, and for tying polyvinyl chloride accessories to lath: 18 gauge galvanized annealed steel wire.

D. Fasteners: For attaching metal lath to concrete: Galvanized flat-head expansion screws, 1-1/4 inches long, equipped with 1/2-inch diameter galvanized steel washers.

2.6 PLASTER MIX

A. Mix and proportion plaster in accordance with ANSI/ASTM C 842 and the plaster manufacturer's instructions.
   1. Use containers of known capacity, or by information contained on the specific packages, and accurately mix the materials.
   2. Do not use any lumpy or frozen materials in the mixes.
   3. Ensure that all mixing equipment, tubs, and tools are absolutely clean, before commencing the mixing operations.
   4. Use specified mix proportions, except where variations thereto would be more suitable due to prevailing conditions, and only when such variations are submitted to, and approved by, the Architect.
   5. Continue mixing process until all materials are evenly distributed and blended.
   6. Mix only the amount of material which may be applied within 2 hours.

B. Scratch coat plaster: 2 cubic feet of sand per 100 pounds of specified basecoat plaster.

C. Brown coat plaster: 3 cubic feet of sand per 100 pounds of specified basecoat plaster.

D. Finish coat plaster: One part lime or lime putty and one part specified finish gauging plaster, with sufficient amount of water added to make the mix workable, in accordance with the manufacturer's recommendations.

PART 3 - EXECUTION

3.3 PATCHING - GENERAL

A. Patching of plaster shall match existing work in texture and finish, and at joining with plaster previously applied, shall finish flush and smooth. Heavy textured sandpaper of other abrasive shall not be used to clean or smooth off finished plaster surfaces.

B. Remove deteriorated plaster from existing plastered surfaces which are to remain. Cut out deteriorated plaster to a point where sound plaster is encountered. Remove plaster base if base is found to be deteriorated.

C. Install steel framing and metal lath as required to apply plaster for patching. Overlap new and existing lath at least 2 1/2 inches, and secure the two together every 6 inches on center.

D. Apply 3 coat plaster system over lath. Plaster finish shall identically match existing plastered surface. Patch existing plastered ceilings so as to maintain fire resistance integrity of the entire ceiling.

E. Patch holes or openings 1/2 inch or less in diameter, or equivalent size, with patching plaster.

F. Through wall cracks on plastered surfaces shall be cut back to the base and 6 inches on each side of crack and attach wire lath to this area and replaster with scratch, brown and finish coats. Surface shall be flush and smooth with existing.

END OF SECTION 09 01 23

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SECTION 09 01 66
REFINISHING WOOD FLOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Perform complete sanding and finishing operations for exposed to view surfaces of all existing wood strip flooring scheduled to remain in place, including flooring patches, and wood edgings furnished hereunder.

1. As part of the scope of this section, patch to match existing wood strip flooring as required.

1.5 QUALITY ASSURANCE

A. Manufacturer: Companies specializing in manufacturing the products specified in this Section, each with minimum 5 years documented experience.

B. Installer specializing in applying the work of this Section with a minimum of 5 years documented experience of the type of flooring system specified.

C. Each board of flooring shall bear grade stamp on underside identifying Grading authority, manufacturer's identification, wood species and grade.

1.10 WARRANTY

A. Provide 5 year warranty under provisions of the Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include coverage for all costs to repair or replace flooring, which shrinks, warps, cracks, or otherwise deteriorates excessively, or which breaks its anchorage, or bond with substrate, or otherwise fails. Warranty shall cover failures due to materials or workmanship. The Installer is not responsible for failure due to excessive moisture penetration through concrete substrate or other similar causes for failure which are beyond the Work of this Section, except verification of acceptable substrates, specified herein.

1.11 EXTRA MATERIALS

A. Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance, an amount equal to [10] square feet of finish and type flooring installed, with an appropriate quantity of adhesive for installation.

B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Finishing:

1. Sandpapers: Number 1-1/2 graduating to 1/2; followed by Numbers 0 and 00 for final sanding, except as otherwise recommended by the flooring manufacturer.
2. Filler: Paste wood filler, in tone as selected by the Architect.
3. Floor finish: Water base catalyzed urethane coating system, as manufactured by Basic Coatings, Des Moines IA., product "Street ShoeXL Commercial Wood Floor Finish".
   a. VOC: Catalyzed, not exceed 350 grams per liter.
   b. Solids content: 31 percent.
   c. Luster Satin finish, 30 units at 60 degrees on wood.

2.2 ACCESSORIES

A. Protection paper: Waxed kraft paper. or red rosin paper.

B. Fasteners:
   1. Fasteners for plywood underlayment: Power-actuated fasteners of appropriate size for the specific substrate.
   2. Fasteners for flooring: 7d or 8d cut nails or screw-type nails, or other fasteners as recommended by the flooring manufacturer, for blind-method installation over plywood underlayment.

C. Filler for patching, smoothing and leveling subfloors and underlayment: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
   1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
   2. Quikrete Companies, product "Fast-Set Underlayment 1248".
   3. Silpro Masonry Systems Inc., product "Masco Latex Cement"

PART 3 - EXECUTION

3.3 INSTALLATION / PATCHING OF IN SITU FLOORING

A. Remove existing floor board to be replaced by cutting with a saw as follows:
   1. Set saw at a depth not to exceed the thickness of the existing flooring making two passes approximately 1/2 inch from each side of the adjacent floor boards.
   2. Do not cut past the end joints of the piece being replaced.
   3. Create a third cut on an angle between the first two cuts avoid cutting through the side match. Use a sharp chisel to remove the cut pieces.
   4. Clean and vacuum the groove and area around the repair, making sure all debris is removed.

B. Install replacement flooring:

1. Cut the replacement piece of flooring to the exact length and ensure a tight fit with no cracks at the end joints.
2. Remove the bottom of the groove of the replacement board. Bevel each end of the board. Dry fit the replacement piece before installation.
3. Install the replacement board using a two-part epoxy adhesive recommended by the flooring manufacturer. Apply adhesive in the groove and on the tongue of the existing boards adjoining the repair and the tongue and groove on the replacement piece. Allow adhesive to set for a minimum of 8 hours prior to sanding and refinishing.

3.4 REFINISHING EXISTING FLOORING

A. Nail loose boards and patch existing flooring with wood plugs.

B. Remove dirt and built-up waxes by wiping floors with mop or cloth moistened with mineral spirits, or sealer as recommended by Maple Flooring Manufacturers Association and sealer/finish manufacturer, and immediately wipe dry. Remove white spots using specialized wood floor cleaners; remove all rubber heel marks, wipe areas dry.

1. Review with Architect in field stained areas of existing flooring, lightly sand where directed to remove stains..

C. Touch-up existing finish staining to match color and shade, and allow to thoroughly dry.

3.5 FINISHING

A. Prior to commencing application of finishing products, measure moisture content of flooring using moisture meter, and record results.

B. Stain wood to color and tone to match architect's accepted sample, applying stain at approximately 100 square feet per gallon; allow stain to fully dry, verify with moisture meter.

C. When stain has cured, apply one coat of Basic Coatings product "Hydroline sealer" as recommended by manufacturer. When that moisture content of wood is same as original prior to application, sand/buff coat with a used 120 grit screen.

D. Vacuum up all dust and tack with a clean water dampened towel. Apply second coat of sealer and, repeat sanding and cleaning procedures.

E. Permit sealer to dry overnight prior to finishing with catalyzed urethane. Re-sand and clean as required.

F. Mix catalyst with urethane in strict adherence to manufacturers' instructions. Apply one coat of catalyzed urethane with a coverage rate as recommended by manufacturer. When manufacturer recommends first coat should be dry, check the moisture content of wood. When moisture content is same as original prior to application, sand with used 120 grit screen, clean and apply second coat. This

should occur between 3 and 5 hours after first coat. If more than 5 hours has lapsed prior to starting the second coat of urethane, repeat sanding and cleaning procedures specified above and apply second coat.

END OF SECTION 09 01 66

SECTION 09 05 60

COMMON WORK RESULTS FOR FLOORING
(FILED SUB-BID REQUIRED AS PART OF SECTION 09 00 06)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. Sub Bid Requirements: As provided under Section 09 00 06 - RESILIENT FLOORING FILED SUB-BID REQUIREMENTS and supplemented under the Bidding Requirements, Contract Forms, and Conditions of the Contract, and applicable parts of Division 1 - GENERAL REQUIREMENTS.

1. Work of this Filed Sub-Bid includes all individual specification sections listed in Section 09 00 06.

1.2 SUMMARY

A. This Section includes general requirements for flooring preparation, installation and temporary protection.

1. Prepare substrates to receive flooring as required to ensure specified tolerance level for finish surface of all work required by this Filed subcontract. Preparation work includes patching, smoothing and leveling substrate, including:

a. Grinding down high spots of substrate.

b. Providing Portland cement-based latex underlayment (filler).

2. Provide independent testing laboratory services to perform relative humidity, moisture vapor emission, and pH tests on in situ concrete slabs, which shall be in addition to testing as may be performed by Owner.

1.6 RELATIVE HUMIDITY, MOISTURE VAPOR EMISSION AND ACIDITY/ALKALINITY (PH)TESTING

A. Concrete slabs and floors:

1. Resilient Flooring Filed Subcontractor shall employ and pay for services of an independent testing laboratory to perform relative humidity, moisture vapor emission, and pH tests on concrete slabs as follows. The test shall be witnessed by the Contractor, and Owner's Project Manager.

a. Relative Humidity, Moisture Vapor Emission and pH Testing on all concrete slabs over-which a finished floor is to be installed. This includes, but is not limited to:

1) Resilient flooring.

2) Linoleum flooring.

b. Perform moisture and pH tests on all concrete floors over-which stone flooring is to be applied.

2. Requirements: As specified under Part 3 of this Section.

a. Submit 1 copy of test data to the installers of all flooring materials or coating materials scheduled to be installed.

b. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

PART 2 - PRODUCTS

2.1 PATCHING AND FILLING COMPOUNDS

A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:

1. Ardex, Inc., products “Feather Flash” and “Ardex SD-P”.

2. Quikrete Companies, product “Fast-Set Underlayment 1248”.

3. Silpro Masonry Systems Inc., product “Profinish”.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that spaces to receive flooring finishes are suitable for installation. Do not proceed with work until unsatisfactory conditions are corrected. Comply with manufacturer's recommendations including the following:

1. Substrates shall be dry and clean.

2. Substrates shall be free of depressions, raised areas, or other defects which would telegraph through installed flooring.

3. Verify concrete substrates have a flat tolerance of 3/16" in ten linear feet.

4. Temperature of resilient flooring and substrate shall be within specified tolerances.

5. Moisture condition and adhesive bond tests shall be performed as specified herein.

B. For applications on concrete, verify curing, hardening, or breaking compounds have not been used. If there are any, do not proceed until compounds have been removed as specified.

C. For applications on concrete slab on grade or below grade, verify vapor barrier below slab was installed. If no vapor barrier was installed, do not proceed with work unless written acceptance of such conditions is received and submitted.

D. Perform testing of in situ concrete, relative humidity and surface pH testing to all concrete slabs specified to be covered with floor coverings or resinous coatings as specified herein. Do not proceed with work until results of moisture condition tests are acceptable.

3.2 PREPARATION

A. General: Comply with flooring manufacturer's requirements for preparation of substrate to receive resilient flooring.

B. Vacuum clean substrate, and ensure that substrate is dry, clean and smooth prior to application of flooring.

C. Remove, by light sanding and grinding, all protruding edges, high spots.

D. Ensure substrate is flat to a plus or minus 1/8 inch in 10 feet tolerance. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

E. Ensure that substrate is free from paint, varnish, wax, oil or other foreign matter.

F. Apply primers as recommended by adhesive manufacturer's written instructions.

G. Condition flooring materials, accessories and adhesives to room temperatures for a period of 48 hours minimum.

3.3 TESTING IN SITU CONCRETE SUBSTRATES

A. Scope:

B. Scheduling:

1. Testing shall take place after allowing concrete to dry for a minimum of 90 days. Testing to be scheduled no less than one, nor more than three weeks prior to scheduled flooring installation.

a. DO NOT conduct testing unless the slab environment is identical to that In which the finished flooring Is to be installed.

2. In the event new flooring is to be installed over existing resilient flooring, remove the portion of the existing flooring and adhesive directly under the area where testing will be conducted. Patch flooring to match existing construction after completion of testing.

C. Test result submittals:

1. Report all test results in chart form listing test dates, time, depth of test well, in situ temperature, relative humidity, moisture vapor and pH levels.

2. List test locations on chart and show same on marked up Floor Plan Drawings.

3. Submit results In duplicate. Deliver copies directly to Architect, Owner's Project Representative and General Contractor.

D. Testing equipment: shall be equal to the following

1. For relative humidity testing:

a. Digital Meter and Calibrated Humidity and Temperature probe kit as manufactured by Vaisala Inc. (Boston Office) 10D Gill Street, Woburn, MA, 01801 (telephone 781-933-4500).

1) Minimum 2 point probe calibration.

2. For calcium chloride testing:

a. Anhydrous calcium chloride testing in accordance with Rubber Manufacturer's Association (RMA) Test requirements.

b. Test kits: Vaprecision, inc. 2941 West MacArthur Boulevard, Suite 135. Santa Ana, CA 92704 (telephone 800-449-6194).

3. For pH testing:

a. pH test paper by Micro Essential Laboratory, Inc., P.O. Box 100824 4224 Avenue “H”, Brooklyn, NY 11210.

b. Distilled or de ionized water.

E. Testing Procedures Quantification of Relative Humidity

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F), and 50 percent (plus or

minus 10 percent) relative humidity. When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be Included with the test report.

2. The number of In situ relative humidity test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 in the first 1,000 square feet and 1 per each additional 1,000 square feet.

3. Drill test holes utilizing a rotary hammer drill. Hole diameter shall not exceed outside diameter of test sleeve by more than 0.04 inch. Drilling operation must be dry. Determine the thickness of the concrete slab from Construction Documents. Depths of test holes shall be as follows:

   a. For elevated slabs (not poured in pans): Drill test holes to a depth equal to 20 percent of the concrete thickness.

   b. For slabs on grade and elevated slabs in pans: Drill test holes to a depth equal to 40 percent of the concrete thickness.

4. Vacuum all concrete dust from test hole.

5. Insert a hole liner, or sleeve, to the full depth of test hole, assuring that the liner is capped or plugged at the end protruding from the concrete surface.

6. Permit the test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.

7. Remove the sleeve plug and place a probe into the sleeve assuring that it reaches the bottom of the test hole.

8. Allow the probe to sit in the test sleeve for 30 minutes before taking readings.

9. Read and record temperature and relative humidity at the test site.

F. Testing Procedures - Quantification of Concrete Moisture Vapor Emission through Calcium Chloride Testing.

1. The test site should be maintained at the same temperature and humidity conditions as those anticipated during normal occupancy. These temperature and humidity levels should be maintained for 48 hours prior and during test period. If meeting this criteria is not possible, then minimum conditions should be 75 degrees F (plus or minus 10 degrees F) and 50 percent relative humidity (plus or minus 10 percent). When a building is not under HVAC control, a recording hygrometer or data logger shall be in place recording conditions during the test period. A transcript of this information must be included with the test report.

2. The number of vapor emission test sites is determined by the square footage of the facility. The minimum number of tests to be placed is equal to 3 In the first 1.000 square feet and I per each additional 1,000 square feet.

3. Tests sites are to be cleaned of all adhesive residue, curing compounds, paints, sealers, floor coverings, and similar materials. 24 hours prior to the placement of test kits.

4. Weigh test dish on site prior to start of test. Scale must report weight to 0.1 grams. Record weight and start time.

5. Expose Calcium Chloride and set dish on concrete surface.

6. Install test containment dome and allow test to proceed for 60 to 72 hours.

7. Retrieve test dish by carefully cutting through containment dome. Close and reseal test dish.

8. Weigh test dish on site recording weight and stop time.

9. Calculate and report results as pounds of emission per 1,000 square feet per 24 hours."

G. Testing Procedures Quantification of Acidity/Alkalinity (pH) Level

1. At or near the relative humidity test site and each vapor emission (calcium chloride) test site, perform pH test.

   a. At each testing site, lay down a loose 2 foot by 2 foot sheet of non perforated sheet backed by plywood. Leave in place for 48 hours.

   b. Remove sheet and place several drops of distilled or de ionized water onto the concrete surface to form a puddle approximately 1 inches in diameter.

   c. Allow the water to set for approximately 60 seconds.

   d. Dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading

2. Record and report results.

H. Testing Procedures:

1. Initial testing: Provide 3 tests for the first 1,000 square feet.

2. Add one test for each additional 1,000 square feet.

3. Concrete surface area to be tested shall be completely clean. Remove all adhesives, residue, debris and sealing compounds. Remove all dust by vacuum or other methods. Do not use chemicals of any kind to clean concrete.

4. Perform moisture tests in strict accordance with the kit manufacturer's Instructions. Moisture tests shall remain undisturbed for 60 to 72 hours.

5. Immediately after moisture test has been removed from test area, conduct pH test in area previously covered by plastic dome of moisture test kit.

6. After completion of tests submit 2 copies of test data to the Architect. Submit a copy of the test data to all installers of flooring materials and resinous flooring materials scheduled to be installed.

7. Provide additional testing in the event test results indicate higher moisture content than recommended by the flooring material and coating material manufacturers for the installation of their products. Perform such additional testing, at no additional cost to the Owner, after procedures have been performed to reduce moisture content to ratings acceptable to the various flooring and coating manufacturers.

3.4 FLOOR PREPARATION – GENERAL REQUIREMENTS

A. General: Comply with ASTM F 710-92 and manufacturer's recommendations for surface preparation. Remove substances incompatible with resilient flooring adhesive by method acceptable to manufacturer.

1. Concrete floors with steel troweled (slick) finish shall be properly roughened up (sanded) to ensure suitable adhesion.

B. Fill voids, cracks, and depressions with trowel-applied leveling compounds acceptable to manufacturer. Remove projections and repair other defects to tolerances acceptable to manufacturer.

C. Vacuum subfloors immediately prior to installation to remove loose particles.

3.5 ADHESIVE BOND TESTING

A. Use the specified flooring and recommended adhesive, install approximately 3 by 3 foot sized flooring as specified under individual flooring specification sections. Install test samples approximately 50 feet apart throughout the area. Areas next to walls or other light traffic areas should be selected for the bond test. Tape down the perimeter of the flooring to prevent drying of the adhesive at the edges. After a minimum period of 72 hours the flooring should be pulled from the subfloor. If an unusual amount of force is required, the bond could be considered sufficient. Floors demonstrating unsuitable bond to substrate require modifications to flooring installation and may require application of moisture mitigation products. Review all conditions with Architect/Engineer.

3.6 PROTECTION

A. Provide protection of completed flooring areas from construction traffic until Substantial Completion of the General Contract. Cover all floor surfaces with heavyweight kraft paper and overlay with red-rosin paper, taping the edges to maintain position of the protection paper. Reapply papers to maintain floor protection.

END OF SECTION 09 05 60

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of non-load bearing metal framing for partitions, ceilings, and soffits, where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Furnish and install:

1. Metal furring and framing where indicated on the Drawings, including cross bracing and knee bracing.

2. Reinforcing plate blocking.

3. Deflection track assemblies at tops of metal stud partitions.

a. Provide fire-rated assemblies at fire-rated, corridor, and smoke partitions.

b. Provide non fire-rated assemblies at all other partitions.

1.5 QUALITY ASSURANCE

A. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Seismic Compliance: Nonstructural components that are permanently attached to structures and their support attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance to local jurisdiction

C. Applicator, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

D. Obtain products required for the Work of this Section from a single manufacturer.

1.9 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Metal components and related items:
    a. Dietrich Industries, Inc., Pittsburgh, PA.
    b. Georgia Pacific Corporation, Gypsum Division, Atlanta, GA.
    c. Marino Industries Corp., South Plainfield, NJ.
    d. National Gypsum Company, Gold Bond Products Division, Charlotte, NC.
    e. Unimast Incorporated, Franklin Park, IL.
    f. USG Corporation, Chicago, IL.
2. Suspended furring system for ceilings and soffits:
    a. Armstrong World Industries, Inc., Lancaster, PA.
    b. Chicago Metallic Corporation, Chicago, IL.
    c. USG Corporation, Chicago, IL.

B. The design and details as shown on the drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 FRAMING MATERIALS

A. "Hat shaped" Furring channels: 7/8 x 2-3/4 inch, roll formed, hat-shaped, furring channel 22 gage hot-dip galvanized steel galvanized steel conforming to ASTM C 645.

B. Studs: 'C-shaped' screw studs, hot-dip galvanized steel complying to ASTM C 645, 20 gage (0.0329 inch minimum thickness), of widths indicated on the Drawings, or other gages as required under the specified standards to meet fire resistance ratings.

C. Runners for metal studs: 'U-shaped' hemmed, hot-dip galvanized steel track conforming to ASTM C645, of gage and width to match respective stud sizes, or heavier gage per design requirements, having 1-1/4 inch leg, provided at tops and bottoms of all studs and at heads of all openings in stud partitions.

D. Internal reinforcement for various stud conditions, and bracing as required: 10 gage, minimum, galvanized steel.

E. Furnish cross bracing and knee bracing, as required to assure a completely rigid assembly on metal stud partitions and furred areas.

2.3 DEFLECTION TRACK ASSEMBLIES

A. Non Fire-Rated Assemblies

1. Deflection Track: Manufacturer's standard top runner with extended flanges designed to prevent cracking of gypsum board applied to interior partitions resulting from deflection of the structure above fabricated from steel sheet complying with ASTM A 653 or ASTM A 568. Thickness as indicated for studs, and width to accommodate depth of studs, and the following configuration.

    a. Top runner with extended deep flanges that either have V-shaped offsets that compress; slots 1 inch o.c. that allow fasteners attached to studs through the slots; or 16 gage sliding clip assemblies attached to top track and clipped to stud.

    b. Deflection track assemblies shall allow for movement of a minimum of 1 inch.

B. Fire-Rated Assemblies: Head of wall dynamic fire rated joint systems for head of wall assemblies in compliance with UL 2079 HW-D classified assemblies. Provide one of the following systems:

1. Deflection track / clip system: The Steel Network, Inc., product "VertiClip", including step bushings. Clips and track 20 gage, and of width to accommodate depth of studs indicated.

2. Deflection slip track System: Comply with requirements of ASTM C 645 except configuration, of thickness indicated for studs and width to accommodate depth of studs indicated with flanges offset to accommodate gypsum board thickness.

    a. Fire Trak Corp., Kimball, MN products:

        1) "Shadowline" at balanced and unbalanced fire-rated assembly partitions.

        2) "Cavity Shadowline" at shaftwall and chase wall (double stud) partitions.

    b. Deflection track assemblies shall allow for movement of a minimum of 1 inch.

3. Coordination: Verify with partition schedule on the Drawings to ensure proper depth of flange offsets at various partitions types.

2.4 CEILING AND SOFFIT SUSPENSION MATERIALS

A. Hanger attachments: Galvanized steel hanger eyes, of size and capacity to safely sustain a live load of at least 150 pounds per hanger attachment.

B. Hangers: Soft temper, pre-stretched galvanized carbon steel wire, conforming with ASTM A641, with a yield stress load of at least three times design load, but not less than 12 gage.

C. Grid system for direct attachment of gypsum board: Comprised of double web main furring tees, 1 1/2 inches high by 1-3/8 inches flange face by 0.020 inch thick; double web cross tees, 1 1/2 inches high by 15/16 inch flange face by 0.020 inch thick; 0.020 inch thick wall channels, with 1 1/2 inches interior web height; and all splices, clips, and related items. Provide Underwriters Laboratories Label fire-rated assemblies for locations requiring fire-rated ceilings and soffits

1. Chicago Metallic product "system 640 Furring System".
2. Armstrong Word Industries product "Drywall Furring System".
3. Donn (USG) Corporation, Chicago IL., product "USG Drywall Furring System" with DGLW tees.

2.5 CEILING AND SOFFIT FRAMING MATERIALS

A. Carrying channels, 2 inches deep, 16 gage cold-rolled channels, galvanized.

B. Support channels: 3/4 inches deep, 16 gage cold-rolled channels, galvanized.

C. Furring Channels: 7/8 x 2-3/4 inch, roll-formed, hat-shaped, furring channel 25 gage hot-dip galvanized steel galvanized steel conforming to ASTM C 645.

D. Metal Studs used in ceiling framing: 'C-shaped' screw studs, hot-dip galvanized steel complying to ASTM C 645, 25 gage, of widths indicated on the Drawings, or other gages as required under the specified standards to meet fire resistance ratings.

E. Coordination: Verify with partition schedule on the Drawings to ensure proper depth of flange offsets at various partition types.

2.6 ACCESSORIES

A. Metal sheet plate blocking and bracing, where indicated: galvanized sheet 0.0312 inch thickness (20 gage).

B. Fasteners:

1. Expansion-type fasteners for securing vertical concrete and masonry surfaces.
2. Concrete stub nails for securing runners to concrete.
3. Nº.7 by 7/16 inch Pan head self-drilling screw to attach metal framing components.

PART 3 - EXECUTION

3.1 INSTALLATION, QUALITY STANDARDS

A. General: Perform erection procedures for the various gypsum board system conditions, except as otherwise specified, as set forth in GA 201, GA 206, the written instructions of gypsum board manufacturer, together with the additional requirements specified herein and as indicated on the Drawings.

B. Wherever fire-resistive rated assemblies are indicated on the Drawings, erect gypsum board systems in strict accordance with the manufacturers' UL listed test constructions for the required fire rating on each specific assembly.

END OF SECTION 09 22 16

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SECTION 09 26 13
GYPSUM VENEER PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

A. The work of this Section consists of veneer plaster finishes with trim, for partitions, ceilings, and soffits, where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Patch all existing veneer plaster disturbed by new construction.

1. Patch all cracks in existing plastered surfaces which are to remain and which are indicated or required to be painted or receive a wall covering.

C. Furnish and install:

1. Two-coat veneer plaster complete with gypsum plaster base, metal screeds, grounds and expansion/control joints, trim accessories, and all related items.
2. Acoustical joint sealant and backing at perimeter of veneer plaster partitions.

D. Install access panels occurring in veneer plaster work furnished by Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain plaster base and veneer plaster from a single manufacturer, or from manufacturers recommended by the prime manufacturer of plaster system.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Plaster base, veneer plaster and related items:
   a. United States Gypsum Company, Chicago IL.
   b. National Gypsum Company, Gold Bond Products Division, Charlotte NC.
   c. Georgia Pacific Corporation, Gypsum Division, Atlanta GA.
   d. Lafarge Corporation, Hendron VA.
2. Polyvinyl chloride (PVC) trim and accessories:
   a. Plastic Components, Inc., Miami FL.
   b. Vinyl Corporation, Miami FL.

c. Alabama Metal Industries Corporation, (AMICO)Birmingham, AL.

3. Acoustical Joint Sealants:

a. Tremco, Beachwood OH.

b. United States Gypsum Company, Chicago IL.

c. Pecora Corporation, Harleysville PA.

B. The design and details as shown on the drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 DESCRIPTION

A. Regulatory Requirements

1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.

2. Fire resistance ratings: Where veneer plaster systems with fire-resistance ratings are indicated, provide materials and assemblies of the rating required, tested per ASTM E 119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters.

3. Seismic Compliance: Nonstructural components that are permanently attached to structures and their support attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance to local jurisdiction.

2.3 BOARD MATERIALS

A. Fire rated gypsum base: Type “X” panels complying with ASTM C 588 and UL classified ‘Type IP-X1’ for use in UL fire resistance rated assemblies, 5/8 inch thick, of lengths to minimize end joints, with tapered edges.

1. Acceptable products include the following, or approved equal:

a. USG Imperial brand “Firecode Core”

b. National Gypsum Company, Gold Bond brand product “Kal-Kore Fire-Shield Type X”.

c. Georgia Pacific Gypsum LLC, product, “Toughrock Fireguard”.

B. Fire rated gypsum base for shaftwall construction: Type “X” panels complying with ASTM C 588 and UL classified ‘Type IP-X1’ for use in UL fire resistance rated assemblies, 5/8 inch thick, of lengths to minimize end joints.

1. Acceptable products include the following, or approved equal:

a. USG Imperial brand “Firecode Core”

b. National Gypsum Company, Gold Bond brand product “Kal-Kore Fire-Shield Type X”.

c. Georgia Pacific Gypsum LLC, product, “Toughrock Fireguard”.

2.4 PLASTER MATERIALS

A. Plaster for Two coat system: High-strength gypsum plaster applied in two troweled-on coats to total thickness of 3/32 inch to 1/8 inch (2.4 mm), over plaster base.

1. Basecoat: troweled-on plaster basecoat specially formulated for two-coat system complying with ASTM C 587, equal to:

   a. USG product “Imperial Basecoat”.

   b. National Gypsum Company “Gold bond, Kal Kote Base”.

2. Finish coat: Troweled-on plaster finish coat complying with ASTM C 587, equal to:

   a. USG product “Imperial Finish Plaster”.

   b. National Gypsum Company, “Gold Bond Kal Kote - Smooth”.

2.5 ACCESSORIES

A. Fasteners:

1. Type S, bugle head screws complying with ASTM C 1002, for applying plaster base to metal framing, ceiling grid system, and furring channels.

   a. Not less than 1 inch long for single layer plaster base.

   b. Not less than 1-5/8 inch [41mm] long for double-layer plaster base/gypsum board.

2. Type W, bugle head screws complying with ASTM C 1002,for applying plaster base to wood framing and furring.

   a. Not less than 1-1/4 inch [31mm] long for single layer plaster base

   b. Not less than 1-5/8 inch [41mm] long for double-layer plaster base/gypsum board,

3. Type S-12, fine thread self-drilling screws complying with ASTM C 1002,for applying plaster base to light gage metal framing.

   a. Not less than 1 inch [25 mm] long for 1/2 inch thick single layer plaster base.

   b. Not less than 1-1/4 inch [31mm] long for 5/8 inch thick single layer plaster base.

   c. Not less than 1-5/8 inch [41mm] long for double-layer plaster base/gypsum board,

B. Ceiling buttons, perforated type, 1 inch diameter, for use at multiple layered plaster base ceiling systems.

C. Veneer plaster trim accessories:

1. Corner beads:
   a. For two coat system: USG Dur-A-Bead, No. 900, or equal, galvanized, with expanded or perforated flanges.
2. Edge trim (grounds)
   a. For two coat system: USG No. 701B, or equal, galvanized, with expanded or perforated flanges.
3. Control joints: USG Control Joint No. 093, or equal, and perforated for one-coat veneer plaster application.
4. Vinyl Edge trim USG No. P-1, or equal, PVC, for use at concealed edge with floor in acoustical insulated partitions.

D. Plaster board joint reinforcement: Glass fiber mesh reinforcing tape for use with veneer plaster.

E. Laminating adhesive: USG Durabond Joint Compound 90, USG Ready-mixed All Purpose Compound, or equal.

F. Joint Sealers (interior acoustical sealant type): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable. Acceptable products include the following, or approved equal.
   1. Tremco, Beachwood OH.; product, "Acoustical Sealant".
   2. United States Gypsum Company, Chicago IL.; product "USG Acoustical Sealant".
   3. Pecora Corporation, Harleysville PA.; product " AC-20 FTR".

2.6 MIXES

A. Veneer plaster basecoat: Mix in accordance with water proportions identified on bag. Mix for 2 to 5 minutes with cage-type paddle mixer attached to drill rated for 1000 revolutions per minute.

B. Veneer plaster - prepared finish: Add all but 1 to 2 quarts of the required water to a non-plastic mixing container. Mix for 1 to 2 minutes, add up to 1 to 2 quarts of retained water and then mix for 1 to 2 minutes more. Mix using cage-type paddle mixer attached to drill rated for 1000 revolutions per minute.

PART 3 - EXECUTION

3.3 INSTALLATION - QUALITY STANDARDS

A. General: Perform erection procedures for the various plaster system conditions, except as otherwise specified, as set forth in GA 201, GA206, the written instructions of plaster manufacturer, together with the additional requirements specified herein and as indicated on the Drawings.

B. Wherever fire-resistive rated assemblies are indicated on the Drawings, erect the plaster systems in strict accordance with the manufacturers' UL listed test constructions for the required fire rating on each specific assembly.

END OF SECTION 09 26 13

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SECTION 09 29 00
GYPSUM BOARD

PART 1 – GENERAL

1.1 SUMMARY

A. The work of this Section consists of gypsum board (drywall) and trim finishes for partitions, ceilings, and soffits, where shown on the Drawings, as specified herein, and as required for a complete and proper installation.

B. Furnish and install:

1. Taped, compounded and sanded gypsum board finishes.
2. Moisture and mold resistant board.
3. All trim and accessory components related to gypsum board work.
4. Acoustical joint sealant and backing at perimeter of gypsum board partitions.
5. Acoustical insulation at all interior partitions.

C. Patch all existing gypsum board finishes disturbed by new construction.

1. Patch cracks, holes and defects in existing gypsum wall-board surfaces which are to remain and which are indicated or as additional required by field conditions requiring a painted or applied wall-covering finish.

D. Install access panels occurring in gypsum board work furnished by Section 08 31 00 - ACCESS DOORS AND PANELS, and by trades requiring the same.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum board.

1.9 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Gypsum board products:

a. United States Gypsum Company, Chicago, IL. (USG).
b. National Gypsum Company, Gold Bond Products Division, Charlotte, NC. (Gold Bond).
c. G-P Gypsum Corporation, Atlanta, GA.
d. Lafarge Corporation, Hendron, VA.

2. Acoustical glass fiber insulation:
   a. CertainTeed Corporation, Valley Forge PA.
   b. Johns Manville Building Insulation, Denver, CO
   c. Owens Corning Fiberglas Corp., Toledo OH.
   d. Schuller International, Inc., Denver CO.
   e. USG Corp./ USG Interiors Inc., Chicago IL.
3. Polyvinyl chloride trim and accessories:
   a. Plastic Components, Inc., Miami FL.
   b. Vinyl Corporation, Miami FL.
   c. Alabama Metal Industries Corporation, (AMICO)Birmingham, AL.
4. Joint Sealants:
   a. Tremco, Beachwood, OH.
   b. United States Gypsum Company, Chicago, IL.
   c. Pecora Corporation, Harleysville, PA.

B. The design and details as shown on the Drawings and the model numbers specified herein are to establish the standards of design and quality and not to limit competition.

2.2 DESCRIPTION

A. Regulatory Requirements:
   1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.
   2. Fire resistance ratings: Where gypsum board systems with fire-resistance ratings are indicated, provide materials and assemblies of the rating required, tested per ASTM E 119, which are identical to those indicated by reference to Gypsum Association file numbers in "Fire Resistance Design Manual" or to design designation in the Underwriters Laboratories "Fire Resistance Directory" or in listing of other testing agencies acceptable to authorities having jurisdiction and to the Owners' insurance underwriters.

2.3 BOARD MATERIALS

A. Non-rated and fire rated gypsum board (for wall fire resistant ratings 120 minutes and less): UL fire resistance rated, ASTM C 1396 'Type X' board, 5/8 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges.

1. Acceptable products include the following, or approved equal:
    a. USG Sheetrock brand "Firecode Core"
    b. National Gypsum Company, Gold Bond brand product: "Fireshield Gypsum Board".
    c. G-P Gypsum Corporation product: "ToughRock Fireguard".
    d. Lafarge Corporation, product: "Firecheck Type X".

B. Sag-resistant interior gypsum board ceiling panels: Non-rated 1/2 inch thick, 48 inch width, of lengths to minimize end joints, with tapered edges, conforming to ASTM C1395 and ASTM C1396.
    1. Acceptable products include the following or approved equal:
        a. USG Sheetrock brand product "Interior Ceiling Panel, Sag Resistant".
        b. National Gypsum Company, Gold Bond brand product "High Strength Ceiling Board".
        c. G-P Gypsum Corporation product, "ToughRock CD Ceiling Board".
        d. Lafarge Corporation, product "Sagcheck".
    2. At fire-resistant rated ceilings, provide 5/8 inch thick fire-rated gypsum board as specified herein.

C. "Paper-less" moisture and mold resistant board: 5/8 inch thick Glass mat, water-resistant, mold-resistant interior wall panel: Coated inorganic glass mat-faced, with Type "X" water-resistant, treated core gypsum wallboard. Physical properties conforming to the applicable sections of ASTM C 1177 and ASTM D3273.
    1. Acceptable products include the following or approved equal:
        a. USG Sheetrock brand product: "Mold-Tough Firecode X".
        b. G-P Gypsum Corporation product: "DensArmor Plus Paperless Interior Panel.
        c. Lafarge Corporation, product: "Weather Defense Platinum Interior, Type X".

2.4 ACCESSORIES

A. Acoustical batt insulation at non-rated walls and partitions: Unfaced glass fiber insulation nominal 3-1/2 inches [89mm] thick conforming to ASTM C 665 Type I, of width appropriate for spacing of framing or furring members with which used.
    1. Flame Spread Classification: Class A (less than 25, per testing by NFPA 255, ASTM E-84 or UL 723).

B. Polyvinyl chloride (PVC) trim accessories, conforming to ASTM D 1784 and C 1047.
    1. J Bead: Edge trim with exposed 1/2 inch face cap, furnish trim model number corresponding to the board thickness where installed.
        a. Plastic Components model number: 200X-50 (for 1/2 inch thick board) or 200S-58 (for 5/8 inch thick board).

b. Vinyl Corp. model number: JB50 (for 1/2 inch thick board) or JB58 (for 5/8 inch thick board).

c. AMICO. model number: AMJB50 (for 1/2" thick board) or AMJB58 (for 5/8" thick board).

2. L Bead: casing edge trim, furnish trim model number corresponding to the board thickness where installed

a. Plastic Components model number: 221-50 (for 1/2 inch thick board) or 221-58 (for 5/8 inch thick board).

b. Vinyl Corp. model number: SB50 (for 1/2 inch thick board) or SB58 (for 5/8 inch thick board).

c. AMICO. model number: AMSB50 (for 1/2 inch thick board) or AMSB58 (for 5/8 inch thick board).

3. L-Bead with removable leg: Casing edge trim for joints at ceilings doors and windows, with removable leg strip, furnish trim model number corresponding to the board thickness where installed

a. Plastic Components model number: 224-50 (for 1/2 inch thick board) or 224-58 (for 5/8 inch thick board).

b. Vinyl Corp. model number: CT-50(for 1/2 inch thick board) or CT-58 (for 5/8 inch thick board).

c. AMICO product "Zip Strip" model number: AMZIP50 (for 1/2 inch thick board) or AMZIP58 (for 5/8 inch thick board).

4. Corner beads, 90 degree with 1-1/4 inch flanges:

a. Plastic Components model number: 209.

b. Vinyl Corp. model number: CB125.

c. AMICO. model number: AMCB125.

5. Control joints: "V" type joint with nominal 3/16 inch reveal and removable temporary tape:

a. Gold bond model "EZ Strip Expansion Joint".

b. Plastic Components model number: 2027-16.

c. Vinyl Corp. model number: CJV16.

d. AMICO. model number: AMDCJV16.

C. Tapes and compound:

1. Joint tape (at paper-faced gypsum): Nominal 2 inch wide, high strength, cross-fibered paper drywall tape.

2. Joint tape (at fiberglass faced gypsum): Nominal 2 inch wide, self adhering (adhesive backed), fiberglass mesh tape.

3. Joint Compound for setting fiberglass joint tape:

a. Cetainteed, Valley Forge PA., product "ProRock Moisture and Mold Resistant 90".

b. Georgia Pacific Gypsum LCC., Pittsburgh PA, product "Densarmor Cote"

c. CTS Cement Manufacturing Corporation, Cypress CA., product "Rapid Set OnePass".

4. Joint Compound for setting paper joint tape: 'Speed-setting type compound', field mixed.

   a. Acceptable products, or approved equal:

      1) USG product "Durabond 20".

      2) Gold bond product "Stay Smooth 30".

      3) Georgia Pacific Gypsum LCC, product "ToughRock All-Purpose Dry Mix"

5. Joint Compound for finishing: field mixed joint compound or factory pre-mixed compound.

   a. Field-mixed compounds: acceptable products, or approved equal:

      1) USG product "Durabond 90".

      2) Gold bond product "Stay Smooth 90".

      3) Georgia Pacific Gypsum LCC, product "ToughRock Setting Compound 90".

   b. Factory pre-mixed compounds: acceptable products, or approved equal:

      1) USG product "Ready-Mixed Joint Compound".

      2) Gold bond product "All Purpose Compound".

      3) Georgia Pacific Gypsum LCC, product "ToughRock Ready Mix All-Purpose Compound"

D. Fasteners (interior board systems):

1. Type S, bugle head screws complying with ASTM C 1002, for applying gypsum board to metal framing, ceiling grid system, and furring channels.

   a. Not less than 1 inch long for single layer gypsum board.

   b. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board.

2. Type W, bugle head screws complying with ASTM C 1002,for applying gypsum board to wood plywood backing, and blocking

   a. Not less than 1-1/4 inch [31mm] long for single layer gypsum board

   b. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board,

3. Type S-12, fine thread self-drilling screws complying with ASTM C 1002,for applying gypsum board to light gage metal framing.

   a. Not less than 1 inch [25 mm] long for 1/2 inch thick single layer gypsum board.

   b. Not less than 1-1/4 inch [31mm] long for 5/8 inch thick single layer gypsum board.

   c. Not less than 1-5/8 inch [41mm] long for double-layer gypsum board,

E. Ceiling buttons, perforated type, 1 inch diameter, for use at multiple layered gypsum board ceiling systems.

F. Laminating adhesive: USG Durabond Joint Compound 90, USG Ready-mixed All Purpose Compound, or equal.

G. Joint Sealers (interior acoustical sealant type): One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable. Acceptable products include the following, or approved equal.

1. Tremco, Beachwood OH; product, "Acoustical Sealant".
2. United States Gypsum Company, Chicago IL; product "USG Acoustical Sealant".
3. Pecora Corporation, Harleysville PA; product " AC-20 FTR".

H. Liquid sealer for cuts, holes and ends of moisture resistant board; provide one of the following or acceptable equal.

1. Shellac type sealer: mix 4 pounds of orange or bleached shellac dissolved in 1 gallon of denatured ethyl-alcohol.
2. Varnish type sealer: Fast setting marine varnish.

I. Spot grout: Provide grout complying with ASTM C 475 for setting type joint compound recommended for spot grouting hollow metal door frames.

2.5 SOURCE QUALITY CONTROL

A. Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

PART 3 - EXECUTION

3.3 INSTALLATION - GENERAL

A. General: Perform erection procedures for the various gypsum board system conditions, except as otherwise specified, as set forth in GA 201, GA 216,GA 220, the written instructions of gypsum board manufacturer, together with the additional requirements specified herein and as indicated on the Drawings.

B. Where fire-resistive rated assemblies are indicated, erect gypsum board systems in strict accordance with the manufacturers' UL listed test constructions for the required fire rating on each specific assembly.

C. Install specified control joints where indicated on Drawings and where run of partitions, or furred surfaces exceeds 30 feet. Show locations of all control joints on shop drawings.

1. Locate control joints at corners of head frames of doors.
2. Run vertical control joints continuously to top of partition, shaft wall or furred area, as applicable.

3.4 INSTALLATION OF GYPSUM BOARD

A. Screw fasten only, gypsum board to framing and furring, with ends and edges occurring over firm bearing. At all door jambs screw fasten gypsum panels 8 inches on center to both box studs

1. Erect single layer fire-resistance rated gypsum board vertically.
2. Erect standard and moisture resistant layer board in most economical direction.
3. Erect ceiling and soffit gypsum boards to meet UL requirements, where applicable, stagger end joints over supports. Secure gypsum board with fasteners inserted through ceiling buttons; anchor fasteners directly to framing or suspended support system.

B. Wherever items penetrate the gypsum board surfaces, use extra care in cutting the gypsum board to ensure a uniformly-dimensioned joint between the penetrating item and the gypsum board, and fill joints with specified sealant material. Verify the expected deflection factor of the penetrating members, and cut the gypsum accordingly, to prevent damage thereto from the deflecting members.

C. Treat cut edges and holes in moisture resistant gypsum board with approved liquid sealer.

1. If shellac is used, apply in thin layers to dry quickly.

3.5 INSTALLING PVC TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same screw fasteners used for gypsum board. Otherwise, attach trim according to manufacturer's written instructions.

1. Nailing, stapling, or crimping methods to install trim components is prohibited.

B. Install corner beads at all exterior corners of gypsum boards.

C. Install casings (PVC trim) wherever gypsum board meets a dissimilar material, and in other locations indicated on the Drawings, except at floors where bottom of the board will be concealed by base, integral with flooring, resilient base, wood base or carpeted base.

3.6 INSTALLATION OF ACOUSTICAL INSULATION

A. Install insulation in accordance with insulation manufacturer's instructions.

B. Install in interior walls, and ceiling spaces where indicated. Trim insulation neatly to fit spaces. Fit insulation tight in spaces. Leave no gaps or voids.

3.7 APPLICATION OF ACOUSTICAL SEALANT

A. General: Install sealant and backing in accordance with the recommendations of ASTM C-919 and sealant manufacturer's recommendations.

1. Perform preparation in accordance with C-790. Thoroughly clean all joints, removing all loose mortar, oil, grease, dust, frost, and other foreign materials that will prevent proper adhesion of primers and sealant materials.
2. If so recommended and furnished by the specific sealant manufacturer, apply primer to all joint surfaces, taking care not to stain adjacent surfaces.

B. Seal all partition perimeters prior to taping or compounding. Where perimeters are edged with metal trim, apply sealant and backing material between trim and dissimilar material.

C. Seal all penetrations in all partitions. Penetrations to receive sealant include electrical boxes, plumbing, heating and air conditioning ducts, telephone, intercom hookups and similar items.

1. Install joint bead back-up in all joints in excess of 5/8-inch depth, and joints that have no back-up therein, placing the joint bead in the joint in a manner that will assure a constant depth 1/8 inch greater than the sealant and caulking material depth tolerances.
   a. Set beads into joints continuously, by slightly stretching during placement, to permit compression against sides of joint, without surface wrinkles or buckles.
   b. Do not stretch back-up material into joints.
   c. Install bond breaker wherever recommended by the sealant manufacturer to prevent bond of the sealant to surfaces where such bond might impair the Work.
2. Apply sealant in continuous beads without open joints, voids or air pockets
   a. The depth of sealant and caulking materials shall be in accordance with manufacturer's recommendations for the specific joint function, but in no case exceed 1/2-inch in depth, nor less than 1/4-inch, regardless of the joint width.
3. Remove the temporary masking tape immediately after tooling, and before the sealant or caulking material has taken initial set.

3.8 APPLICATION OF JOINT TREATMENT

A. Install joint tape at all joints where gypsum boards abut and where boards form internal corners, whether or not such joints will be concealed from view.

B. Apply compound to all joints, edges, corners, fastener head depressions and abrasions in the surfaces, whether or not such conditions will be concealed from view. Sand completely smooth all compound surfaces, which will be exposed to view, and leave ready to receive applied coatings or finish.

C. Provide the minimum levels of gypsum board finishes as defined by the Gypsum Association recommended specifications GA-214 and GA-216, per the following:

1. At areas hidden from view, except as otherwise specified: Level 1.
2. At areas hidden from view, requiring a fire rating: Level 1.
3. At concealed plenum spaces above ceilings attic spaces: Level 1.
4. At non-occupied spaces (i.e. attics): Level 1.
5. At areas hidden from view, corridor side of all corridor partitions: Level 1.
6. At surfaces scheduled to receive applied acoustical wall paneling: Level 2.
7. At surfaces scheduled to receive plastic wall panels specified under Section 09 77 63 - SANITARY WALL PANELS: Level 3.
8. At surfaces scheduled to receive "flat" (without any sheen), "pearlescent", and egg-shell low-gloss painted finishes: Level 4.
9. At each of the following conditions, provide Level 5 finish:
   a. Boards having glass-fiber facing scheduled to receive a painted finish.
   b. Surfaces subject to long dimensional runs, sun-lit and grazed lighting conditions.
   c. Wall surfaces with a light cove at the ceiling level.
   d. Wall surfaces that are lit with raking light or washed with lights.
   e. Wall surfaces that are perpendicular to an exterior wall that have a window coming right up to the intersection of the interior and exterior walls.
   f. Locations noted on Drawings.

END OF SECTION 09 29 00

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SECTION 09 30 13
TILING
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.2 SUMMARY

A. The work of this Section consists of tiling where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Interior wall tile.
2. Porcelain floor tile.
3. Tile base and associated trim.
4. Stone thresholds and saddles.
5. Fluid applied waterproofing membrane at wet floor areas occurring over occupied spaces and where additionally indicated.
6. Anti-fracture membrane at slab on grade conditions and “dry” flooring areas.
7. Cementitious tile backer board.
8. Installation systems, adhesives, mortars and grouts.
9. Control joints in tiled floors.

C. Install the following furnished under the designated Sections:

1. Install access panels into tiled walls as specified under Section 08 31 00 - ACCESS DOORS AND PANELS.

D. Perform drilling and cutting in tile surfaces, as required to accommodate penetrating items of other trades, from templates and instructions furnished by the respective trades.

1.9 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. Conform to ANSI/TCNA A 137.1 and TCNA Handbook for Ceramic Tile Installation.
2. Tiles delivered to the job or installed in the work which do not fall within the accepted color and texture range demonstrated by the samples shall be removed from the site and replace with acceptable materials.

B. Sole Source: Obtain installation products required for the Work of this Section from a single manufacturer.

C. Qualifications:

1. Installer/Applicator: Minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.10 MOCK-UPS

A. Provide mock-up under provisions of Section 01 45 00 - QUALITY CONTROL.

B. Provide mock-up panels, minimum 25 square feet, illustrating color, texture and finish, and demonstrating the minimum standard for the Work.

1. Mock-up will demonstrate quality of work, construction methods, color and texture of tile, flatness of installation, joint spacing and color of grout. Include typical tile accessories and a control joint.
2. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.
3. Accepted mock-ups may remain as part of the work; the number of mock-ups shall not be restricted.

1.13 WARRANTY

A. General: Submit warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS.

B. Manufacturer Warranty: The manufacturer of installation systems, adhesives, grouts and mortars shall provide a comprehensive non pro-rated written five (5) year warrantee against defective products which covers replacement materials and labor costs for demolition, tile accessories, and installation systems.

1. Warranty to provide for tile lifting or separation from substrate, and setting bed/grout deterioration, when products have been installed with referenced TCNA setting systems using specified setting and grout materials.
2. Warranty excludes structural failure, movement or cracking of substrate materials, and workmanship performed not in accordance with manufacturer's instructions and industry standard guidelines.

C. Special Warranty: Provide 2 year, non pro-rated warranty which shall include provisions for cracking, breakage or failure of tile due to defective workmanship

1. Materials must be compatible and from one source, single source responsibility for waterproofing, installation, mortars and grouts. Job-site mixtures of sand portland cement and site dilution of additives shall not be permitted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Porcelain tile:
   a. Casalgrande Padana
   b. American Olean Tile Company, Lansdale PA.
   c. Crossville Ceramics, Crossville TN.
   d. Floor Gres (Cerim Ceramich) West Long Branch, NJ.
2. Glazed ceramic wall tile:
   a. Johnson Tiles
   b. American Olean Tile Company, Lansdale PA.
   c. Dal-Tile Corporation, Dallas TX.
   d. Sikes Corp., Florida Tile Division, Lakland FL.
   e. United States Ceramic Tile Company, Sparta OH.
3. Mortars, adhesives and grouts:
   a. Bostik Corp. (Hydroment), Middleton MA.
   b. C-Cure Chemical Company, Inc., Houston TX
   c. Custom Building Products, Inc., Seal Beach, CA.
   d. Laticrete International, Inc., Bethany CT
   e. Mapei Corporation, Elk Grove IL.
   f. TEK Special Construction Brands, Inc. (division of HB Fuller), Arlington Heights IL.
4. Cementitious tile backer board ("Cement board"):
   a. Custom Building Products, Inc., Seal Beach, CA.
   b. Fin Pan, Inc., Hamilton OH.
   c. Unifix, Inc., division of National Gypsum Company, Charlotte, NC.
   d. United States Gypsum Company, Chicago, IL.
5. Edging materials:
   a. Schlüter Systems L.P., Plattsburgh NY.
   b. Custom Building Products, Inc., Seal Beach, CA.
   c. Ceramic Tool Company Inc., Waukesha WI.

2.2 PORCELAIN TILE

A. Porcelain paver tile: Equal to Casalgrande Padana, "Pietra Native Meteor Series", Color "Grafite" nominal 12 by 12 inch by 5/16 inch thick, unglazed porcelain body, cushion-edges.

2.3 GLAZED CERAMIC TILE

A. Glazed ceramic wall tile: Standard grade glazed ceramic tile, conforming to ANSI A137.1, nominal 6 by 6 inch by 5/16 inch thick, hexagonal porcelain body, square-edges.

1. Colors and Patterns: Up to 3 colors in a pattern, with not more than 25 percent of total area being accent tile in colors selected from the full range of glazed wall tile, including but not limited to the following or approved equal:

a. Johnson Tiles: "Prismatic", gloss finish, Color "PRG16 Teal".

b. Johnson Tiles: "Prismatic", gloss finish, Color "PRGPRG48 Goldcrest".

c. Johnson Tiles: "Prismatic", satin finish, Color "PRS15 Shark".

d. Johnson Tiles: "Prismatic", satin finish, Color "PRS12 White".

B. Base trim and special shapes: Provide all bases, caps, stops, returns, trimmers, and other shapes indicated or required to produce a completely finished installation.

1. Except as may be otherwise indicated, provide color and finish matching adjacent field tile.

2.4 STONE THRESHOLDS

A. Where indicated on the Drawings, provide marble thresholds complying with Class "A" of the Marble Institute of America, in color selected by the Architect from standard colors of the approved fabricator, shaped to provide a comfortable transition between tile and other floor finishes, with smooth matte surface finish and in the dimensions and thickness shown on the Drawings.

2.5 SETTING MATERIALS

A. Thin-set polymer-modified Portland cement dry-set mortar, complying with the bond strength requirements of ANSI A118.4.

1. Acceptable products include the following, or approved equal:

a. Mapei product: "Kerabond" with "Keralastic" additive.

b. Laticrete product number 254 Platinum, with antimicrobial additive.

c. Custom Building Products " Porcelain Tile Mortar"

B. Mortar for porcelain tile: complying the requirements of ANSI A118.4. Acceptable products include the following, or approved equal:

1. Mapei product: "Grani-Rapid".

2. Laticrete product number 254 Platinum.

3. Custom Building Products " Porcelain Tile Mortar"

C. Fluid applied waterproofing membrane: ASTM C627 classification "Extra Heavy". Two component liquid rubber membrane cold applied, load bearing, bonded, non-toxic, non-flammable, and non-hazardous, used with 20 mil (0.5mm) thick flexible nonwoven rot-proof polyvinyl chloride reinforcing fabric.

1. Waterproofing membrane shall be IAPMO certified as shower pan liner under the International Plumbing Code.
2. Waterproofing membrane shall provide crack suppression and isolation for anti-fracture per ANSI A118.12.5.4, spanning 1/8 inch (3mm) crack, and meet the following physical requirements:
   a. Water Permeability (at 30ft.hydro/0.9 atmos/91.2kPa): Nil.
   b. Elongation at break (ASTM D-751): 20 to 30%
   c. Service Temperatures: -20° to +280°F. (-29°to +138°C).
   d. Tensile breaking strength: 2950psi (20.4MPa;207kg/cm˝)
   e. Bond strength to concrete: 350psi (2.4MPa;24kg/cm˝)
   f. Resistance to chemicals (90 day immersion):
      1) Brine solution Not Affected.
      2) Sugar solution Not Affected.
      3) Milk Not Affected.
      4) 10% Citric Acid Not Affected.
      5) 3.5 percent HCl Acid: Not affected.
      6) 5% Acetic Acid: Not Affected
      7) 1% Alkali solution: Not Affected
      8) Urine: Not Affected
      9) Calcium chloride: Not Affected.
      10) Toluol Softens.
   g. Floor Tile Installation Evaluation (ASTM C627-81) 900 cycles
   h. Service Rating (TCNA) Extra Heavy Duty
3. Acceptable products include the following, or approved equal:
   a. Mapei product: "Mapelastic 315" with fabric reinforcing
   b. Laticrete product "Laticrete 9235 Waterproofing".
   c. Custom Building Products "9240 Waterproofing"
   d. Bostik Corp. (Hydroment), product "Black Top 90210".
   e. TEC Specialty Construction Brands (HB Fuller), product "TEK Triple Flex".

D. Anti-fracture membrane for crack suppression and substrate crack isolation. Two component system (liquid and fabric) complying with TCNA performance level: Extra Heavy Service".

1. Acceptable products include the following, or approved equal:

a. Mapei product: “Plani/Lastic”.
b. Laticrete product “Blue 92”.
c. Custom Building Products “Crack Buster Pro” or Fracture Free
d. TEC product 1flex Crack Isolation Membrane.
e. Bostik Corp. (Hydroment), product “Hydroment Gold”.

E. Cementitious tile backer board (“cement board”): 1/2-inch nominal thickness, glass fiber reinforced, with a minimum compressive strength of 1,250 pounds per square inch and minimum flexural strength of 750 pounds per square inch.

1. Acceptable products include the following, or approved equal:
   a. Custom Building Products, Inc. product “WonderBoard Lite” (7/16 inch thickness)
   b. Fin Pan, Inc., product: “Util-a-Crete”.
   c. National Gypsum Company, Charlotte, NC. product “PermaBase”.
   d. United States Gypsum Company, product: “Durock”.

2.6 GROUTING MATERIALS

A. Grout for walls having joints less than 1/8 inch width: Acrylic modified Portland cement (unsanded) grout conforming to ANSI 118.6. Acceptable products are limited to:

1. Mapei product: “Ker-800” with acrylic latex additive “Plastijoints”,
2. Laticrete product “Laticrete 1600 Series (unsanded) with admix 1776 antimicrobial.
3. Custom Building Products PolyBlend unsanded grouts.

B. Grout for floors, and walls having joints 1/8 inch and greater width: Acrylic modified Portland cement sanded grout conforming to ANSI 118.6. Acceptable products are limited to:

1. Mapei product: “Ultracolor” with acrylic latex additive “Plastijoints”,
2. Laticrete product “Laticrete 1500 Series (sanded) with admix 1776 antimicrobial.
3. Custom Building Products PolyBlend sanded grouts.

C. Epoxy grout: Multi-component epoxy grout, stain resistant, conforming to ANSI 118.3.

1. Epoxy Grout shall be non-toxic, non-flammable, non-hazardous during storage, mixing, application and when cured and shall meet the following minimum physical requirements in compliance with ANSI A118.3 test methods:
   a. Compressive Strength: greater than 3500 psi (24,131 kPa).
   b. Quarry Tile Shear Bond Strength: 1000 psi (24,131 kPa) min.

2. The finished Epoxy grout shall be chemically and stain resistant to catsup, mustard, tea, coffee, milk, soda, beer, wine, bleach (5% solution), ammonia, juices, vegetable oil, brine, sugar, cosmetics, and blood. It shall also be chemically resistant to dilute acids and alkalis, gasoline, turpentine, and mineral spirits.
3. Acceptable products are limited to:
   a. Mapei product: "Kerapoxy" grout.
   b. Laticrete product "SpectraLock Pro Premium". Series.
   c. Custom Building Products, product "100% Solids Epoxy Gout".

2.7 ACCESSORIES

A. Cleavage membrane: ASTM D 226 Number 15 asphalt saturated felt or ASTM D 2103, polyethylene film, 4 mil thick.

B. Edge strips: Equal to Schlüter Systems L.P., product series "Jolly", in height as required for tile thickness, fabricated from extruded aluminum with integrated joint spacer and brushed antique bronze finish.

2.8 SCAFFOLDS AND STAGING

A. General: Filed Subcontractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS and herein.
   1. Scaffolding and staging required for use by this Filed Subcontractor pursuant to requirements of Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-Trade requiring such scaffolding.
   2. Each Filed Subcontractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS and as additionally required for dust control).
   3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Filed Subcontractor.

2.9 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Filed Subcontractor shall be furnished, installed, operated and maintained in safe conditions by this Filed Subcontractor, as

referenced under Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

PART 3 - EXECUTION

3.3 INSTALLATION - GENERAL REQUIREMENTS

A. Installation Standards: 2016 TCNA Handbook for Ceramic, Glass, and Stone Tile Installation and The American National Standard Specifications for the Installation of Ceramic Tile, 2017 edition (ANSI A108-A118-A136.1), is hereby made a part of this specification. All work of this Section shall be installed in accordance with the requirements contained in referenced standards, and as additionally specified below, and in accordance with the manufacturer's specifications of those products used.

B. Installation Methods: Schedule of substrate conditions, generic type of tile used, with appropriate setting and grouting methods are listed at end of this Section.

1. Use trowel shapes and sizes as recommended by setting materials manufacturer.
2. Clean porcelain tiles (backs) and remove manufacturer's residue.
3. Back-butter tiles as required to provide coverage indicated, except for tiles exceeding 144 square inches which require a complete back application of mortar (100% coverage).

C. Tile Patterns and types: Tile patterns are shown on the Drawings, if more information is required, obtain the necessary information from the Architect. Do not interrupt tile pattern around openings.

D. Tile Layout and installation

1. Layout tile on room axis, leaving equal sized border units of not less than one-half tile width.
2. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align base and wall joints.
3. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, full without voids, cracks, excess mortar, or excess grout.
4. Do not align joints of base units and lowest course of tile, offset joints by one-half of unit width.

3.4 INSTALLATION OF CEMENT BOARD

A. Walls:

1. Wall framing substrate: Do not install cement board directly over protrusions from stud plane such as heavy brackets or fastener heads.

2. Make necessary cut-outs. Install cement board horizontally leaving 1/8 to 3/16 space at all joints, including joints with dissimilar materials. Stagger board joints with those of adjacent rows.
3. Fasten cement board with 1-1/4 inch length type S bugle head screw. Fasten boards every 8 inches on center in field and along edges. At edge conditions, locate fasteners between 1/2 inch to 2 inches from board edge.
4. At all joints and corners, fill gap solidly with dry-set or latex-modified, portland cement mortar and imbed 2 inch mesh fiberglass table and smooth material over joint and corner.

3.5 INSTALLATION – METAL EDGE TRIM

A. General: Apply materials in strict accordance with the written instructions and recommendations of edge material and setting materials manufacturers.
   1. Ensure that top surface of metal edge and transition strips align with surface plane of tile.
   2. Locations: Provide metal edge at every flooring transition between tile and other flooring materials.

B. Press perforated anchoring leg of trim into troweled dry set mortar bedding. Trowel additional mortar over perforated anchoring leg of trim to ensure full coverage and support of tile edges.

C. Solidly embed tiles in manner that tiled surface is flush with top of trim profile. Tile may exceed trim height by 1/32 inch [1 mm] to 1/16 inch [1.5 mm], but tile may not be installed lower than height of trim. Maintain a 1/8 inch [3 mm] minimum uniform joint width between edge of tile and metal trim to be filled by grout.

D. Corner intersections shall be a 45-degree chamfer cut. No butt joints will be accepted.

3.6 INSTALLATION OF CONTROL JOINTS

A. General: Provide control joints where indicated on the Drawings, and as directed by the Architect. Where not indicated, provide joints per the following requirements in specific locations approved by Architect:
   1. Interior tilework: 24 to 36 feet in each direction, except where exposed to direct sunlight or moisture.
   2. Interior tilework exposed to direct sunlight or moisture: 12 to 16 feet in each direction.
   3. Where tile abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, and where changes occur in substrate materials.
   4. At perimeter walls in rooms and spaces larger than 12 feet on one side.
   5. As continuation of expansion joints, control joints, and seismic joints in the building structure which occur in tile areas.

B. Locations: Verify exact locations of joints with Architect prior to commencing tile installation.

C. Control joints:

1. Form control joints neat, straight, and uniformly wide equal to width of normal tile joint. Cut tile neatly and to accurate radius at exposed junction with pipes.
2. Extend control joints full thickness of tile, setting bed and reinforcing.

D. Keep open joints free of grout and debris until filled with sealant. Install non-contaminating temporary joint filler to maintain joints in clean condition until installation of joint backing and sealant under Section 07900 - JOINT SEALERS.

3.7 FLOORING INSTALLATION – TCNA NUMBER F115 MODIFIED

A. Description: Thin-set tile installation.

B. General: Install in accordance with ANSI A108.5, and TCNA installation method number F115, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.

1. Setting materials: Latex modified portland cement (ANSI A118.4).
2. Grout materials: epoxy grout (ANSI A118.3).

C. Install latex/portland cement mortar bed over cured anti-fracture membrane to a nominal thickness of 3/32 inch.

D. Install tile ensuring mortar coverage of at least 90 percent on back of tile.

E. Grouting:

1. Allow tile to fully set prior to grouting; do not grout in less than 24 hours after installation of tile.
2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.

3.8 FLOORING INSTALLATION – TCNA NUMBER F122 MODIFIED WITH EPOXY GROUT

A. Description: Thin-set tile installation with reinforced waterproofing membrane.

B. General: Install in accordance with ANSI A108.5, and TCNA installation method number F122, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.

1. Setting materials:
   a. Membrane: Anti-fracture membrane (DIN18156, part 2).
   b. Bonding coat: Latex modified portland cement (ANSI A118.4).
2. Grout materials: epoxy grout (ANSI A118.3).

C. Install liquid applied waterproofing membrane with reinforcing over entire tile substrate area in strict compliance with manufacturer's written instructions.

D. Install latex/portland cement mortar bed over cured anti-fracture membrane to a nominal thickness of 3/32 inch.

E. Grouting:

1. Allow tile to fully set prior to grouting; do not grout in less than 48 hours after installation of tile.
2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.

3.9 FLOORING INSTALLATION – TCNA NUMBER F125 MODIFIED

A. Description: Thin-set tile installation with anti-fracture membrane.

B. General: Install in accordance with ANSI A108.5, and similar to TCNA installation method number F125 as modified by requirements herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.

1. Setting materials:
   a. Membrane: Anti-fracture membrane.
   b. Bonding coat: Latex modified portland cement (ANSI A118.4).
2. Grout materials: epoxy grout (ANSI A118.3).

C. Install anti-fracture membrane over existing cracks and joints in substrate materials.

D. Install latex/portland cement mortar bed over cured anti-fracture membrane to a nominal thickness of 3/32 inch.

E. Grouting:

1. Allow tile to fully set prior to grouting; do not grout in less than 48 hours after installation of tile.
2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.

3.10 WALL TILE INSTALLATION - TCNA NUMBER W244C WITH THIN-SET

A. General: Install in accordance with ANSI A108.5, TCNA installation method number W244C, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.

1. Setting materials: Latex modified Portland cement (ANSI A118.4).
2. Grout materials: Acrylic modified Portland cement (unsanded) grout (ANSI A118.6).

B. Install latex modified Portland cement mortar bed to a thickness recommended by manufacturer.

C. Grouting:

1. Allow tile to fully set prior to grouting; do not grout in less than 24 hours after installation of tile.
2. Grout tile joints in accordance with ANSI A108.10 and as additionally specified.

3.11 INSTALLATION - TCNA NUMBER TR611 WITH STONE THRESHOLDS

A. General: Install in accordance with ANSI A108.5, TCNA installation method number TR611, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.

B. Grouting: Install in accordance with installation requirements of abutting tile.

3.12 INSTALLATION – METAL EDGE AND TRANSITION STRIPS

A. General: Install in accordance with ANSI A108.5, TCNA installation method number F113, and as additionally specified herein below. Apply materials in strict accordance with the written instructions and recommendations of setting materials manufacturer.

B. Grouting: Install in accordance with installation requirements of abutting tile.

C. Corner intersections shall be a 45-degree chamfer cut. No butt joints will be accepted.

3.13 INSTALLATION - GROUT

A. Remove spacers, ropes, glue, and similar foreign matter prior to grouting.

B. Force the maximum amount of the approved grout into joints in accordance with pertinent recommendations contained in ANSI A108.10 and for epoxy grouts, ANSI A108.6.

C. Fill in joints of cushion-edge tile to depth of the cushion; fill joints of square-edge tile flush with the surface.

D. Fill all gaps and skips. Do not permit mortar or mounting mesh to show through grouted joints.

E. Provide hard finished grout which is uniform in color, smooth and without voids, pin holes, or low spots.

F. Remove all excess grout immediately after installation thereof, wash and rinse tile free from grout film, and tool grout to a uniform density throughout.

3.14 REPAIR

A. Replace cracked chipped, broken, and otherwise defective tiles.

B. Remove work not complying with requirements of the Contract Documents or the referenced standards, and promptly replace with work which does comply.

END OF SECTION 09 30 13

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SECTION 09 51 23

ACOUSTICAL TILE CEILINGS
(FILED SUB-BID REQUIRED)

PART 1 – GENERAL

1.2 SUMMARY

A. The work of this Section consists of acoustical tile where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Furnish and install the following:

1. Suspended acoustical tile ceiling including suspension system and associated edge moldings.

2. Furnish and install joint sealant at ceiling edge angles where abutting walls.

C. Patching existing acoustical tile ceilings to match existing ceilings where disturbed by demolition and Work of this Contract. This Section includes both ceilings, suspension systems and associated edge moldings. Reinstall ceiling tiles salvaged under Section 02 41 19 – SELECTIVE DEMOLITION.

1.8 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Sole Source: Obtain products required for the Work of this Section from a single manufacturer, or from manufacturers recommended by the prime manufacturer of acoustical ceiling panels.

1.9 MOCK-UPS

A. Locate mock-ups where directed and include all surfaces and materials scheduled to receive a field applied finish.

B. Maintain mock-up during construction for workmanship comparison; remove and legally dispose of mock-up when no longer required.

C. Accepted mock-ups may not remain as part of the work; the number of mock-ups shall not be restricted.

1.12 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

B. Manufacturer Warranty:

1. In addition to the specific guarantee requirements of the GENERAL CONDITIONS and SUPPLEMENTAL GENERAL CONDITIONS, the Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of all materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. All these guarantees shall be in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Acoustical ceiling panel:

a. Armstrong World Industries, Inc., Lancaster, PA.

b. USG Interiors Inc., Chicago, IL.

c. Certainteed Corporation, Valley Forge, PA.

2. Suspension system:

a. Armstrong World Industries, Inc., Lancaster, PA.

b. USG Interiors Inc., (Donn®) Chicago, IL.

c. Chicago Metallic Corp., Chicago, IL.

2.2 DESCRIPTION

A. General Description: Manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance as indicated.

1. Obtain certificate of compliance from authority having jurisdiction indicating approval of specified products.

2.3 PERFORMANCE/DESIGN CRITERIA

A. Fire Resistance: Where fire-resistance ratings are indicated or required by authorities having jurisdiction, provide materials and construction which are identical to assemblies whose fire-resistance ratings have been tested in compliance with ASTM E 119 by independent agencies acceptable to the Architect and authorities having jurisdiction.

B. Surface Burning Characteristics: Provide UL Classified material whose surface burning characteristics, when tested in compliance with ASTM E 84 are Class A.

C. Where the following ratings are specified, provide materials and construction which are identical to those tested by Underwriters Laboratories or equivalent independent testing agencies acceptable to the Architect.

1. Noise Reduction Coefficient (NRC): Ratings have been tested in compliance with ASTM C423.

2. Ceiling Attenuation Class (CAC) : Ratings have been tested in accordance with ASTM E1414.

3. Light Reflectance (LR): Ratings has been tested in compliance with ASTM C523.

2.4 ACOUSTICAL CEILING PANELS

A. Type ACT-1 Ceiling panel:

1. Panel size: 24 by 24 inch by 3/4 inch thick.

2. Panel edge: Beveled tegular edge.

3. Description: ASTM E-1264 Type III, Form 2, Pattern CE, Class A flame spread, wet formed mineral fiber non-directional fissured, medium textured panel, non-combustible, vinyl latex paint finish.

4. Color: White.

5. Minimum light reflectance range: LR 0.85.

6. Acoustical characteristics:

a. NRC range: 0.70 – 0.75.

b. CAC range: 35.

7. Acceptable products:

a. Armstrong product “Ultima Open Plan, product number 1942HRC.

b. USG product “Mars High NRC” with FLB edge, product number 87100.

c. Certainteed product “Fine Fissured High NRC”, product number HHF-454-HNRC.

2.5 CEILING GRIDS

A. Type ACT-1 Ceiling grid: 9/16 inch exposed tee grid in white color matching ceiling panel, furnished with hemmed edge wall molding; acceptable products are:

1. Armstrong; 9/16" Suprafine Exposed Tee Grid.
2. Chicago Metallic; Tempra 4000.
3. USG; Centricitee System.

2.6 ACCESSORIES

A. Edge moldings: Standard edge trim: Grid system manufacturer’s standard L-shape edge trim compatible with exposed grid system and color matched.

1. Armstrong: Model 7800.
2. Chicago Metallic: Model 1430.01.
3. USG: Model M7.

B. Hanger attachments: Of the most appropriate types for the specific receiving surfaces.

C. Hanger rods: Black finished hanger ½ inch diameter threaded rods at ACT-4 location.

D. Hangers: ASTM A641 Soft temper, pre-stretched galvanized carbon steel wire, with a yield stress of at least 3 times design load, but not less than 12 gage.

E. Retention clips (ACT-2):

1. Armstrong product number “0414,”
2. Chicago metallic product number “935”
3. USG product number “20428.”

F. Joint Sealer: One component acrylic latex, permanently elastic, non-staining, non-shrinking, non-migrating and paintable.

1. Tremco, Beachwood OH.; product, “Acoustical Sealant”.
2. United States Gypsum Company, Chicago IL.; product “USG Acoustical Sealant”.
3. Pecora Corporation, Harleysville PA.; product “ AC-20 FTR”.

2.7 SCAFFOLDS AND STAGING

A. General: Trade Contractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and herein.

1. Scaffolding and staging required for use by this Trade Contractor pursuant to requirements of Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Trade Contract requiring such scaffolding.

2. Each Trade Contractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS and as additionally required for dust control).

3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility this Trade Contractor.

2.8 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Trade Contractor shall be furnished, installed, operated and maintained in safe conditions by this Trade Contractor, as referenced under Section 01 50 00 - TEMPORARY FACILITIES AND CONTROLS.

PART 3 - EXECUTION

3.3 INSTALLATION

A. Locate system on room axis, leaving equal sized border units of not less than one-half tile width.

B. Install all components of the suspended grid systems in accordance with the manufacturer's instructions, the approved shop drawings, conforming to ASTM C-636 requirements. Ensure a deflection not to exceed 1/360 span of 48-inch simple span.

C. Install specified edge moldings wherever ceilings intersect a wall or partition surface, and around all items having any dimension of 4 inches or more which penetrate the ceilings, including circular penetrations. Set moldings absolutely level, using as long lengths as practicable, and secure with fasteners recommended by manufacturer for the type of substrate.

1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before installing moldings.
2. Screw-attach moldings to substrate at intervals not over 16 inches on center. and not more than 3 inches from ends, leveling with ceiling suspension system to tolerance of 1/8 inch in 12'-0". Miter corners accurately and connect securely.

D. Install hanger attachments to overhead construction in accordance with the approved shop drawings, spacing the attachments not more than 48 inches on centers over location of each main tee member.

1. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers to span the extra distance.
2. Install hanger wire to attachments with triple twists.

E. Install main tees parallel to the long dimension of each area, spacing the tees 48 inches on centers. Secure the bottom of hanger wires through slots in the main tee members and tie with triple twists. Level the main tees as the work progresses.

F. Lateral bracing:

1. Provide lateral bracing as required by applicable codes and regulations.
2. Secure lateral bracing to structural members as detailed on the Drawings.

G. Uniformly space the cross tees at 24 inches on centers, and secure the cross tees into the main tees as recommended by the system manufacturer.

H. Provide sealant at gaps between new acoustical ceiling edge angles and all irregular walls.

I. Fit acoustical ceiling tile units in place, free from damaged edges or other defects detrimental to appearance and function. Install acoustical ceiling tile level, in uniform plane, and free from twist, warp or dents.

1. Field cut tegular type tile with a tegular reveal at all edge conditions.
2. Where required by governmental agencies having jurisdiction, install retention clips, provide two clips per ceiling panel installed on opposite sides of panel.

END OF SECTION 09 51 23

SECTION 09 65 13

RESILIENT TILE FLOORING AND ACCESSORIES
(FILED SUB-BID REQUIRED AS PART OF SECTION 09 00 06)

PART 1 – GENERAL

1.1 SUMMARY

A. Prepare substrate to receive resilient base.

B. Furnish and install the following:

1. Coved resilient base at resilient flooring and at sealed exposed concrete floors.
2. Straight (non-coved) resilient base at tile carpeted areas.
3. Rubber floor tile.

1.6 QUALITY ASSURANCE

A. General: Avoid color and pattern differential; provide base from one production run in any single room or contiguous areas.

1.9 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

B. Manufacturer Warranty:

1. Resilient Base: Provide manufacturer's standard one year limited product warranty for resilient base materials.
2. Adhesives: Provide manufacturer's one year limited product warranty for adhesion reliability.

1.10 EXTRA MATERIALS

A. Upon completion of the Work of this Section, deliver to the Owner extra base materials for future repairs and maintenance, from the same manufacturing runs as those installed, in the following amounts.

1. Resilient base: 10 percent of each type, color and quantity installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Johnsonite, Middlefield OH.
2. Burke-Mercer Products Company, San Jose CA.

3. Roppe Corporation, Fostoria OH.
4. Vinyl Products Inc., Floor Products Division, Sheboygan WI.
5. Tarkett, Inc., Parsippany NH.

2.2 RESILIENT BASE

A. Rubber Base: 4 inches or 6 inches high as scheduled, ribbed back, 1/8 inch thick, rounded top complying with ASTM F-1861, Type TP, Thermoplastic Rubber (TBR). Colors shall be as selected. Rubber base shall be furnished in continuous lengths, approximately 100 feet long.

1. Provide coved base at resilient flooring.
2. Provide straight (non-coved) base at carpeted and walk-off entrance mat areas.

B. Base accessories: Premolded end stops of same material, size and color as base. Job-form all external and internal corners from base material, pre-molded corner pieces will not be acceptable

2.3 RUBBER FLOORING

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Johnsonite, Inc., Chagrin Falls OH., Product: "EcoNaturals Floor Tile" or approved equal.

2.4 ACCESSORIES

A. Adhesives:

1. General: Water resistant, low VOC, acceptable to the resilient flooring manufacturer, for substrate conditions.
2. Acceptable products include the following, or approved equal:
   a. Advanced Adhesive Technology, Inc, Dalton GA, product: "No. 432 Modified Acrylic Cove Base Adhesive".
   b. DAP Incorporated, Dayton OH, product: "Cove Base Construction Adhesive".
   c. Roberts Consolidated Industries, Inc., City of Industry, CA, product: "Premium Solvent-Free Cove Base Adhesive".

B. Joint Sealer for between the top of wall base and irregular wall surfaces: Plastic filler as recommended by manufacturer.

C. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.

B. Spread only enough adhesive to permit installation of materials before initial set.

C. Install resilient base: Install base on solid backing, bond to vertical substrate with continuous contact at horizontal and vertical surfaces. Apply wall base to walls, columns, casework and other permanent fixtures in areas where base is required.

1. Install in lengths as long as practical.
2. Scribe to fit to door frames and other interruptions.
3. Scribe level to fit below ceramic wall tile.
4. Form all external and internal corners in accordance with manufacturer's written instructions. Cope inside corners and fit neatly.
5. Fill voids with plastic filler along the top edge of the resilient wall base on masonry surfaces or other similar irregular substrates.

END OF SECTION 09 65 13

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SECTION 09 65 43

LINOLEUM FLOORING
(FILED SUB-BID REQUIRED UNDER SECTION 09 00 06)

PART 1 – GENERAL

1.2 SUMMARY

A. The work of this Section consists of resilient flooring where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Work includes, but is not limited to the following.

B. Prepare substrates to receive resilient flooring as required to ensure specified tolerance level for finish surface of floor tile. Preparation work includes patching, smoothing and leveling substrate, including:

1. Grinding down high spots of substrate.

2. Providing Portland cement-based latex underlayment (filler).

C. Furnish and install the following:

1. Linoleum sheet with welded seams.

2. Transition strips wherever edges of resilient flooring materials abut dissimilar flooring, where no thresholds occur.

1.7 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1. Provide types of resilient flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives, as available or as otherwise recommended by flooring manufacturer.

2. Avoid color and pattern differential; provide flooring from one production run in any single room or contiguous areas.

1.8 FIELD SAMPLES

A. Provide on-site samples, locate where directed. Each field sample shall be minimum 24 square feet, illustrating selected floor finish.

B. Accepted samples will be used to determine the remainder of work, and may not remain as part of the work.

1.11 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

1.12 EXTRA MATERIALS

A. Upon completion of the Work of this Section, submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Extra Materials: Deliver to the Owner extra materials for future repairs and maintenance. Clearly label and package securely to prevent damage.

a. Owner's carpet stock: 10 percent of each color, pattern and type of linoleum flooring installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Linoleum Flooring:

a. Forbo Industries Inc., Hazleton PA.

b. Armstrong World Industries, Inc., Flooring Division, Lancaster PA

c. Johnsonite Inc., Chagrin Falls OH.

2. Leveling filler:

a. Ardex, Inc., Coraopolis, PA.

b. Quikrete Companies., Atlanta, GA.

c. Silpro Masonry Systems Inc., Ayer MA.

3. Adhesives:

a. Advanced Adhesive Technology, Inc, Dalton GA.

b. DAP Incorporated, Dayton OH.

c. W.W. Henry Company, Aliquippa PA.

d. Roberts Consolidated Industries, Inc., City of Industry, CA.

2.2 DESCRIPTION

A. Regulatory Requirements:

1. Provide materials and assemblies conforming to applicable building codes and regulatory agencies for flame/fuel/smoke rating requirements of flooring in accordance with ASTM E 84.

2. Provide flooring material to meet the following fire test performance criteria as tested by a recognized independent testing laboratory:

a. ASTM E 648 (Critical Radiant Flux) of 0.45 watts per sq. cm. or greater, Class 1.

b. ASTM E 662 (Smoke Generation) Maximum Specified Optical Density of 450 or less.

B. Sustainability Requirements:

1. Biobased Material: Consisting of oxidized linseed or other vegetable drying oil and rosin, mixed with ground cork or wood flour, mineral filler, and natural pigments. Mixture shall be bonded and keyed to a burlap (jute) or other suitable fibrous backing so that backing is partially embedded in mixture.

2. Product shall be completely biodegradable.

2.3 LINOLEUM SHEET FLOORING

A. Sheet linoleum flooring: Marbleized sheet linoleum, all natural resilient, self-sanitizing, bactericidal flooring of primarily natural materials consisting of linseed oil, wood flour, and rosin binders, mixed and calendared onto a polyester backing. Total construction non-asbestos. Pattern and color shall extend throughout total thickness of wear surface. Products which may be incorporated in the work include the following:

1. Forbo Industries Inc., Hazleton PA, product “Marmoleum”.

2. Johnsonite Inc., Chagrin Falls OH, product “Harmonium xf Veneto” in style(s) as selected by Architect.

B. Color and patterns as indicated on Drawings, where not indicated, as selected by Architect from full available range.

C. Linoleum sheet flooring characteristics

1. Sheet width: 200 cm (6 feet 6 inches).

2. Nominal Thickness: 2.5 mm (1/10 inch).

3. Backing: Jute.

D. Color and patterns are as indicated on Drawings, where not indicated, as selected by Architect from manufacturer's full range.

2.4 ACCESSORIES

A. Filler for patching, smoothing and leveling subfloors and underlayments: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:

1. Ardex, Inc., products: "Feather Flash" and "Ardex SD-P".
2. Bonsal American, Charlotte, NC, product: "Pro Spec – Floor Pach Pro".
3. Quikrete Companies, product: "Fast-Set Underlayment 1248".
4. Silpro Masonry Systems Inc., product: "Profinish".
5. Accessories:
   a. Primers: Unless otherwise recommended by cementitious underlayment and patching mortar manufacturer for substrate material, condition, and porosity encountered:
      1) Ardex: "P-51".
      2) Pro Spec: "Level Set Primer".
      3) Silpro: "C 21 All Acrylic".
   b. Cleaning agent: Commercial Muriatic acid.
   c. Provide accessories from the same manufacturer as patching and filling compounds as approved by the Architect.

B. Adhesives

1. General: Water resistant, acceptable to the resilient flooring manufacturer, for substrate conditions.
2. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Forbo Industries Inc., Hazleton PA, product "Sustain 1195M" adhesive.
3. Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   a. Forbo Industries Inc., Hazleton PA.
   b. Advanced Adhesive Technology, Inc, Dalton GA.

c. DAP Incorporated, Dayton OH.

d. W.W. Henry Company, Aliquippa PA.

e. Roberts Consolidated Industries, Inc., City of Industry, CA.

C. Heat Welds Rods: Manufacturer's standard solidified thermo-plastic adhesive welding rod. Rods may be matching solid color, multi-color welding rod or contrasting color welding rod as selected by Architect, at no additional cost to Owner.

D. Transition, edge strips and nosings:

1. General: Homogeneous vinyl, of profiles required for thickness of abutting materials.

2. Edge strips: Tapered or bull nose edge.

3. Stair nosings: Visually impaired recessed vinyl stair nosing, 2 inch (5.08 cm) hinged square nose configuration, 3 inch (7.62 cm) tread depth with 2 inch (5.08 cm) wide co-extruded contrasting color strip, undercut for 1/8 inch (3.17 mm) resilient or 3/16 inch (4.76 mm) butt with lip removed, equal to Johnsonite, Chagrin Falls, PA, Model "VIRCN-B".

4. Ramp abrasive strips: 1 inch abrasive strips for recessed installation.

5. Colors: Match or contrast with the flooring, as selected by the Architect from standard colors available, of width shown on the drawings.

E. Cleaning material: Domestic neutral floor detergent having a pH 7 or pH 8, as recommended by the flooring manufacturer.

PART 3 - EXECUTION

3.3 INSTALLATION - GENERAL

A. Install all products in strict accordance with each manufacturer's written installation procedures and other provisions specified herein.

1. Apply primers as recommended by adhesive manufacturer's written instructions.

B. Spread only enough adhesive to permit installation of materials before initial set.

C. Maintain reference markers, holes and openings that are in place or have been marked for future cutting; repeat markers on flooring as marked on substrate. Use non-permanent marking devices which may be cleaning washed off when no longer required.

3.4 INSTALLATION - SHEET LINOLEUM FLOORING

A. Install linoleum using conventional full-spread method and heat welded seams. Application shall be performed by factory trained mechanics franchised by the manufacturer in accordance with the manufacturer's instructions, and using tools and techniques recommended by the flooring manufacturer. Do not reverse roll sheets.

B. Cut sheet material into required lengths and sizes. Layout and cut to achieve minimum number of seams and for pattern match between abutting edges, Reverse every other sheet.

1. Locate seams not less than 6 inches (150mm) away from parallel joints in flooring substrate.

2. Seams in corridors shall run perpendicular to corridor.

3. Avoid cross and but seams.

C. Lay cut sheets flat and allow to come to room temperature prior to installation.

D. Lay flooring so as to ensure full uniform contact with adhesive and substrate and to produce finished surfaces which are smooth, even and in true planes, free of buckles, waves, and other imperfections.

1. Match edges of sheet flooring for color shading and pattern at seams, in accordance with manufacturer's written recommendations.

2. Wet install flooring with adhesive. Adhesive spread rate shall be as recommended by manufacturer, at approximately 125 to 175 square feet per gallon.

3. Install the sheets and roll the floor surface to work wrinkles and air pockets out past the outer edges.

4. Terminate flooring at centerline of door in closed position where adjacent floor finish is of different material or color. Where flooring pattern continues through door openings, continue established pattern with no interruption.

E. Heat welded seams:

1. General: Prepare seams and weld in strict accordance with flooring manufacturer's written installation instructions and in compliance with ASTM F-1516.

2. Groove and clean seams, apply welding rod and ensure rod melts fully into prepared groove. Remove excess weld materials while rod is still warm.

3. Patch all areas where welding rod has not properly bonded.

4. Protect welded joints from damage during curing, for a minimum period of 24 hours.

3.5 INSTALLATION OF ACCESSORIES

A. Resilient edge and transition strips:

1. Install edge strips at all edges of flooring which would otherwise be exposed.

2. Place resilient edge strips tightly butted to flooring and secure with adhesive recommended by the edge strip manufacturer.

B. Stair nosings: Secure with manufacturer's recommended epoxy adhesive.

C. Abrasive strips: Recess for flush installation in 1 inch strips for full width of ramp every 12 inches.

END OF SECTION 09 65 43

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SECTION 09 68 13
CARPETING

PART 1 - GENERAL

1.1 SUMMARY

A. Prepare substrates to receive carpet as required to ensure specified tolerance level for finish surface of carpeting. Preparation work includes patching, smoothing and leveling subfloors and underlayment, including:

1. Grinding down high spots of substrate.
2. Providing Portland cement-based latex underlayment (filler).
3. Cleaning subfloors as required for installation of carpet.

B. Furnish and install carpeting directly adhered over floors, where indicated on the Drawings, including all accessories necessary to complete the work.

1.5 QUALITY ASSURANCE

A. Environmental impact characteristics of carpet:

1. Product, inclusive of adhesive, to comply with the 1994 State of Washington protocol. The product, when tested as manufactured (no air-out period required), shall pass the protocol as written and shall have the following characteristics:
   a. Less than 0.05 ppm (part per million) of formaldehyde.
   b. Less than 0.50 mg/cubic meter of total volatile organics.
   c. Less than 50 ug/cubic meter of total particulates.
   d. Less than 1.0 ppb (part per billion) 4-PC.
   e. Test over a 96 hour time period.
   f. Submit compliance table.
2. Carpet to be delivered with a recycle bag for recycling of the plastic film used to protect the Microencapsulated Tackifier.
3. All carpet products must pass the University of Pittsburgh protocol for toxicity being "no more toxic than wood" when burned under the same conditions.
4. Carpet to be a reduction barrier to radon flow.
5. Carpet to provide asbestos enclosure properties. Enclosure means an airtight, impermeable, permanent barrier around ACBM (Asbestos Containing Building Material) to prevent the release of asbestos fibers into the air.
6. Carpet to be installed without the use of wet adhesives.
7. Company to have an in-place, operational recycling program for product (at the end of its useful life) and manufacturing waste. Program shall recycle 100 percent of the product in the same operation.
8. This program shall not consist of incineration.

1.9 WARRANTY

A. Furnish the following warranties under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Carpet manufacturer's 20 year printed, non-prorated warranty which shall include texture retention, wear, and static protection and edge ravel resistance and run resistance strength. Commencing on the date of substantial completion. All warranty items to be full term, not pro-rated, for the indicated period. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced at the discretion of the Manufacturer.
   a. As a minimum, manufacturer's warranty shall include protection against:
      1) Excessive surface wear. Excessive wear means more than 15 percent loss of pile fiber weight measured before and after use.
      2) Edge ravel.
      3) Zippering.
      4) Backing delamination. Backing delamination is defined as separation of the secondary backing from the primary backing.
      5) Watermarking on any product not 100 percent loop construction. Watermarking means an apparent color difference between areas of the same carpet due to permanent pile reversal with random differences in pile lay direction and differences in the amount of light reflected by carpet fibers.
      6) Excessive static electricity. Excessive static electricity means more than 3.0 kilovolts when tested per AATCC 134 at a relative humidity of 20 percent and a room temperature of 70 degrees Fahrenheit.
   b. Chair pads are not required for carpet warranty coverage.
   c. All carpet warranties to be sole source responsibility of the Manufacturer. Second source warranties or warranties that involve parties other than the Manufacturer are unacceptable.
   d. Carpet warranties will be official standard documents, not customized, and shall not be created on a job by job basis.
   e. All carpet warranties shall be signed and notarized by a company representative.
2. Carpeting installer's written guarantee covering prompt and proper replacement of any and all carpeting which indicates improper installation workmanship and/or defective material within twelve months from completion of the installation and acceptance thereof by the Architect, said corrective work being performed by the Carpeting installer at no cost to the Owner.

1.10 EXTRA MATERIALS AND MAINTENANCE DATA

A. Upon completion of the Work of this Section, submit the following under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS:

1. Extra Materials: Deliver to the Owner extra materials for future repairs and maintenance. Clearly label and package securely to prevent damage.
   a. Owner's carpet stock: An amount equal to 10 percent of each color, pattern and type of carpet installed.
2. Maintenance Data: Prior to final acceptance of the carpet installation, carpet subcontractor shall deliver to the Architect 3 printed copies of the carpet manufacturer's detailed maintenance recommendations for the care cleaning and stain-removal, and repair of the types of carpets installed. Include product data and Material Safety Data Sheets (MSDS) for cleaning materials.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Tandus US, LLC, Dalton, GA products "Alcove: No. 04163 with Powerbond Cushion RS.

2.2 CARPET

A. General requirements: Carpet, shall conform with or pass tests of the following Standards:
   1. ASTM D-2859 (Methenamine Reagent Pill Test).
   2. ASTM E-648 (Flooring Radiant Panel Test): Class I (Minimum Average CRF of 0.48).
   3. NBS Smoke Chamber Test: Maximum average of 450.
   4. AATCC-134 (Electrostatic Propensity): Maximum electrostatic generation below level of human sensitivity.

B. Colors/Patterns: Colors as selected by Architect.
   1. Areas not having indicated patterns shall include as minimum in the Contract Sum the following: Within any single contiguous space or corridor may include one field color, (65% of floor area) and one accent color, (35% of floor area) in colors selected by the Architect.

C. Filler for patching, smoothing and leveling subfloors and underlayment: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:
   1. Ardex, Inc., products "Feather Flash" and "Ardex SD-P".
   2. Quikrete Companies, product "Fast-Set Underlayment 1248".
   3. Silpro Masonry Systems Inc., product "Masco Latex Cement"

D. Adhesives for carpeting: NFPA Class A or UBC Class 1 types, as determined by ASTM E-84 Tunnel Test, as recommended by Carpet manufacturer for application and intended use. Acceptable manufacturers include:

1. Advanced Adhesive Technology, Inc, Dalton GA.
2. DAP Incorporated, Dayton OH.
3. W.W. Henry Company, Huntington Park CA.
4. Macklanburg-Duncan Company, Oklahoma City, OK.
5. Roberts Consolidated Industries, Inc., City of Industry, CA.

E. Transition strips, carpet reducers, edgings and accessories: Composition nitrile rubber alloy in colors as selected by the Architect.

1. Acceptable manufacturers:
   a. American Biltrite (Canada) Ltd., Sherbrooke, Quebec.
   b. Burke Industries, San Jose, CA.
   c. Roppe Corporation, Fostoria OH.
   d. Freudenberg Building Systems Inc., Lawrence MA.
2. Profiles as indicated, submit shop drawings for all conditions not indicated and obtain Architect's approval for each transition/reducer.

PART 3 - EXECUTION

3.3 INSTALLATION – CARPET

A. Install carpet in accordance with carpet and environmentally approved carpet adhesive manufacturers' instructions. Immediately notify Architect of conflicts.

B. Layout carpet with location of seams per approved shop drawings.

C. Cement carpet directly to the substrate with specified installation adhesive. Trowel adhesive evenly on the substrate. Install the carpet within thirty minutes after spreading adhesive.

1. Apply a 6 inch wide band of specified seaming adhesive continuously at each seam location, before bedding the carpet therein, ensuring that each carpet edge will be embedded therein at least 3 inches.
2. Apply a continuous band of specified edge adhesive around entire perimeter edge of each carpeted area, and embed the carpeting therein.

D. Roll all carpet areas with a 30 pound carpet roller to ensure proper contact of carpet with adhesive, and to remove all bubbles and buckles. Carefully roll seams and edges with the roller centered over the seam.

E. Run all carpet in the same direction. Plan and install carpet in all areas so that single pieces per area shall be used to the fullest extent possible. No seams will be permitted in areas which are 12 feet, or less, in width.

F. Carefully measure all cut-outs at the project.

G. Make all seams in carpeting by back-cutting the carpet on an angle so that the face yarn of abutting pieces intermingles, and provides a practically invisible transition at each seam location.

1. Center seams, occurring at door openings, parallel to, and directly under, the doors.
2. Seams occurring at corridor changes in direction shall follow wall line parallel to carpet direction.
3. Do not center seams in travel path to doors.

H. Do not center seams in path, perpendicular to, in the path of, or travel to doors.

I. Install specified edging wherever carpeting abuts a dissimilar flooring material, except where wood thresholds, or resilient floor tile trim occurs.

END OF SECTION 09 68 13

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SECTION 09 90 00

PAINTING
(FILED SUB-BID REQUIRED AS PART OF SECTION 09 00 09)

PART 1 - GENERAL

1.2 SUMMARY

A. Summary: This Section consists of painting work where shown on the Drawings, as specified herein, and as required for a complete and proper installation. Painting work includes, but is not limited to the surface preparation and application of coated finishes, and subsequent touch-up, of interior and exterior items and surfaces as indicated on the Contract Drawings and as scheduled herein.

1. No attempt is made in this Section to list all surfaces, fixtures and equipment requiring painting on this project. It is the responsibility of the Trade Contractor to determine for itself the scope and nature of the Work required for a complete installation from the information provided herein and in the Drawings.
2. Exposed Surfaces:
   a. Where item or surface is not specifically mentioned, paint same as similar adjacent materials or surfaces.
   b. If color or finish is not designated, Architect will select from standard colors or finishes available.

B. Surfaces and Materials: In general, without limiting the generality thereof, the following new and existing surfaces, fixtures and equipment require a painted finish:

1. Gypsum board partition and wall surfaces, ceilings and soffits.
2. Veneer plaster partition and wall surfaces, ceilings and soffits.
3. Plaster walls, ceilings and soffits.
4. Masonry walls and partitions.
5. Metal and wood doors and frames.
6. Wood trim not scheduled for shop finishing.
7. Window interiors.
8. Exposed to view ductwork.
9. Exposed to view structural steel.
10. Exposed to view sprinkler piping.
11. Exposed to view electrical conduit and raceways.
12. Exposed to view portions of ducts, (interior side) at diffusers.
13. Access panels and frames.
14. Historic plaster trim, molding and ornamental detailing.

C. DO NOT PAINT the following surfaces and materials.

1. Concealed from view surfaces, except as indicated otherwise in the Contract Documents or as specified herein.
2. Chrome or nickel plating, stainless steel, bronze, brass.
3. Aluminum other than mill finished or factory primed.
4. Factory finished mechanical and electrical equipment, pumps, machinery and similar items which occur in mechanical, storage or equipment rooms or areas.
5. Factory finished materials, specialties, and accessories unless otherwise specified.
6. Ceramic tile, resilient flooring, and other integrally finished floor, wall and ceiling finishes.
7. Prefinished millwork items.
8. Fire resistant testing and certification labels, code required labels, safety warning labels, performance rating plates, nomenclature plates, identification plates, and similar other labels.

1.6 QUALITY ASSURANCE

A. Single source responsibility: Provide primers and other undercoat paint produced by same manufacturer as finish coats. Use only thinners approved by paint manufacturer, and use only within recommended limits.

B. Environmental Requirements for Volatile Chemicals:

1. For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:
   a. Flat Paints and Coatings: VOC not more than 50 g/L.
   b. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
   c. Anti-Corrosive Coatings: VOC not more than 250 g/L.
   d. Floor coatings: VOC not more than 100 g/L
   e. Sealers:
      1) Waterproofing sealers: VOC not more than 250 g/L.
      2) Sanding sealers: VOC not more than 275 g/L.
      3) All other sealers: VOC not more than 200 g/L.
   f. Stains: VOC not more than 250 g/L.
2. Do not use water based paints formulated with aromatic hydrocarbons (organic solvent with a benzene ring in its molecular structure), formaldehyde, halogenated solvents, mercury or mercury compounds, or tinted with pigments of lead, cadmium, chromium VI and their oxides. Water based paints shall be low VOC and shall have a flash point of 61 degrees C or greater.

3. Where it is necessary to use solvent-based paints, with less than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
4. The following shall be low VOC and not be formulated with aromatic hydrocarbons (organic solvent with a benzene ring in its molecular structure).
    a. High performance water based acrylic coatings.
    b. Pigmented acrylic sealers.
    c. Catalyzed epoxy coatings.
    d. High performance silicone grafted epoxy coatings.

1.11 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
1. Paints and general finishes:
    a. Benjamin Moore & Company, Montvale, NJ.
    b. California Paints, Andover MA.
    c. Glidden Professional / PPG Industries, Inc, LLC, Strongsville, OH.
    d. Devoe High Performance Coatings / PPG Industries, Inc, LLC, Strongsville, OH.
    e. Pittsburgh Paints / PPG Industries, Inc., Pittsburgh PA.
    f. Pratt & Lambert Inc., Buffalo, NY.
    g. Sherwin Williams, Cleveland OH.
2. Cold galvanizing touch-up paint:
    a. ZRC Worldwide Inc., Marshfield MA.
    b. Duncan Galvanizing, Malden Ma.
    c. Rustoleum Corp., Vernon Hills IL.
3. Caulking
    a. Pecora Corporation, Harleysville PA.
    b. Sonneborn Building Products Inc., Minneapolis MN.
    c. Tremco, Beachwood OH.

2.2 MATERIALS

A. Coatings: Ready mixed, except for field catalyzed coatings with good flow and brushing properties; capable of drying or curing free of streaks or sags. Color pigments shall be processed to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating. Provide best quality grade, where manufacturer makes more than one grade of any material specified.

B. Liquid zinc coating, for touch-up of welds, scratches, and abrasions in galvanized steel: Low VOC organic zinc-rich coating containing 92% metallic zinc, by weight in the dried film (ASTM D520, Type III) and conforming to SSPC Paint 20, Type II, Level 1. Liquid zinc coating shall be recognized under the Component Program of Underwriter's Laboratories, Inc. as an equivalent to hot-dip galvanizing; conforming to MIL-P-21035B and SSPC Paint 29, Type II, Level I, for repair of hot-dip galvanizing and meeting the requirements for Zinc-Rich Paints.

1. VOC limit: not more than 250 g/L.
2. Specified manufacturer and product: ZRC Worldwide, Marshfield MA, product "ZRC-221".

C. Filler for repair of minor cracks in gypsum wallboard prior to painting: One component acrylic latex caulking compound, conforming to FS 19-TP-21M and ASTM C 834, paintable within 24 hours after application, with a minimum movement capability of ±12.5 percent, equal to one of the following:

1. Pecora, product " AC-20+".
2. Sonneborn Building Products Inc., product, "Sonolac".
3. Tremco, product, "Trimflex 834".

2.3 ACCESSORIES

A. Accessory materials: other materials not specifically indicated, but are required to achieve the finishes specified of commercial quality.

B. Cleaning Materials:

1. Tri-Sodium Phosphate (TSP) substitute products:
   a. Savogran, Norwood MA, products "TSP-PF", or "Liquid TSP Substitute".
   b. Custom Building Products, Seal Beach, CA., product "Custom T.S.P. Substitute".
   c. DAP Inc., Baltimore MD., product "T.S.P. Substitute Heavy Duty Cleaner".

PART 3 - EXECUTION

3.3 APPLICATION

A. Apply all materials in strict accordance with the approved manufacturer's printed instruction, and in accordance with the best trade practices. Each coat shall be reviewed and approved by the Architect before succeeding coats are applied.

B. Do not apply successive coating until the preceding coat is thoroughly dry, and in no case in less than 24 hours after the preceding coat.

C. Number of coats is indicated under Painting Schedules. Number of coats is indicated as a minimum number to be applied over scheduled substrates. An additional coat or coats may be required for proper color coverage of substrate as determined by the Architect, at no additional cost to the Owner. Examples of these conditions include, but are not limited to:

1. Dark colored substrates may require an additional primer or intermediate coat to stabilize color, if final applied top-coat color is light.
2. Pre-finished or pre-primed products may require an additional field applied coat to stabilize the shop/factory applied base color prior to application of top-coat finishes.
3. Dark color top coat finishes may require additional finish coat over white or light colored substrates to obtain correct color density.

D. Apply each coat to a uniform finish; Apply primer and first coat of slightly lighter in color tint than the scheduled color of the final coat.

E. Sand lightly between coats to achieve required finish and remove sanding dust prior to applying succeeding coat.

F. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

3.4 APPLICATION – CONCRETE MASONRY

A. Apply epoxy block filler to concrete masonry partitions at maximum rate allowed by coating manufacturer. Apply by airless spray followed by back rolling to force material into voids. Use a squeegee to remove excess material prior to initial set, and provide a smooth surface texture. After initial set, touch-up and fill apparent voids and holidays with fresh material.

3.7 PAINTING SCHEDULE

A. Colors: The Architect will furnish a schedule of colors for each area and surface. Tinting and matching shall be to the satisfaction of the Architect. No limit is placed on the number of colors that may be required, or the number of colors in any one room, area, or surface. Premium paints of deep-hued, bright, pigment intensive, accent and primary colors may be scheduled for up to 25 percent of all interior and exterior surfaces without additional cost to the Owner.

1. Colors of priming coats (and body coats where specified) shall be lighter in tint than those of finish coat.
2. Colorants: Pure, non-fading pigments, mildew-proof, ultra-violet resistant, finely ground in approved medium; and be limeproof, when used in coatings to be applied on masonry, concrete, plaster, and gypsum board surfaces.

B. Paint schedule for exterior surfaces and materials: Refer to Document 09 91 13.

C. Paint schedule for interior surfaces and materials: Refer to Document 09 91 23.

D. Paint schedule for labeling and identifying fire resistive and rated designations: Refer to Document 09 91 23.

E. Painting schedule for mechanical and electrical equipment: Refer to Document 09 91 23.

END OF SECTION 09 90 00

DOCUMENT 09 91 13

EXTERIOR PAINTING SCHEDULE
(FILED SUB-BID REQUIRED AS PART OF SECTION 09 00 09)

PART 1 - GENERAL

1.2 PAINTING SCHEDULE FOR EXTERIOR SURFACES AND MATERIALS

A. Exterior METAL, FERROUS, new, shop primed and existing:

1. One coat of rust prohibitive primer for unfinished metal surfaces, and touch up bare metal at shop primed, existing and previously coated surfaces:
   a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.
   b. Devoe Coatings: Devflex 4020PF DTM Primer and Flat Finish.
   c. Moore: “Acrylic Metal Primer”, Nº. P04.
   d. Pittsburgh: “Pitt-Tech DTM Primer/Finish 100% Acrylic”, 90-709/712 Series
   e. Sherwin-Williams: "DTM Acrylic Primer Finish", B66 W1 Series.
2. Two coats acrylic semi-gloss enamel:
   a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.
   b. Devoe Coatings: Devflex 4216HP High Performance Waterborne Acrylic Semi-Gloss Enamel.
   c. Moore: “Super Spec HP DTM Semi-Gloss Enamel”, Nº. P29.
   d. Pittsburgh: “Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel”, 90-1210 Series.
   e. Sherwin-Williams: “Sher-Cryl HPA Semi-Gloss”, B66 Series.
3. Color and finish: Match existing.

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DOCUMENT 09 91 23

INTERIOR PAINTING SCHEDULE
(FILED SUB-BID REQUIRED AS PART OF SECTION 09 00 09)

PART 1 - GENERAL

1.2 PAINTING SCHEDULE FOR INTERIOR SURFACES AND MATERIALS

A. Interior EXPOSED DUCTWORK, Insulated.

1. Apply one prime coat and two finish coats of a paint recommended by the approved paint manufacturer for application on the exposed ductwork.

B. Interior GYPSUM BOARD AND PLASTER partitions:

1. One coat latex primer.
   a. California: “Elements 100% Acrylic White Primer”, Nº. 74600.
   b. Glidden Professional: “Lifemaster No VOC Primer Nº. 9116”.
   c. Moore: “Eco Spec Interior Latex Primer Sealer”, Nº. 231.
   d. Pittsburgh: “Pure Performance Interior Latex Primer”, Nº. 9-900.
   e. Sherwin-Williams: "Harmony Interior Latex Primer”, B11W900 Series.
2. Two coats eggshell paint:
   a. California: “Elements 100% Acrylic Zero VOC Eggshell”, Nº. 731.
   b. Glidden Professional: “Lifemaster No VOC Eggshell Nº. 9300”.
   c. Moore: “Eco Spec Interior Latex Eggshell”, Nº. 223.
   d. Pittsburgh: “Pure Performance Eggshell”, Nº. 9-300.
   e. Sherwin-Williams: "Harmony Low Odor Interior Latex Eg-Shel”, B9 Series”.

C. Interior GYPSUM BOARD AND PLASTER ceilings and underside of soffits:

1. One coat latex primer.
   a. Basis of Design: California: “Envirotech 646xx”.
   b. Glidden Professional: “Lifemaster No VOC Primer Nº. 9116”.
   c. Moore: “Eco Spec Interior Latex Primer Sealer”, Nº. 231.
   d. Pittsburgh: “Pure Performance Interior Latex Primer”, Nº. 9-900.
   e. Sherwin-Williams: "Harmony Interior Latex Primer”, B11W900 Series.
2. Two coats flat paint
   a. Basis of Design: California: “Envirotech 735xx”.

D. Interior METAL, FERROUS, excluding railings, to receive semi-gloss finish: (includes galvanized metal doors and frames):

1. One coat of rust prohibitive primer for unfinished metal surfaces, and touch up bare metal at shop primed, existing and previously coated surfaces:
   a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.

b. Glidden Professional: “Devflex” Nº. 4020 DTM Flat WB Primer/Finish.

c. Moore: “Acrylic Metal Primer”, Nº. P04.

d. Pittsburgh: “Pitt-Tech DTM Primer/Finish 100% Acrylic”, 90-709/712 Series

e. Sherwin-Williams: "DTM Acrylic Primer Finish", B66 W1 Series.

2. Two coats acrylic semi-gloss enamel:

a. California: “Novus 466xx”.

b. Glidden Professional: “Devflex 4216HP Semi-Gloss DTM WB Acrylic Enamel”.

c. Moore: “Super Spec HP DTM Semi-Gloss Enamel”, Nº. P29.

d. Pittsburgh: “Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel”, 90-1210 Series.

e. Sherwin-Williams: “Sher-Cryl HPA Semi-Gloss”, B66 Series.

E. Interior METAL, GALVANIZED, (includes exposed ductwork):

1. Touch-up with metal primer.

a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.

b. Glidden Professional: “Devflex” Nº. 4020 DTM Flat WB Primer/Finish.

c. Moore: “Acrylic Metal Primer”, Nº. P04.

d. Pittsburgh: “Pitt-Tech DTM Primer/Finish 100% Acrylic”, 90-709/712 Series.

e. Sherwin-Williams: "DTM Acrylic Primer Finish" B66 W1 Series.

2. Two coats acrylic semi-gloss enamel:

a. California: “Rust-Stop DTM Primer/Finish”, Nº. 1061.

b. Glidden Professional: “Devflex 4216HP Semi-Gloss DTM WB Acrylic Enamel”.

c. Moore: “Super Spec HP DTM Semi-Gloss Enamel”, Nº. P29.

d. Pittsburgh: “Pitt-Tech Plus High Performance, Semi -Gloss DTM Industrial Enamel”, 90-1210 Series.

e. Sherwin-Williams: “Sher-Cryl HPA Semi-Gloss”, B66 Series.

F. Interior exposed METAL, PIPING: Same as specified for ferrous metal.

G. Interior METAL, RAILINGS (handrails and guardrails):

1. One coat of epoxy primer (dry film coat 3.0 to 4.0 mils)

a. California: No equivalent.

b. Glidden Professional: “Tru-Glaze B” Nº. 4030 Epoxy Primer.

c. Moore: “Epoxy Metal Primer”, P33 Series.

d. Pittsburgh: “Aquapon WB Epoxy Primer”, 98 Series

e. Sherwin-Williams: "Recoatable Epoxy Primer", B67 Series.

2. Two coats of gloss finish epoxy coating (dry film coat 1.5 to 2.0 mils).
   a. California: "Tile-Cote Polyamide Epoxy", Nº. 12.
   b. Glidden Professional: "Tru-Glaze B" No. 4408 Epoxy Primer.
   c. Moore: "Acrylic Epoxy Gloss Coating", Nºs. P43/P44.
   d. Pittsburgh: "Aquapon WB Epoxy Coatings", 98 Series.
   e. Sherwin-Williams: "Hi-Solids Polyurethane-Low VOC, B65 Series".

1.3 PAINTING SCHEDULE FOR FIRE RESISTIVE AND RATED DESIGNATIONS

A. In compliance with Massachusetts State Building Code, Eighth Edition (referencing Section 703.6 of the 2009 International Building Code) and as additionally specified herein, provide identification for all fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions and any other wall or partition which is required to have protected openings or penetrations.

1. Application:
   a. Apply to outside of fire rated shafts, and to both sides of partitions at intervals not to exceed 30'-0" for entire length of partition or wall, or once on any partition 30'-0 feet or less in length.
   b. Locate identification in all accessible concealed floor, floor-ceiling and attic spaces. Locate identification within 12 to 18 inches above finished ceilings.
   c. Apply stenciled lettering by spray or brush, or provide permanent signage. Identification shall be waterproof, fade-proof and non-combustible. Signage shall be mechanically fastened or permanently adhered to partition.
   d. Stencil character height: 1 inch minimum.
   e. Color: Easily identifiable color, contrasting with background, acceptable to Owner.
2. Apply stenciled lettering to the following types of partitions using wording specified:
   a. Applied identification for 2 hour fire rated partitions shall read: "2 HOUR FIRE WALL - PROTECT ALL OPENINGS".
   b. Applied identification for 1 hour fire rated partitions shall read: "1 HOUR FIRE WALL - PROTECT ALL OPENINGS".

1.4 PAINTING SCHEDULE FOR MECHANICAL AND ELECTRICAL EQUIPMENT

A. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of flat black enamel.

B. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

C. Remove unfinished louvers, grilles, covers and access panels on and paint as scheduled above.

D. Plywood backboards for electrical panels and other equipment. Paint both front and back surfaces and all edges of plywood backboards before backboards are installed.

1. One coat latex primer-sealer (undercoater):
   a. Glidden Professional: “Prep & Prime Odor-Less Interior Water-Based Primer-Sealer” LM 9116.
   b. Moore: “EcoSpec Interior Latex Primer Sealer” 231.
   c. Pittsburgh: “Pure Performance Interior Latex Primer”.
   d. Sherwin-Williams: "Harmony Interior Latex Primer” B11W900.
2. Two coats latex semi-gloss paint:
   a. Glidden Professional: "Lifemaster 2000 Interior Semi-gloss” LM9200.
   b. Moore: “EcoSpec Interior Latex Semi-gloss” Nº. 224.
   c. Pittsburgh: “Pure Performance Interior Semi-gloss”, 9-500 Series.
   d. Sherwin-Williams: "Harmony Interior Latex Semi-gloss" B10 Series.

E. Prime and paint insulated and exposed cold pipes, conduit, electrical boxes, insulated and exposed ducts, hangers, brackets, collars and supports, except where items are located in storage, mechanical or equipment spaces or those items which are factory prefinished.

F. Exposed to view un-insulated hot pipes within finished painted areas: Two coats heat-resistant enamel conforming to Federal Specification TT-E-496, Type I, applied when surfaces are less than 140 degrees Fahrenheit.

END OF DOCUMENT 09 91 23

SECTION 10 11 23
VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Markerboards and tackboards.
2. Tackrails.
3. Trim, marker tray and accessories

1.5 QUALITY ASSURANCE

A. Contractor is fully responsible for proper handling during demolition and salvage, temporary storage and re-installation of chalkboards. Broken or otherwise damaged chalkboards shall be replaced in like units to match existing.

1.6 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

B. Provide manufacturer's standard 5 year warranty which shall include coverage of dry-marker board and porcelain enamel chalkboard surfaces from discoloration due to cleaning.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Basis of Design (Specified Manufacturer): To establish a standard of quality, design and function desired, Drawings and specifications have been based on Claridge Products & Equipment Inc., Harrison AR, Product: "Series 5."

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Claridge Products & Equipment Inc., Harrison AR.
2. AARCO Products, Inc., Yaphank NY.
3. EverWhite Corp. Menomonee Falls, WI.
4. Ghent Corporation, Lebanon OH.
5. Marsh Industries, Inc., New Philadelphia, OH.

2.2 MARKERBOARD

A. Aluminum framed dry markerboards, of sizes indicated on Drawings.
   1. Exposed trim: Extruded 6063-T5 alloy aluminum, anodized, satin finished, with 5/8 inch exposed face.
   2. Top rail and tack strips:
      a. Top rail: 1 inch high display rail with cork insert and end trim.
      b. Grip strips:

B. Markerboard surfaces:
   1. Porcelain enamel writing surface, equal to Claridge LCS-II and Greengard Certified.
      a. Bottom ground coat: 1.5 to 2.2 mils.
      b. Top ground coat: 2.0 to 2.8 mils.
      c. Color coat: 3.0 to 4.0 mils.
   2. Face sheet: Low-gloss white finish equal to Claridge No. 75.
   3. Core material for laminated construction: 7/16 inch fiberboard core.
   4. Backing sheet: steel sheet or aluminum, minimum 0.015 inch thick.

C. Factory applied silk screened fused-on porcelain graphics:
   1. Music staff lining: 1/8 inch lines, 1-1/2 inch on centers with 5 inches between staffs. 48 inch high by width indicated on Drawings.

D. Tackboard surfaces, where indicated: Self-healing, mildew resistant vinyl embossed fabric covered 1/4 inch thick natural cork laminated to 1/4 inch thick fiberboard.
   1. Divider strip at combination units: manufacturer's standard mullion trim, finished to match perimeter frame.

E. Marker tray: Manufacturer's standard continuous box type aluminum marker tray with slanted front and cast plastic end closures for each markerboard. Extend marker tray full width of markerboard or markerboard/tackboard combination.

2.3 ACCESSORIES

A. Provide sliding aluminum accessories, hook type, to fit display rail.
   1. Provide two sliding aluminum map supports for every 8 linear feet of marker board.
   2. For each room provide one flag holder.
   3. For each room provide two roller map brackets.

B. Provide instructions for dry-marker board cleaning on metal plate attached to perimeter frame near marker tray.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Install marker boards in accordance with manufacturer's instructions. Protect porcelain enamel facing from chipping and damage during handling and installation. Install units level and plumb utilizing concealed continuous hangers wherever possible and where fasteners must be exposed, use tamperproof-type fasteners.

B. Establish top of units to align with top of adjacent door frames, or as otherwise indicated on the Drawings.

END OF SECTION 10 11 23

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SECTION 10 14 00
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following informational and directional signage:

1. Interior signage:
   a. Primary signage: Photopolymer AAB-compliant room signage adhered with double sided acrylic foam tape, (all permanent spaces) with removable name holder slot; 0.16 inch thick, with backed acrylic polyurethane enamel paint, and raised Braille cells.
   b. Secondary signage adhered with double sided acrylic foam tape, installed at 12 inches AFF. 2 inch high letters, using the same plastic background as AAB-compliant room signage, (only at main corridor doors into permanent spaces, indicating room number only).
2. Exterior signage:
   a. Cast aluminum individual letters at main entry canopies painted.
   b. Plaques identifying all exterior doors/entrances: 3 inch high reflective vinyl letters on painted aluminum, mechanically fastened.
3. Directional signage.

1.6 QUALITY ASSURANCE

A. General: Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

B. Drawings and Signage Design: The Contract Drawings are for purpose to show design intent only. The Contractor is responsible for the proper engineering of all signage and support. Signage, lettering, graphics, fasteners and support items for all signs required for the Project shall be indicated in the approved shop drawings.

C. Sole Source: Obtain products required for the Work of this Section from a single signage fabricator, or from manufacturers recommended by the prime signage fabricator of plastic plate signage.

D. Qualifications:

1. Signage Fabricator: Minimum of 5 years documented experience demonstrating previously successful work of the type specified herein.

1.9 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Interior plaque signs:
   a. Basis of Design: Advance Corporation, Cottage Grove, MN.
   b. Apco New England, Franklin, MA.
   c. Design Communications, Boston, MA.
   d. Sunshine Sign, North Grafton, MA.
   e. General Sign Company, Norwood, MA.
   f. Back Bay Sign Company, Somerville, MA.
2. Individual letter signage:
   a. ARK Ramos, Oklahoma City OK.
   b. Gemini Inc., Cannon Falls MN
   c. Matthews International Corporation, Pittsburgh PA
   d. Metal Arts, Mandan ND.

2.2 SIGNAGE - GENERAL

A. General: Provide sign copy to comply with the requirements indicated in the Drawings, for sizes, styles, spacing, content, positions, materials, finishes and colors of letters.

1. All Signs shall conform to United States "*Americans with Disabilities Act*" and Commonwealth of Massachusetts Regulation 521 CMR: *Architectural Access Board*.
2. Final placing and sizing of lettering shall be done as part of the shop drawing approval process, at which time the manufacturer shall make recommendations for Architect's review. Lettering shall have stroke width to height ratio and width to height ratio in accordance with the Americans with Disabilities Act.

B. Installation of all signs shall be done by vandal-proof method, fully described on the shop drawings.

2.3 INTERIOR PLAQUE SIGNAGE

A. Photopolymer plaque signage (general requirements): Identification signs with raised tactile graphics, text, and Grade 2 Braille. Signs shall consisting of 1/32 inch thick synthetic light sensitive photo emulsion permanently bonded to a rigid phenolic substrate, aluminum or acrylic plaque.

1. Raised lettering: Minimum above the surface of the sign 1/32", and be in compliance with Americans with Disabilities Act.
    a. Bond photopolymer permanently to sign plaque, with appropriate laminating film, as recommend by the photopolymer manufacturer.
2. Lettering height: As indicated on Drawings.
3. Lettering font: As indicated on Drawings.
4. Screenprinting: All screen printing graphics, including raised areas of tactile plaques except Braille, shall be screen printed in a contrasting color so as to meet the color contrast requirements of Americans with Disabilities Act.
    a. All non-tactile text shall be screen printed with catalyzed epoxy ink. Applied vinyl lettering and graphics is not acceptable.
    b. Apply screen printing inks evenly without pinholes, scratches or orange-peeling.
5. Graphics: All text, symbols and graphics shall be reproduced utilizing computer generated digital art. All screen printed graphics shall utilize photographically prepared screens and shall be printed in accordance with industry standards. Hand-cut screens are not acceptable.
    a. All edges and corners and letter forms shall be true and clean. Letterforms, color areas, or lines with rounded positive or negative corners, built-up edges, bleeding, spattering, etc., shall not be accepted.
    b. Prepare artwork from typesetters reproduction of the test specified, minimum 1200 dpi resolution, camera ready artwork. All camera ready artwork and typesetting shall be no less than 75 percent of actual finished size.
6. Mounting: Surface applied by means of silastic adhesive mounting.
7. Sign colors: As selected by Architect from manufacturer's standard and standard special colors.
    a. All signs shall be two color signs.

2.4 DIE-CUT VINYL SIGNAGE - INTERIOR

A. Die-cut letters: 2 Signs of equal size, with 1-1/2 inch high letters in Helvetica font. One sign shall read: "EMERGENCY EXIT ONLY" and the other: "ALARM WILL SOUND".
    1. Die-cut copy characters, reverse reading, from opaque non-reflective white vinyl film, 0.0035" min. thickness letters: with pressure sensitive adhesive backing, suitable for interior applications. Apply copy to the back face of 1/8-inch thick, transparent, colorless, matte finish, acrylic sheet and mount signs to finished door.
    2. Mount signs to inside face of door with brass round head screws.

2.5 DIE-CUT VINYL SIGNAGE - EXTERIOR

A. Die-cut letters: Fabricate die-cut copy characters, reverse reading, from opaque high-reflective cast vinyl film, with pressure sensitive adhesive backing, suitable for exterior applications.

1. Film: Equal to "TFX High Performance Cast Film" as manufactured by Universal Products, Inc., Goddard KS, having a minimum thickness of 2.1 mils plus repositionable pressure sensitive acrylic adhesive, rated for exterior durability of 7 years.
2. Color: As Selected.

2.6 CAST METAL LETTERS

A. Cast aluminum letters: Projecting individual cast aluminum letters , 1/2 inch thick, equal to A.R.K. Ramos, Typeface: "Condensed Futura Nº. 517" with an average width of 3-1/2 inches and a stroke of 1-1/8 inches. Letters shall have a satin face, matte edges, and be clear anodized.

1. Cast aluminum shall be solid aluminum, no scrap permitted. Cast aluminum shall be free of all porosity, with sharp corners, flat and accurate profiles. All exposed welds shall be filed smooth with all tool marks removed by fine abrasive grain air blasting or other approved method. All burrs and rough spots shall be removed and faces shall be polished to a uniform high luster finish. Aluminum shall be mechanically sanded and degreased prior to receiving finish. All coatings shall be true to form with no irregularities.

2.7 ACCESSORIES

A. Exposed mounting hardware: Chrome plated brass or bronze screws.

B. Adhesive tape: Double sided acrylic foam tape, permanent adhesive, equal to 3M, St. Paul, MN., product: "3M VHB".

C. Fasteners for entrance and exit signs: Concealed metal fasteners, non-corrosive to sign material or mounting surface.

D. Anchors and inserts for cast aluminum letters:

1. Aluminum collars, matte finished to match letter edges.
2. Mounting studs: Threaded type 304 stainless steel studs.

E. Fasteners for interior brass plate signage: Nº. 6 brass wood screws, round head.

2.8 FINISHES

A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated.

B. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations.

C. Aluminum Finishes: Finish designations prefixed by AA conform to the system established by the Aluminum Association for designation aluminum finishes

1. Class II Clear Anodized Fine Satin Finish: AA-M31C21 A31 (Mechanical Finish: Fine satin direction textured' Chemical Finish: Fine matte etched finish' Anodic Coating, Class II Architectural, clear film thicker than 0.4 mil.)

D. Paints: Paint for signs is acrylic polyurethane enamel, eggshell finish. Paint for background of tactile photo-polymer signs is eggshell finish automotive grade lacquer. All surfaces shall be cleaned, primed and pre-treated according to the manufacturer's specifications and noted in Shop Drawings as part of the finished surface work.

E. Inks:

1. Inks for metal signs, glass and wall surfaces are Alkyd enamel based inks.
2. Inks for plastic signs are lacquer based inks.
3. Inks for tactile graphics on photo-polymer signs are eggshell finish Low Odor Vinyl Ink.
4. All inks and paints are evenly applied without pin-holes, scratches or application marks. Prime coats or other surface pre-treatments, where recommended by the manufacturers are included in the work and noted in the shop drawings as part of the finished surface work.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. Locate sign units and accessories where indicated, locations in accordance with the approved shop drawings. Use mounting methods of the type described and in compliance with manufacturer's instructions.

B. Install signs plumb, level and true to height indicated, with sign surfaces free from distortion or other defects in appearance.

C. Shop fabricate signs where practical and deliver to site completely assembled. All joints of such fabricated work are completely smooth without apparent marks showing throughout the finish. All work "broken down" is erected so that all parts fit accurately with hairline joints, with all joints flush. Joints in lighted signs shall be light-proof.

D. Wall and door mounted signs: Attach to surfaces as follows:

1. Vinyl Tape Mounting: Use very high bond, double sided foam tape, of thickness indicated, to mount signs to smooth nonporous surface. Use construction adhesive in conjunction with foam tape.

2. Silicone Adhesive Mounting: Use appropriate liquid silicone adhesive to attach sign units to irregular, porous , or vinyl-covered surfaces. Use double-sided vinyl tape to hold the sign in place until the adhesive has fully cured.

END OF SECTION 10 14 00

SECTION 10 21 13
TOILET PARTITIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Floor/wall mounted metal toilet partitions with overhead bracing.
2. Urinal screens, matching toilet partition design and finish.

1.8 WARRANTY

A. Furnish the following manufacturer's warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS. Manufacturer's warranties are in addition to, and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

1. Manufacturer's written warranty, for a minimum period of 10 years from date of Substantial Completion. Warranty shall cover panel, pilaster and door material and manufacturing workmanship against defects, including delamination of surfacing, corrosion and breakage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS AND MODELS

A. Toilet compartments: Flush type, floor mounted, overhead braced, of standard height and depth, except for sizes of handicapped compartments, which shall be as indicated on the Drawings. Acceptable models are the following, or approved equal:

1. Accurate Partitions Corp., Lyons IL.
2. General Partitions Manufacturing Corp., Deer Park NY., series "40".
3. Global Partitions, Estanollee, GA., "Floor Anchored/Overhead Braced" series.
4. Hadrian Inc., Mentor OH.
5. Mills Partitions (Bradley Corporation), Menomonee Falls, WI., series 400 "Sentinel"

B. Urinal screens: Flush type, 42 inch high, 18 inches deep matching construction and finish of toilet partitions with continuous wall hung channel support. Acceptable models are the following, or approved equal:

1. Accurate Partitions, "Wall hung".
2. General Partitions, series "WHF-1".
3. Global Partition, series "Wall hung".
4. Hadrian Inc., series "Wall hung".
5. Mills Partitions (Bradley Corporation), model Nº. 2.

2.2 MATERIALS

A. General: Provide materials selected for surface flatness and smoothness. Exposed surfaces which exhibit pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections or finished units are not acceptable.

B. Material: Stainless Steel.

1. Finish: Satin.

2.3 FABRICATION

A. Panels: One inch thick, consisting of two sheets of minimum 22 gage galvanized and bonderized stretcher-leveled sheet steel pressure bonded to a sound-deadening honeycomb fiber core. Form and close all edges, miter and weld on the corners. Hot-dip galvanize all concealed connections, bolts, and nuts.

1. Doors: Fabricate same as panels with minimum 22 gage sheet.
2. Door widths; except as otherwise indicated, provide the following widths:
   a. Standard stalls, 24 inches [610 mm]
   b. Handicapped accessible stalls, 36 inches [914 mm] door width having a minimum 32 inch [813 mm] clear opening, or greater.
3. Arrange toilet compartment doors to swing in and remain slightly ajar, except for doors of handicapped compartments, or as otherwise indicated on the Drawings.

B. Pilasters: 1-1/4 inches thick, constructed same as specified for panels, of sizes required to suit cubicle width and spacing. Adequately reinforce pilasters to support hardware and dividing panels.

1. Pilaster Anchors: Inverted stirrup with jack bolt for leveling during installation and permanent height adjustment, integrally welded to base of pilaster, with "L" brackets coupled to stirrup bracket and floor for full range adjustment; concealed by pilaster shoe after installation.

C. Head rails: Hollow extruded aluminum tube with anti-grip top having wall thickness of not less than 0.125 inches; with cast aluminum or stainless socket brackets. Provide corner brackets, wall brackets and end caps as required.

D. Pilaster shoes: 3 inches high formed chromed steel with satin finish.

E. Fittings: Heavy duty Type 302/304 stainless steel, continuous angles to keep partitions and pilasters clear from walls. Fasten all fittings with tamperproof stainless steel screws and bolts.

F. Hardware: Heavy duty stainless steel hardware including pivot hinges, gravity type, adjustable for door close positioning, with nylon bearings; thumb turn door latch; door strike and keeper with adjustable rubber bumper.

G. Internal Reinforcement: Provide in areas of attached hardware and fittings. Mark locations of reinforcement for partition mounted washroom accessories.

2.4 FACTORY FINISHING

A. Clean, degrease, and neutralize panels.

B. Apply phosphatizing treatment, and thermo-cured electrostatically-applied one coat hybrid-epoxy powder-coat polyester finish in selected color(s) having 1.7 mil minimum DFT (Dry Film Thickness). Color(s) selected by Architect from manufacturer's full color range. Ensure that finish coating is uniform in color intensity and degree of gloss, throughout.

1. Manufacturer's one coat of baked-on rust and moisture-resistant primer followed by two coats of baked-on synthetic enamel is an acceptable alternative finish for powder-coated finish.

2.5 ACCESSORIES

A. Equip all doors with combination coat hook and bumper.

PART 3 - EXECUTION

3.2 INSTALLATION - GENERAL

A. Comply with manufacturer's recommended procedures and installation sequence, and as specified herein.

B. Install pilasters, partitions, urinal screens, and doors rigid, straight, plumb and level. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Set pilaster units with anchorages having minimum 2 inches penetration into structural floor, unless otherwise recommended by partition manufacturer.

D. Attach panel brackets securely to walls using anchor devices.

E. Anchor urinal screen panels to walls with two panel brackets and tube vertical upright anchored to floor.

F. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.

G. Hang door and adjust so tops of doors are level with tops of pilasters when doors are in closed position.

H. Ensure that all holes in partitions, as required for attachment of related items, are accurately located and drilled, in accordance with the templates furnished by the accessory manufacturer. Conceal all evidence of drilling, cutting, and fitting in the finished work.

l. No permanent exposed to view labels of any kind will be permitted to remain on the partitions, urinal screens, headrails, or doors.

END OF SECTION 10 21 13

SECTION 10 28 00
TOILET, BATH AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install toilet, bath and custodial accessories.

B. Furnish concealed anchorage devices for handicap handrails for installation under Section 06 10 00 - ROUGH CARPENTRY.

C. Furnish toilet and bath accessory templates, to locate anchorage reinforcement, to trades responsible.

1.8 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufactures: To establish a standard of quality, design, function desired, and appearance, Drawings and specifications have been based on manufacturers and model numbers specified herein below. Manufacturers offering products which may be considered as equal include the following:

1. A&J Washroom Accessories, Inc., (A&J) New Windsor NY.
2. American Specialties, Inc. (ASI), Yonkers NY.
3. Bobrick Washroom Equipment, Inc. (Bobrick), Clifton Park NY.
4. Bradley Corporation / Washroom Accessories Division, (Bradley) Menomonee Falls, WI.

B. Materials and finishes:

1. Stainless Steel: AISI Type 302 or Type 304, with satin finish.

2.2 TOILET ACCESSORIES

A. Baby Changing Station: Recessed diaper changing station equal to Bobrick KB110-SSRE "Horizontal Recessed Mounted Stainless Steel Finish."

1. Horizontal format design.
2. Unit shall comply with Federal ADA Accessibility Guidelines, ANSI A117.1
3. Unit shall have a maximum holding capacity of 250 lbs. (113.4 kg) and shall be fabricated of non-porous plastic (FDA approved HDPE) tested according to ASTM G21 and ASTM G22.

4. No parts of the operating mechanism shall be accessible when unit is open or closed to provide a tamper-resistant and pinch proof user environment. Provide unit with damped gas spring to assist user in opening and closing unit with one hand.
5. Unit shall be provided with two integral heavy-duty bag hooks clearly marked with international-style symbols. Unit shall provide a bed-liner dispenser with concealed, self-latching lock requiring no keys, that may be easily converted to a multi-fold towel dispenser with no adapters.
6. Provide unit with an adjustable two-part child protection safety-strap mounted with concealed fasteners on high walls of cradle. Rear strap shall be vinyl coated. Entire unit shall be assembled of completely sealed components to provide easy cleaning and no penetration zones to harbor microbes or bacteria.
7. Mounting fasteners shall be concealed after installation using color matched recess plug-covers.

B. Coat/robe Hook: Surface mounted satin finish 11 gage stainless steel single robe hook.
   1. A&J model Nº. UJ22.
   2. ASI model Nº. 120.
   3. Bobrick model Nº. B-233.
   4. Bradley model Nº. 9111.

C. Grab bars (of lengths and configurations as indicated on Drawings): Type 304 Stainless steel, minimum wall thickness 18 gage (Stub's gage), with non-slip knurled, peened or striated surface.
   1. Grab Bar Loading Criteria as defined in Commonwealth of Massachusetts Regulation 521 CMR: *Architectural Access Board*.
      a. Bending stress in a grab bar induced by the maximum bending moment from the application of 250 lbs. shall be less than the allowable stress for the material of the grab bar.
      b. Shear stress induced in a grab bar by the application of 250 lbs. shall be less than the allowable shear stress for the material of the grab bar. If the connection between the grab bar and its mounting bracket or other supports is considered to be fully restrained, then direct and torsional shear stresses shall be totaled for the combined shear stress, which shall not exceed the allowable shear stress.
      c. Shear force induced in a fastener or mounting device from the application of 250 lbs. shall be less than the allowable lateral load of either the fastener or mounting device or the supporting structure, whichever is the smaller allowable load.
      d. Tensile force induced in a fastener by direct tension force of 250 lbs. plus the maximum moment from the application of 250 lbs. shall be less than

the allowable withdrawal load between the fastener and the supporting structure

e. Grab bars shall not rotate within their fittings.

f. Configuration and Length: As indicated on Drawings.

g. Mounting: Provide optional mounting packages where grab bars are located on toilet partitions.

2. Grab bars: 1-1/4 inch to 1-1/2 inch maximum outside diameter with satin finished ends, concealed 1/8 inch thick mounting flange with snap-on cover, equal to:

a. Basis of Design: Bobrick series B-5806.99.

b. A&J series UG2X.

c. ASI Model 3100 .

d. Bradley series 832.

D. Mop and broom holders: Surface mounted, nominal 34 inch long stainless steel unit with 18 gage 8 inch deep continuous shelf, 4 stainless hooks and 3 mop/broom holders, anti-slip spring loaded, rubber cam mop holders, capable of holding 7/8 to 1-1/4 inch diameter handles.

1. Basis of Design: Bobrick model Nº. B-239-34.

2. A&J model Nº. UJ45A.

3. ASI model Nº. 1308-3.

4. Bradley model Nº. 9933.

E. Sanitary napkin disposal: Partition mounted feminine napkin disposal unit serving two toilet compartments. Napkin disposal shall be furnished with a removable molded polyethylene 1.2 gallon capacity waste receptacle and be equipped with a tumbler lock.

1. A&J model Nº. U580.

2. ASI model Nº. 0472. Bobrick model Nº. B-354.

4. Bradley model Nº. 4721-15

F. Sanitary napkin disposal: Recessed mounted stainless steel cabinet with self-closing door of napkin disposal with international graphic symbol shall close against cross bar, not against waste receptacle. Napkin disposal shall be furnished with a minimum 1.2 gallon capacity waste receptacle and be equipped with a tumbler lock.

1. A&J model Nº. U5814, Uni-door Series.

2. ASI model Nº. no equal model.

3. Bobrick model Nº. B-35303, Trim Line Series.

4. Bradley model Nº. 4737 contemporary Series.

G. Shelving in Janitor's closets: Custodial shelf, stainless steel, 8 inches deep by 30 inches wide with 3/4 inch edge return. Mounting brackets, 16 gage welded to shelf.
   1. A&J model Nº. U778.
   2. ASI model Nº. 0692-830.
   3. Bobrick model Nº. B-298x36.
   4. Bradley model Nº. 758.

H. Electric dryer, high speed, non-heated, filtered, surface-mounted hand dryer with no-touch infrared-sensor operation. Automatic shut-off after 30 seconds of non-use.
   1. Characteristics:
      a. Electrical requirements, 115 volt AC, 12 amp, 60hz. 1400 watts.
      b. Casing: Die-cast aluminum with powder coated finish.
      c. Filter: HEPA 99.9 per cent bacteria removal.
      d. Motor type: Switched reluctance brushless, 81,000 rpm.
      e. Air flow: 68 cfm.
      f. Air speed: 400 mph.
   2. Acceptable models:
      a. Basis of Design: Dyson US, Chicago IL., product: "Airblade"., model MK2 with "gray" finish.
      b. Saniflow Hand Dryer Corporation, Miami, FL., product "Dualflow Plus", model M12ACS, with "silver satin" finish.
      c. Veltia, Barcelona, Spain, product "Veltia Hand Dryer", as available from Good Earth Products, Fort Lee NJ., with "aluminum matte" finish.
      d. World Dryer, "Vmax series" model Nº. V-629A, color "silver".

I. Soap dispensers: Surface mounted for viscous free flowing soaps, with lockable 40 fluid ounce stainless steel container, and corrosion resistant all purpose valve for liquid soaps, lotions and detergents which will operate with less than 5 pounds of force.
   1. A&J model Nº. U124.
   2. ASI model Nº. 9343.
   3. Bobrick 'Contura' Series, model Nº. B-4112.
   4. Bradley model Nº 6542.

J. Toilet seat cover dispenser, satin finish, able to accommodate a maximum of 500 covers.
   1. A&J model Nº. U8054.
   2. ASI model Nº. 9477.
   3. Bobrick 'Contura Series, model Nº. B-4221.

4. Bradley model Nº. 5847.

K. Toilet tissue dispenser: Surface-mounted, jumbo-roll, toilet tissue dispenser, constructed of type-304 stainless steel. Dispensing mechanism accommodate two 10" (254-mm) diameter toilet tissue rolls; and be equipped with a sliding access panel that exposes one roll at a time. Spindles shall be convertible in the field to dispense 3" or 2-1/4" (76 or 57 mm) diameter core rolls with use of removable core adapters furnished.

1. A&J model Nº. U834.
2. ASI model Nº. 0040.
3. Bobrick model Nº. B-2892.
4. Bradley model Nº. 5425.

L. Towel dispenser & waste receptacle units: Recessed combination paper towel dispenser and waste receptacle unit with stainless steel door and cabinet, welded construction. Paper towel dispenser shall have a capacity of 600 “C fold” or 800 “Multi-fold” towels. Waste container shall have a removable leak-proof rigid molded plastic container with a capacity of 12 gallons.

1. A&J model Nº. U650.
2. ASI model Nº. 0469.
3. Bobrick model Nº. B-3944.
4. Bradley model Nº. 234.

2.3 LOCKS

A. General: All locks shall be keyed alike. Provide four (4) keys, for lockable accessories, to the Owner.

2.4 INSTALLATION ACCESSORIES

A. Fasteners, screws, and bolts: Type 304 stainless, tamperproof.

B. Expansion shields: Fiber, lead or rubber as recommended by accessory manufacturer for component and substrate.

2.5 FABRICATION

A. Form exposed surfaces from single sheet of stock, free of joints. Form surfaces flat without distortion, scratches or dents. Weld and grind smooth joints of fabricated components.

B. Back paint components where contact is made with building finishes to prevent electrolysis.

C. Shop assemble components and package complete with anchors and fittings. Hot dip galvanize exposed and painted ferrous metal and fastening devices. Provide steel anchor plates, adapters, and anchor components for installation.

2.6 FACTORY FINISHING

A. Ferrous metals: Clean and treat, spray apply one coat of baked-on rust and moisture-resistant primer, followed by two coats of baked-on synthetic enamel, in selected colors. Ensure that finish coating is uniform in color intensity and degree of gloss, throughout.

B. Chrome/Nickel Plating: ASTM 456, Type SC2, satin finish.

C. Stainless steel: Number 4 satin finish, except as otherwise specified above under the Article entitled “Toilet Accessories”.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Perform installation work in accordance with the approved shop drawings and the manufacturer's installation instructions.

B. Install toilet accessories absolutely level and in true line, securely and rigidly anchored with theft proof fasteners of the size and type most appropriate for the specific receiving surface, concealing the fasteners as far as practicable.

END OF SECTION 10 28 00

SECTION 10 44 00
FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install:
   1. Fire extinguisher cabinets, (rated and non-rated types).
   2. Fire extinguishers (Keynote Number 104416.01): Provide 10 pound capacity extinguishers at locations indicated on the Drawings.

1.7 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   1. J.L. Industries, Bloomington MN.
   2. Larsen Manufacturing Co., Minneapolis MN.
   3. Strike First Corporation of America, Front Royal, VA (*fire extinguishers only*).
   4. Amerex Corporation, Trussville, AL (*fire extinguishers only*).

2.2 FIRE EXTINGUISHERS CABINETS AND BRACKETS

A Fire extinguisher cabinets:
   1. Cabinet trim style: Trimless with concealed flanges, fully recessed cabinet.
      a. Surface of surrounding wall finishes flush with exterior finished surface of cabinet frame and door, without overlapping trim attached to cabinet. Provide recessed flange, of same material as box, attached to box to act as drywall bead.
      b. Provide appropriate model for use in rated wall construction.
   2. Door style:
      a. Vertical duo design with tempered glazing.
      b. Vigilante alarm: Provide 9 volt, battery operated (battery included), plunger activated vigilante alarm.
      c. Door Hardware: Provide manufacturer's standard door operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide either lever handle with cam action latch, or

door pull, exposed or concealed, and friction latch. Provide concealed or continuous type hinge permitting door to open 180 degrees.

1) Handles: Stainless steel.

d. Lettering: Factory applied die-cut lettering, applied to metal portion of door.

1) Pattern: Vertical reading.

2) Color: As selected by the Architect.

e. Door color: As selected by Architect from full range of industry colors and color densities

3. Cabinet construction:

a. Non-rated cabinet construction: 18 gage cold-rolled steel with factory applied baked acrylic enamel corrosion-resistant finish.

b. Fire-resistance rated cabinet construction for up-to a two-hour wall rating: 18 gage cold-rolled steel double wall construction with fire barrier material lining in compliance with ASTM E-814 (UL 1479). Provide cabinet with factory applied baked acrylic enamel or powder coat corrosion-resistant finish.

4. Acceptable models for non-fire-resistant rated assemblies:

a. JL Industries “Ambassador Series”, model number 1014

b. Larsen “Architectural Series”, model number 2409-RT

c. Potter-Roemer, “Alta Series”, model number 7020

5. Acceptable models for fire-resistant rated assemblies:

a. JL Industries “Ambassador Series”, model number 1014-FX

b. Larsen “Architectural Series”, model number FS-2409-RT

c. Potter-Roemer, “Alta Series”, model number FRC-7020

B. Wall mounting bracket: 16 gage steel surface mounted bracket, with red glossy polyester thermo-set coating, equal to the following. Provide with red letter decals spelling “FIRE EXTINGUISHER” applied to wall surface, letter size, style as required by code, location as selected by Architect.

1. Basis of Design: Larsen model number 864.

2. JL Industries, model number “MB-810”.

3. Potter-Roemer, model number 3903.

2.3 FIRE EXTINGUISHERS

A. Extinguishers: Multi-purpose dry chemical type (mono amonium phosphate), 10 pound capacity, multi-purpose rated ‘10A, 120B:C’; with metal valves and siphon tubes, replaceable molded valve stem seals, pressure gauges and hose discharge.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Install fire extinguisher cabinets in accordance with manufacturer's instructions in locations indicated, and as additionally directed by regulatory authority having jurisdiction.

1. Provide cabinets for locations as indicated, and as additionally directed by Architect and local regulatory authority.

B. Do not commence installation of fire extinguisher cabinets until immediately adjacent surfaces have been completely installed and finished.

C. Install cabinets absolutely level and in true line, with units securely anchored to the surrounding construction. Fit trim pieces accurately and tight to adjacent construction.

1. Maximum variation from plumb and level: 1/8 inch.
2. Maximum offset from true dimensional alignment: 1/4 inch.

END OF SECTION 10 44 00

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SECTION 10 51 13
LOCKERS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Metal lockers complete with all required tops, closures and filler pieces.

1.4 QUALITY ASSURANCE

A. Obtain locker and benches from a single manufacturer, or from manufacturers recommended by the prime manufacturer of lockers.

B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.5 QUALIFICATIONS

A. Manufacturer, with a minimum of 3 years experience demonstrating previously successful work of the type specified herein.

1.8 EXTRA MATERIALS

A. Upon completion of the Work of this Section, deliver to the Owner extra materials for future repairs and maintenance.

1. Provide spare keyed cylinders (with keys), an amount equal to 10 percent of total lockers.
2. Provide two master keys.

B. Clearly label and package extra materials securely to prevent damage.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Debourgh Manufacturing Company, La Junta CO.
2. List Industries, Inc., Deerfield Beach, FL.
3. Penco Products, Inc., Oaks PA.
4. Republic Storage Systems Company, Inc., Canton OH.

2.2 MATERIALS

A. Sheet Steel: Mild cold-rolled and leveled steel, free from buckle, scale, and surface imperfections.

B. Fasteners: Cadmium, zinc, or nickel plated steel; exposed bolt heads, slotless type; self-locking nuts or locker washers for nuts on moving parts.

1. Locker assembly fasteners shall be "pop" type rivets with aluminum bodies and steel mandrels. Rivets shall be backed up by washers to ensure correct rivet expansion and secure fastening.

C. Equipment: Hooks and hang rods of cadmium-plated or zinc-plated steel or cast aluminum.

2.3 LOCKER TYPES

A. Locker types: Lockers: Single tier wardrobe locker 15 inches wide by 18 inches deep by 72 inches high at front.

B. General requirements:

1. General design, equal to Republic Storage Systems Company, Inc., Canton OH; product: “Heavy Duty Corridor Series Locker”.
2. Body: Backs, sides, tops, bottoms and shelves sides minimum 24-gage. Flange tops, bottoms and shelves on four sides, and backs on two sides.
   a. Form exposed ends of non-recessed lockers of minimum 16-gage steel.
   b. Lower shelf:
      1) Standard locker: 6 inches above finished floor.
      2) Handicapped accessible locker: 9 inches above finished floor.
   c. Top shelf:
      1) Standard locker: Manufacturer’s standard height.
      2) Handicapped accessible locker: 48 inches above finished floor.
3. Door frame: 16 gage channel or 12 gage angles, with continuous door stop/strike integral with frame on both sides of opening.
4. Door: Flush design without louvers or perforations, 14 gage steel, formed with full channel shape on lock bar side, channel formation on hinge side and flanged top and bottom. Perforate top and bottom flanges for locker ventilation. Fabricate to swing 180 degrees.
5. Hinges: Three 5 knuckle, 2 inch high full loop pin hinge welded to frame and riveted to inside of door flange.
6. Door handle:
   a. Latching method: three point latching with spring steel latch contained in a lock bar under tension. Lock bar contained in door channel by self-lubricating polyethylene guides. Lock bar is limited in travel by concealed

elastomeric cushioning devices. Provide frame hooks welded to door frame, furnished with soft rubber silencers at each hook.

b. Pocket: Recessed formed 20 gage stainless steel pocket encased with molded ABS thermoplastic cover.

c. Locking method: door handle latch design capable of receiving user furnished padlocks.

7. Base: Closed 16 gage “Z-base”, 6 inches high. (note: available 3, 4, 6 inches high)

8. Sloping tops: 20 gage steel minimum having a sloped rise approximately 18 to 25 degrees, finished to match lockers, in lengths as long as practicable but not less than 4 lockers. Provide closures at ends finish to match lockers

9. Filler panels: 18 gage steel minimum, factory-fabricated and finished to match locker units.

10. Trim: 18 gage steel minimum; Provide at jambs and head of recessed lockers, finished to match locker units. Secure with concealed fasteners.

11. Accessories:

a. Double prong hook mounted to underside of locker top or back of locker.

b. Single prong hook mounted on each side of locker.

c. Number Plates: Provide each locker door with polished aluminum number plate with black numerals not less than 1/2 inch height.

d. Handicapped accessible locker.:

2.4 FACTORY FINISHING

A. Clean, degrease, and neutralize metal; prime and finish with two coats of baked enamel finish.

1. Colors of locker bodies and doors shall be a single color as selected from manufacturer's standard range. Up to three colors of lockers may be selected by location.

PART 3 - EXECUTION

3.3 INSTALLATION

A. Do not commence installation of lockers until immediately adjacent surfaces have been completely installed and finished.

B. Perform installation work in accordance with the approved shop drawings and the manufacturer's installation instructions.

C. Furnish and install all sloped top pieces as required, refer to the Drawings for the various conditions.

D. Furnish and install all filler pieces as required to completely fill recesses, and to align with ends of partitions. Refer to the Drawings for the various conditions.

E. Set lockers absolutely level and in true line, with units bolted together and to the surrounding partitions, to provide a rigid and secure installation. Conceal screw heads and bolts as far as practicable, leaving exposed panels completely free from unused bolt holes.

END OF SECTION 10 51 13

SECTION 11 16 00
VAULT DOOR

PART 1 – GENERAL

1.1 SUMMARY

A. Furnish and install a UL rated prefabricated insulated vault door.

1.5 QUALITY ASSURANCE

A. Manufacturer specializing in fabricating the work of this Section with a minimum of 10 years documented experience.

1.9 WARRANTY

A. Provide 3 year warranty under provisions of Section 01700 - CONTRACT CLOSEOUT. Warranty shall include repair of faulty vault door unit.

PART 2 - PRODUCTS

2.1 MANUFACTURER AND TYPE

A. Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on American Vault Door, Waco, TX, product, "100 Series" with inner gate corresponding products of equal or superior quality may be submitted for Architect's review and acceptance.

B. Assembly: UL tested and certified fire resistance rated, in accordance with NFPA number 232 for File-Room Doors. Doors shall additionally carry a Class B Mercantile Burglary Insurance Rating.

1. Fire rating: 6 hour rated.

C. Door size and bolting: Nominally 4-7/8 inches thick with clear opening of 78 inches high by 32 inches wide. Coordinate installation details with wall thickness indicated on Drawings.

1. Door will be locked with 10 live bolts, each 11/16 inches in diameter, located five on each side of door. All exposed boltwork shall be nickel-plated and permanently lubricated.
2. Bolts will be checked by a three-tumbler group II key change combination lock equipped with UL relocking device to reset lock bolt if lock is damaged by tool attack. A second UL relocking device will automatically deadlock door bolts in case of tool or torch attack.

D. Escape mechanism: Equip door with inside escape mechanism.

E. Hinges: Roller throat bearing type. Provide stainless steel hinge covers.

2.2 FINISHES

A. Hardware: chrome/nickel plating, satin finish.

B. Finish: Natural textured baked-on enamel in color selected by the Architect from the manufacturer's full range of available colors.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Inspect all surfaces and verify that they are in proper condition to receive the work of this Section. Verify that roughed-in ductwork is ready to receive work, and clear dimensions are as indicated on shop drawings. Verify that electric power is available and of the correct characteristics

3.2 INSTALLATION

A. Install vault door frame and door, plumb and level per tolerances specified herein, in accordance with the manufacturer's written instructions, and in accordance with standards required by authority having jurisdiction.

1. Provide masonry anchorage devices where required or securing frames to masonry construction. Set devices in accordance with approved shop drawings.
2. Place frame and brace in place until wall construction is completed. Remove temporary braces and spreaders leaving surfaces smooth and undamaged.

END OF SECTION 11 16 00

SECTION 11 52 13
PROJECTION SCREENS

PART 1 - GENERAL

1.1 SUMMARY

A. Electrically operated, ceiling mounted projection screens.

1.4 WARRANTIES

A. General: Submit warranties under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS.

B. Provide manufacturer's standard warranty which shall include coverage of screen surfaces from discoloration. Warranty is in addition to and not in lieu of, other liabilities which the Contractor may have by law or other provisions of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Draper, Inc.

1. Electrically operated screen units, Basis of Design: Draper, Inc. Product: “Rolleramic” .

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Bretford Manufacturing Inc., Schiller Park, IL.
2. Da-Lite Screen Company, Inc., Warsaw, IN.
3. Draper, Inc. Spiceland, IN.
4. Stewart Filmscreen Corporation, Torrance, CA.

2.2 ELECTRICALLY OPERATED SCREEN UNITS

A. General Requirements: Manufacturer's standard UL-listed and marked automatic electric projection screen: units consisting of case, screen, motor, controls, mounting accessories and other components and complying with the following requirements

1. Motor: Instant reversing motor in size and capacity recommended by screen manufacturer, with permanently lubricated bearings, automatic thermal overload protection, preset limit switches to automatically stop screen in "up" and "down" position, and positive stop action to prevent coasting; and as follows:

a. For end-mounted-motors mount motors on end indicated.

b. For motor-in-roller-units mount motors with vibration insulators to reduce noise transmission.

c. Screen Characteristics: Provide mildew-resistant and flame-resistant glass fiber fabric mounted on rigid roller, with vinyl-coated viewing surfaces complying with the following requirements, in sizes indicated:

1) Viewing surface: Seamless, glass beaded, textile backed.

a) Diagonal dimension: 222 inches.

b) Format: 16:10

2) Edge treatment: Black masking borders.

3) Provide extra drop length: 2 feet.

4) Direction of roll: Reverse roll.

5) Verify screen format with Owner.

d. Screen Control: Single station control with low voltage control system consisting of a single control unit, directionally lighted, single button control stations of number and at locations indicated, with metal device boxes and flush cover plates.

e. Case and brackets:

1) Furnish and install ceiling mounted projection screen case fabricated from 3/4 inch thick, warp-resistant composite wood panels with hinged panel for metal lined motor compartment. Case bottom shall fully enclose case assembly with an integral slot to allow for passage of the screen fabric. Finish case assembly with manufacturer’s standard prime coat.

a) Provide 1/4 inch thick case mounting brackets configured to wrap under the bottom edge of the case assembly.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Verify that electric power is available and of the correct characteristics.

B. Install projection screen units in accordance with manufacturer's instructions. Secure units level and plumb.

END OF SECTION 11 52 13

SECTION 12 24 13
ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:

1. Chain driven, manually and electrically operated roller-screens for solar shading, privacy shading and A/V blackout.
2. Supplementary items required for shade installation including valences where indicated.

1.4 PERFORMANCE REQUIREMENTS

A. Fire performance characteristics; shade material tested in accordance with NFPA 70 1- Vertical Burn Test, rated "FR".

B. Electrical control equipment must be wired in accordance with the shade manufacturer's wiring diagrams and in accordance with the National Electrical Code and local codes.

1.6 QUALITY ASSURANCE

A. Obtain shade operators and fabric products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of operator.

B. Notify the Architect where conflicts apply between referenced standards and existing materials, and existing methods of construction.

1.7 QUALIFICATIONS

A. Installer, with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein.

1.11 WARRANTY

A. Furnish the following warranties under provisions of Section 01780 - CLOSEOUT SUBMITTALS.

B. Manual operating components: Manufacturer's 10 year warranty from Date of Substantial Completion of shade installation. Warranty shall include provisions that installation shall remain operational without fault and include all operating parts, except for the bead chain which is not warranted.

C. Motorized components: Manufacturer's 1 year warranty from Date of Substantial Completion of project. Warranty shall include provisions that installation shall remain operational without fault for the warranty period including coverage of motor, electrical controls and override circuits.

D. Shade cloth: Manufacturer's 10 year warranty from Date of Substantial Completion of shade installation. Warranty shall include provision that shade cloth will not fade, deteriorate, sag or warp for the warranty period.

1.12 EXTRA MATERIALS

A. Provide to Owner, 1 percent extra shade fabric for each size, color and type installed.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. MechoShade, Long Island City, NY.
2. Draper Shade and Screen Co., Spiceland IN.
3. Hunter Douglas Contract, Poway, CA.
4. Levolor Corporation, Sunnyvale CA.

2.2 SHADE COMPONENTS

A. Clutch operator: Bi-directional clutch and beaded chain mechanism, fabricated from high-strength glass-fiber -reinforced polyester and high-carbon steel springs. Control loop chain shall endless nickel-plated brass bead chain; plastic bead chain is not acceptable.

1. Furnish flexible offset drive, where required, with universal joint permitting up to 12 degree angle between any two shades with a single operator.
2. Provide all shades with chain hold down, spring-tension pulley and shock absorber.

B. Rollers: Removable, 1-1/2 inch or larger diameter, extruded aluminum alloy 6063-T5 or alloy 6063-T6 tube with a minimum wall thickness of 0.065 inch.

1. Shade mounting spline: Extruded vinyl spline, enabling shade cloth to be removed without having to remove the tube from retainer brackets or without removing brackets from wall
2. Tube Support: Delrin cover plate shall provide protection from tube dislocation. In the event the tube is pushed out of place, the Delrin end of the mounting plates shall contain the tube preventing the tube from falling out of the bracket.

C. Mounting Brackets: Zinc chromate finished 16 gage steel in manufacturer's standard configuration for head or wall mounting.

D. Roller idler assembly: Type 6/6 injected molded nylon or high-strength glass-fiber -reinforced polyester outside sleeve, with zinc plated steel pin.

E. Black Out Fabric: PVC-free, Glass-fiber yarn coated with opaque acrylic backing comprising of 53% fiberglass, 45% acrylic, 2% poly finish, equal to MechoShade "Equinox 0100 Series" meeting the following minimal requirements:

1. Minimum thickness: 0.030 inch (0.762 mm).
2. Minimum weight: 0.94 pounds per square yard.
3. Flame retardant treated certified in conformance with NFPA 701, UL 214.
4. Color: As selected by Architect from manufacturer's standard colors.
5. Seamless up to 100 inch width.
6. Hem pocket: Provide hem pocket, heat sealed or sewn with bottom weight enclosed.
7. Fabric warranty: Manufacturer's standard 10 year limited warranty.
8. Location: Selectman's Meeting Room, Conference Room.
    a. Provide shades at all exterior and interior windows and sidelights.

F. Solar /Privacy Fabric, PVC-Free: MechoShade Eurotwill, 6000 Series, fabricated from thermoplastic olefin (TPO) for both core yarn and jacket, woven in a 2 by 2 non-directional basketweave, meeting the following minimal requirements:

1. Minimum thickness: 0.030 inch (0.762 mm).
2. Flame retardant treated certified in conformance with NFPA 701, UL 214.
3. Maximum open in weave: 3 percent.
4. Color: As selected by Architect from manufacturer's standard colors.
5. Fading:
    a. UV test 200 sun-fade hours: no change.
    b. UV test 500 sun-fade hours: Maximum 5 percent change.
6. Seamless up to 126 inch width.
7. Hem pocket: Provide hem pocket, heat sealed or sewn with bottom weight enclosed.
8. Fabric warranty: Manufacturer's standard 10 year limited warranty.
9. Location: Typical except where blackout fabric is indicated.
    a. Provide shades at all exterior and interior windows and sidelights.

2.3 ELECTRIC OPERATION

A. Motor: 110 VAC, single phase, 60 HZ, instantly reversible, lifetime lubricated, and equipped with internal thermal overload protector, electric brake, and pre-set accessible limit switches. Tubular motor concealed inside each shade roller tube.

1. Controls: Equal to Draper "Intelliflex Wall Switches" low voltage switch to provide control via bus cable or dry contacts.

2.4 MOUNTING SYSTEM

A. Mounting: Wall, jamb, or overhead mounted as indicated, brackets made of 1/8 inch sheet steel to which drive assembly, idle end assembly and center support systems are attached.

1. Furnish center support brackets to meet span or weight requirements.
2. Components of brackets shall be interchangeable or replaced without removing bracket from wall or ceiling, inside or outside mount.
3. Metal support brackets cadmium plated steel. Custom color as selected by the Architect.

2.5 ACCESSORIES

A. Fascia: One-piece extruded aluminum 6063-T5 alloy with average thickness of 0.062 inches, snap-loc clipped to the brackets without the use of glue, magnetic strip or screws, concealed fastening.

1. Offset Drive - No Notch Fascia: Chain drive shall fall behind the return edge of the fascia without notching or otherwise defacing the return leg of the fascia.
2. Fascia filler; readily removable to bridge mullions, transition piece between shades in same material and finish as fascia panel.

B. Blackout side and sill channels; extruded aluminum with polybond edge seals, and snap-loc mounting brackets;

1. Jamb channels, 1-15/16 inched wide by 1-3/16 inches deep; double jamb channels 2-5/8 inches wide by 1-3/16 inches deep.

C. Recessed housing, for acoustical plaster ceilings with removable closure plate for access.

D. Guide cables provide where recommended by manufacturer.

2.6 FABRICATION

A. Fabrication: Fabricate units to completely fill existing openings, from head-to-sill and jamb-to-jamb. Do not commence fabrication of shade units until field measurements are confirmed.

B. Fabric shall hang straight and flat without buckling or distortion. Fabric edges shall be straight and without ravels.

2.7 FACTORY FINISHES

A. Aluminum: PPG Duracron baked enamel in standard colors.

B. Steel parts, cadmium plated, satin finished, or bonderized prior to painting with baked enamel finish.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Install units to comply with manufacturer's instructions for type of mountings and operations required. Provide units plumb and true, securely anchored in place with recommended hardware and accessories to provide smooth, easy operation.

END OF SECTION 12 24 13

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SECTION 12 32 00
CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Provide modular casework, of types and sizes shown on the Drawings and in Schedules, complete in place, as specified herein, and as needed for a complete and proper installation.

1.2 RELATED REQUIREMENTS

A. Division 22 - Plumbing: All plumbing work related to items in this Section

B. Division 26 - Electrical: All electrical work related to items in this Section

1.3 SUBMITTALS

A. Submit the following under provisions of Section 01 33 23 - Submittal Procedures:

1. Literature: Manufacturer's product data sheets, specifications, performance data, physical properties and installation instructions.
2. Materials schedule: A complete schedule of casework components, coordinated with the Contract Drawings.
3. Shop Drawings in sufficient detail to show fabrication, installation, anchorage, and interface of the work of this Section with the work of adjacent trades.
4. Selection samples:
   a. Sample card indicating Manufacturer's full range of colors of laminate, edging or other surfacing material, available for selection by Architect.
   b. Provide additional samples as requested by Architect for initial selection of colors and finishes.
5. Verification samples: All hardware items (hardware samples will be returned to the Contractor after review.

1.4 QUALITY ASSURANCE

A. Workmen: Install casework under the supervision of the manufacturer's representative with factory-trained mechanics authorized by manufacturer.

1.5 PRODUCT HANDLING

A. Delivery and Storage: Casework shall be protected in transit. Deliver materials under protective cover and store within dry enclosed space. Do not expose to extreme temperature and humidity changes.

1. Do not store or install casework in building until concrete, masonry, and plaster work is dry.

2. Protection: Use all means necessary to protect materials of this Section before, during, and after installation and to protect installed work and materials of all other trades.

B. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect, at no change in Contract Sum.

1.6 COORDINATION AND SCHEDULING

A. Coordinate work of this Section with related work of other Sections as necessary to obtain proper installation of all items.

B. Verify site dimensions of cabinet locations in building prior to fabrication.

PART 2 - PRODUCTS

2.2 MANUFACTURERS

A. Manufacture: To establish a standard of quality, design and function desired, Drawings and specifications have been based on KraftMaid Cabinetry, Inc. Similar products manufactured by others, may be considered as an equal by the Architect.

2.3 CABINET MATERIALS

A. Exposed Materials: Comply with the following:

1. Exposed Wood Species: TBD
   a. Unless otherwise indicated, do not use two adjacent exposed faces shall be similar that are noticeably dissimilar in color, grain, figure, and or natural character markings.
2. Solid Wood: Clear hardwood lumber of species indicated, free of defects, selected for compatible grain and color, kiln dried to 7 percent moisture content.
3. Plywood: Hardwood plywood complying with HPVA HP – 1 face veneer of species indicated, selected for compatible color and grain with Grade A faces and Grade C backs of same species as faces.
   a. Edge band exposed edges with minimum 1/8 inch (3 mm) thick, solid-wood edging of same species as face veneer.
4. Vinyl-Faced Fiberboard: Medium-density fiberboard complying with ANSI A208.2, milled to required shapes, with a thermoformed vinyl overlay applied in a vacuum or membrane press.
5. Thermoset Decorative Overlay: Medium-density particleboard complying with ANSI A208-1, Grade M-2; with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
   a. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semi-exposed surfaces.

B. Semi-exposed Materials: Unless otherwise noted, provide the following:

1. Plywood: Hardwood plywood complying with HPVA HP-1 with Grade C faces and backs stained to be compatible with exposed surfaces.
2. Plywood: Hardwood plywood complying with HPVA HP-1 with Grade C faces stained to be compatible with exposed surfaces and Grade 3 backs of Birch species, with clear finish.
3. Plywood: Hardwood plywood complying with HPVA HP-1 with Grade C fac
4. stained to be compatible with exposed surfaces and an embossed, natural birch vinyl film adhesively bonded to the plywood.
5. Vinyl-Faced Particleboard: Medium density particleboard complying with ANSI A208.1, Grade M-2 with an embossed, wood grain-patterned vinyl film adhesively bonded to particleboard.
   a. Provide vinyl film on both sides of shelves, dividers, and other components with two semi-exposed surfaces and semi-exposed edges.

C. Concealed Materials: Comply with the following:

1. Plywood: Any hardwood or softwood species, with no defects affecting strength or utility.
2. Particleboard: ANSI A208.1, Grade M-2

D. Solid Wood Edges and Trim: Clear hardwood lumber of species indicated, free of defects, selected for compatible grain and color, kiln dried to 7 percent moisture content.

1. Wood Species: TBD.

2.4 CASEWORK HARDWARE

A. General: Manufacturer's standard units complying with BHMA A156.9, type, material, size, and finish as selected from manufacturer's standard choices.

B. Hinges: Concealed European-style, 6-way adjustable hinges.

C. Drawer Guides: Undermount, self-closing drawer guides, designed to prevent rebound when drawers are closed; with nylon-tired, ball bearing rollers; and complying with BHMA A156.9, type B05091.

1. Full-extension buffered runners with easy-release mechanism.

D. Locks where indicated: to be disc tumbler lock keyed alike and master keyed. Dull chrome finish.

2.5 CABINET CONSTRUCTION

A. Face Style: Reveal overlay: door and drawer faces partially cover body or face frame.

B. Face Frames: 3/4-by-1 1/2-inch (19-by-38-mm) solid wood.

C. Door and Drawer Fronts: Solid wood stiles and rails, 3/4-inch (19mm), with 1/4-inch (6.4mm) thick, veneer-faced plywood center panels.

D. Exposed Cabinet Ends: 3/4-inch (19mm) thick, veneer-faced plywood with natural birch veneer interior.

E. Cabinet Tops and Bottoms: 1/2-inch (12.7mm) thick, vinyl-faced particleboard or 1/2- inch (12.7mm) thick natural birch veneer-faced plywood, supported by and secured in rabbits in end panels and front face frame.

F. Base Unit Top Rails: 3/4 by 2 3/4-inch solid wood, interlocking with end panels, and secured under pressure with glue and with mechanical fasteners.

G. Wall-Hung Unit Top and Bottom Rails: 1/2 by 2 1/2-inch solid wood, interlocking with end panels, and secured with glue and mechanical fasteners.

H. Base Unit Back Panels: 3/8-inch vinyl-faced or veneer particleboard fastened to rear edge of end panels and to top rail.

I. Wall-Hung Unit Backs: 3/16-inch thick plywood or 1/8-inch hardboard, captured on the end panels and fastened to the top and bottom rails.

J. Front Face Frame Drawer Rails: 3/4-by-1 1/2-inch solid wood fastened into face frame.

K. Drawers: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued dovetail joints.
2. Subfronts, backs, and sides: 3/4-inch (19mm)-thick solid wood.

L. Shelves: 3/4-inch (19mm)-thick particleboard or 5/8-inch-(16mm)-thick plywood.

M. Joinery: Rabbet backs flush into end panels and secure with concealed mechanical fasteners. Connect tops and bottoms of wall cabinets and bottoms of base cabinets to ends and dividers with mechanical fasteners. Rabbet tops bottoms, and backs into end panels.

N. Factory Finishing: To the greatest extent possible, finish casework at the factory. Defer only final touch up until after installation.

PART 3 - EXECUTION

3.2 INSTALLATION

A. Erect casework straight, level and plumb and securely anchor in place. Scribe and closely fit to adjacent work. Cut and fit work around pipes, ducts, etc.

B. Install all items complete and adjust all moving parts to operate properly.

C. Leave surface clean and free from defects at time of final acceptance.

END OF SECTION 12 30 00

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SECTION 12 36 40
SOLID SURFACE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install the following:
   1. Solid surface (solid polymer) countertops and backsplashes.
   2. Plastic laminate countertops and backsplashes.
   3. Sealant, for joints between countertops, backsplashes and abutting surfaces.

B. Make all cut-outs within solid surfacing items as required to accommodate sinks, and other plumbing fixtures, from templates provided by the respective trades.

1.4 QUALITY ASSURANCE

A. Fabricator and Installer; with a minimum of 3 years documented experience demonstrating previously successful work of the type specified herein, and approved by product manufacturer.
   1. Fabricator and Installer for solid surfacing products shall be trained and certified by solid surfacing manufacturer.

B. Quality Standards: All materials, workmanship and finishes shall meet AWI/AWMAC/WI Architectural Woodwork Standards, 2nd. Edition, as amended by published errata, for the following Quality Grades:
   1. All plastic laminated work: Custom grade.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:
   1. Aristec Acrylics LLC (Avonite Surfaces), Florence, KY., product “Avonite”.
   2. E. I. du Pont de Nemours and Company, Inc., Wilmington DE product, “Corian”.
   3. Formica Corporation, Cincinnati, OH, product: “Solid Surfacing”.
   4. LG Hausys America, Inc., Adairsville, GA., product “HI Macs”
   5. Wilsonart International, Inc. Temple TX, product “Solid Surfaces”

2.2 SOLID SURFACING MATERIALS

A. Polymer solid surfacing material: Non-porous surfacing material homogeneously composed of natural minerals and high-performance polymer, fabricated sizes and profiles as shown on the Drawings, in colors and finishes as selected by Architect.

1. Solid surfacing material shall be NSF (National Sanitation Foundation) listed under publication 51 - Plastic Materials and Components used in Food Equipment and bear the "component" mark.
2. Colors and patterns shall be as selected by the Architect.

B. Sheet thicknesses shall be as specified below or as otherwise indicated on Drawings.

1. Countertops: One piece monolithic design 1/2 inch thick with solid plywood backing.
2. Backsplashes: 1/2-inch thick in locations and heights as shown on the Drawings.

2.3 PLASTIC LAMINATE FACING AND BACKING

A. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Formica Corp., Cincinnati, OH.
2. Laminart, Elk Grove Village, IL.
3. Pioneer Plastics Corp. (Pionite), Auburn, ME.
4. Nevamar Corp., Odenton, MD.
5. Ralph Wilson Plastics Co. (Wilsonart), Temple, TX.

B. Plastic laminate, general purpose, conforming to NEMA LD3.1 -1991 Grade GP50, nominal 0.050 inch thickness, in a low non-directional texture in color price group selected by the Architect.

1. General purpose grade laminate shall be used for counter tops where indicated on the Drawings.

C. Plastic laminate, cabinet interior grade, conforming to NEMA LD3-1985 Grade CL20, 0.020 inch nominal thickness, selected from full range available color price groups by the Architect.

1. Cabinet interior grade laminate may be used for the interior surfaces of all 'closed cabinets' where general purpose grade is not required.
2. All shelving shall be cabinet interior grade.

D. Plastic laminate, unfinished balancing (backer) sheet, conforming to NEMA LD3-1985 undecorated laminate, Grade BK20, 0.020 inch nominal thickness.

E. PVC Edging for plastic laminate millwork:

1. Manufactured by EdgeCo, Dolken Woodtape, Charter, or equal. Edging shall be 3 mm thick solid edge banding.
2. Edges: Square.
3. Custom colors to match plastic laminate colors.

2.4 ACCESSORIES

A. Plywood backing for countertops: APA C-C PLUGGED EXT, fir plywood, sanded, thickness as indicated on Drawings.

B. Adhesive for build-up of solid surfacing sheets: color matched two-component seam adhesive as provided by solid surfacing manufacturer.

C. Adhesive for installation of trim components, neoprene panel adhesive or structural silicone glazing sealant, as recommended by solid surfacing manufacturer.

D. Sealant, for joints between countertops and dissimilar materials: One component acetoxy silicone rubber, mildew resistant, FS TT-S-001543A, Type Non-Sag, Class A, and FS TT-S-00230C, Type II, Class A and ASTM C 920, Type S, Class 25, Grade NS, use NT,G and A with a minimum movement capability of ±25 percent, and a Shore A hardness of 20, in manufacturer's standard colors as selected by the Architect, equal to one of the following:

1. Dow Corning Corporation, Midland MI.; product, "786".
2. General Electric Company, Waterford NY.; product, "Sanitary 1700".
3. Sonneborn Building Products Inc., Minneapolis MN.; product, "Sonolastic - OmniPlus".
4. Tremco, Beachwood OH.; product, "Proglaze".

E. Bolts, nuts, washers, lags, pins, and screws: Of size and type to suit application chrome finish in exposed-to-view locations.

F. Concealed supports for edge and corner backing shall be kiln dried birch or poplar.

2.5 FABRICATION OF SOLID SURFACING

A. Coordinate the fabrication of solid surfacing products with that of the various trades responsible for installing materials and items which will be inserted into, or applied to, the countertop surfaces. Obtain and verify templates, dimensions, and instructions from the respective trades before making cut-outs, holes, slots, and other cutting in the countertops.

B. Shop fabricate all solid surfacing items in strict accordance with the details on the Drawings, the approved shop drawings, and recommendations of the solid surfacing manufacturer

1. Prepare countertops for undermount design sinks furnished and installed under Division 22 - PLUMBING.
2. Prepare solid surfacing fabrications for installation of plumbing fixtures.

C. Fit corners and joints hairline. Make all field joints and miters tight, secure with concealed fasteners.

D. Provide shop fabricated counters, shop mitered components, closure trims with ample allowance for field cutting and fitting. Provide additional trim as required for scribing and site cutting.

E. Route all edges to be butted for a smooth, clean fit. Sand edges with 120 grit sandpaper to rough up surfaces for adhesive bonding. Clean with denatured alcohol.

F. Prepare and apply adhesive in compliance with manufacturer's written instructions. Clamp all components using manufacturer's approved clamping methods at all joints and build-up laminations, maintain clamping until adhesive is set. Avoid over-tightening clamps and squeezing out adhesive.

G. Remove excess adhesive when dry with router. Follow with belt sander using 120 grit, diagonal to joint. After adhesive is leveled and smooth with surface, proceed with final shaping and finishing.

H. After shaping, smooth finish of cut surfaces equal to manufacturer's original finish. Sand surfaces smooth with wet 400 grit sandpaper. Remove superficial scratches and sander markings, buff with nylon buffing pads as recommended by solid surfacing manufacturer. Wipe surfaces clean and dry with cloths.

I. Finished work shall be free from visible adhesive and pencil marks.

J. Field touch-up: Shall be the responsibility of the installer and shall include the filling, and touch-up of exposed job made nail or screw holes, refinishing of surfaces resulting from job fitting, repair of job inflicted scratches and marks, and final cleaning up of the finished surfaces.

2.6 FABRICATION OF PLASTIC LAMINATE CLAD ITEMS

A. Do not fabricate materials until all specified submittals have been submitted to, and approved by, the Architect.

B. Except as otherwise specified hereunder, fabricate plastic laminate clad items in strict accordance with the details on the Drawings, the approved shop drawings, and workmanship standards set forth in the AWI Quality Standards Section 400, for specified Quality Grade.

C. Shop fabricate all plastic laminate clad items. Adhere plastic laminate to plywood backing sheets by cold-press-method. Use of contact cements are not permitted. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Apply laminate backing sheet to reverse side of all laminated, panels, shelving and tops.

D. Fit corners and joints hairline. Make all joints and miters tight, secure with concealed fasteners.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

A. General: Install work in accordance with manufacturer's instructions.

B. Solid surfacing shall be installed plumb, level, true and straight without distortions:
   1. Use concealed shims as required
   2. Work shall be installed to a tolerance of 1/8 inch in 8 feet for plumb and levelness, including tops.
   3. There shall be no variations in flushness of adjoining surfaces.

C. Tops and trim shall be scribed and trimmed to fit adjoining work.
   1. Where cuts occur, refinish surfaces and repair damaged finishes

D. Secure solid surfacing fabrications to blocking directly attached to substrates.
   1. Secure fabrications using concealed fasteners.
   2. Anchor tops securely to base units and to other support systems as required.

E. After installation and leveling of solid surfacing fabrications has been completed; apply a continuous bead of specified sealant to all joints which abut walls or partitions. Tool the sealant to a uniformly dense surface, level with the edges of the casework. Immediately remove all excess sealant from solid surfacing surfaces.

END OF SECTION 12 36 40

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SECTION 12 48 16

ENTRANCE FLOOR MATS

PART 1 - GENERAL

1.1 SUMMARY

A. Furnish and install entrance floor gratings and modular floor tiles.

1. Provide sub-floor filler, to ensure the specified tolerance level for finish surface of matting.

2. Frames at entrances.

1.8 WARRANTY

A. Provide 10 year warranty under provisions of Section 01 78 39 – PROJECT RECORD DOCUMENTS. Warranty shall include texture retention, wear, and static protection and edge ravel resistance and run resistance strength for the life of the matting. Commencing on the date of substantial completion.

B. Mat installer's written guarantee covering prompt and proper replacement of any and all floor mating which indicates improper installation workmanship and/or defective material within twenty-four months from completion of the installation and acceptance thereof by the Architect, said corrective work being performed by the mat installer at no cost to the Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturer: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Mats, Inc., Stoughton, MA, Product: “Safe Track Grille“ and “Supreme Nop”.

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following, or approved equal:

1. Mats, Inc., Stoughton, MA.

2. Arden Architectural Specialties, Inc., St. Paul, MN.

3. Balco Inc., Wichita, KS.

4. Construction Specialties, Inc., Muncy, PA.

2.2 RECESSED ALUMINUM FOOT GRILLE

A. Foot grille shall be constructed from 40% post-industrial recycled aluminum alloy type 6061-T6, fabricated to sizes indicated on the Drawings with mechanically fastened rails (swedge or key lock fastening of rails is not acceptable).

1. Tread: T-shaped blades; 3/8 by 1/8 by 1 inch size; spacing between blades not to exceed 3/16 inch.

2. Recessed Frame: Frames shall be a "Z" shape equal to model "TT" by Mats Inc., anchoring the foot grille structure into concrete. All aluminum frames shall be pre-assembled at factory incorporating welded construction for all joints with mitred corners. Multiple grille sections shall incorporate an invisible section divider integrated and welded within the frame.

2.3 FLOOR TILE

A. Polypropylene modular matting tiles: 100 percent heavy denier, solution dyed, needle punched polypropylene equal to Mats, Inc. “Supreme Nop”, 19-11/16 by 19-11/16 by 7/16 inch thick tiles, with bitumen backing, total weight 169 oz/sq yd.

1. Accessories:

a. Adhesive for mounting bitumen backing: Equal to Mats Inc. “Release-Bond Adhesive” or as recommended by manufacturer.

b. Floor mat frame at entrances: 1/2 inch high (upturned edge) by 1/8 inch thick and minimum 1-1/4 inch (bottom edge) by 1/16 inch thick stainless steel with US 32D finish.

1) Fabricate frame to be truly straight, level and square. Provide frame pieces in longest available lengths to minimize joints. Form corners with tightly mitered joints or use prefabricated joint-less corners.

2) Shop fabricate framework to the largest unit sizes possible. No joints are permitted within 12 inches of corners.

2.4 FINISHES

A. Finish coatings for aluminum to conform to Finish Designation system: AAMA 607.1.

1. Exposed Aluminum Surfaces: (AA designation M12C22A41) Architectural Class I anodic coating, 0.7 mil thickness or greater, prepared with a mechanical M12, chemical C22 pre-treatment, clear anodized in color.

2.5 ACCESSORIES

A. Filler for patching, smoothing and leveling substrate: Portland cement-based latex underlayment acceptable to flooring manufacturer, equal to the following:

1. Ardex, Inc., products “Feather Flash” and “Ardex SD-P”.

2. Quikrete Companies, product “Fast-Set Underlayment 1248”.

3. Silpro Masonry Systems Inc., product “Masco Latex Cement”

2.6 FABRICATION

A. Fabricate frame to be truly straight, level and square. Provide frame pieces in longest available lengths to minimize joints. Space unavoidable joints evenly about centerline of mat and spline butt-joints with connecting pins. Form corners with tightly mitered joints or use prefabricated jointless corners.

B. Provide frames and mats to sizes, shapes, and profiles indicated on approved shop drawings. Provide one-piece mats except where size exceeds manufacturer’s recommended limit for easy removal and cleaning. Where more than one-piece mats are used, locate seams away from main traffic pattern.

PART 3 - EXECUTION

B. Thoroughly sweep and vacuum all surfaces and remove all foreign matter.

3.3 INSTALLATION

A. Install the work of this Section in strict accordance with the manufacturer's recommendations as approved by the Architect, anchoring all units firmly into position, square, plumb, straight, and true.

B. Cast the edge extrusion into the concrete slab.

C. Set the grid units in place, shimming with vinyl to provide stability on the Drain Pan.

END OF SECTION 12 48 16

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SECTION 14 24 00

HOLELESS HYDRAULIC ELEVATORS
(FILED SUB-BID REQUIRED)

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

A. The BIDDING REQUIREMENTS, CONTRACT FORMS, and CONTRACT CONDITIONS as listed in the Table of Contents, and applicable parts of Division 1 - GENERAL REQUIREMENTS, shall be included in and made a part of this Section.

B. Work of this Section requires Filed Sub-Bids and is governed by the provisions of the Massachusetts General Laws (MGL), Public Bidding Law - Chapter 149, Sections 44A to 44J inclusive, as amended, and applicable Sections of the MGL, Public Contract Law - Chapter 30.

C. The work to be completed by the Filed Subcontractor for the work of this Section is shown on the following listed Drawings, not just those pertaining particularly to this Sub-Trade, unless specifically called out otherwise, regardless of where among the Drawings it appears:

1. Examine all Drawings and all other Sections of the Specifications for requirements therein affecting the work of this Section The listing of Contract Drawings above does not limit Filed Subcontractor's responsibility to determine full extent of work of this Section as required by all Drawings listed in the Drawing List on the Drawing Title Sheet, as modified by Addenda.

D. Alternates: Special attention is called to the fact that it shall be the responsibility of the General Contractor and all subcontractors to thoroughly examine all the alternates and evaluate for themselves as to whether or not these alternates in any way affect their respective section. In the event that the General Contractor or subcontractor feels that any alternate(s) do reflect a cost difference, additional or a deduction in his bid proposal, then he shall so stipulate this sum and/or sums under the proper alternate(s) as provided for the bid proposals. Failure to do so will in no way relieve the hereinbefore stated General Contractor or subcontractors of their responsibilities regardless of what alternate(s) is selected. No extra cost will be charged to the Owner. Refer to Section 01 23 00 - ALTERNATES for the list and description of Alternates.

E. Sub-Bids for work under this Section shall be for the complete work and shall be filed in a sealed envelope with the Awarding Authority at a time and place as stipulated in ADVERTISEMENT TO BID and INSTRUCTIONS TO BIDDERS.

1. The following shall appear on the upper left hand corner of the envelope:

NAME OF SUB-BIDDER: _____
SUB-BID FOR TRADE: ELEVATORS

2. Each Sub-Bid submittal for work under this Section shall be on forms furnished by Awarding Authority, as bound herein, accompanied with the required bid deposit in compliance with MGL Chapter 149 Section 44B in the amount of 5 percent of Filed Sub-Bid.

F. Sub Sub-Bid Requirements: NONE REQUIRED UNDER THIS SECTION.

1.2 SUMMARY

A. Furnish and install: One roped hydraulic elevator, work includes, but is not limited to:

1. Commercial, standard pre-engineered roped-hydraulic passenger elevator.
2. Elevator car enclosures, hoistway entrances and signal equipment.
3. Plunger(s) and Cylinder(s) and roping system.
4. Operation and control systems.
5. Accessibility provisions for physically disabled persons.
6. Equipment, machines, controls, systems and devices as required for safely operating the specified elevators at their rated speed and capacity.
7. All other devices, materials and accessories for operation, dispatching, safety, security, leveling, and alarms, as required to complete the elevator installation.

B. Furnish the following products to be installed under the designated Sections:

1. Inserts required to be cast into concrete: installed by Section 03 30 00 - CAST-IN-PLACE CONCRETE.
2. Guide rail brackets and inserts for placement in masonry: installed by Section 04 20 00 - UNIT MASONRY.

C. Place, install and build-in, as work progresses, the following products and materials furnished under the indicated Sections:

1. Continuous supports for sills at each hoistway entrances and elevator pit ladders furnished under Section 05 50 00 - METAL FABRICATIONS.
2. Cylinder for key control of elevator call buttons.

D. Furnish all hoisting equipment, crane services and lift machinery required to perform the Work of this section. Install, operate and maintain in safe condition.

1. Provide crane services to place the cylinder assembly in the hoistway prior to enclosing the top of the hoistway

E. Provide 12 month maintenance and call back services for elevator equipment furnished.

1.9 QUALITY ASSURANCE

A. In the interest of unified responsibility, the elevator installer shall be either the actual equipment manufacturer or a firm fully authorized by the manufacturer of

the proposed equipment to install the equipment; regularly engaged in the business of manufacturing, installing, and servicing elevators of the type and character required under this Section, with all major components, including the entire power unit, controller, hydraulic cylinder, door operators, signal fixtures, and other major items, being the products of a single elevator manufacturer.

1.12 WARRANTY

A. Provide 2 year warranty under provisions of Section 01 78 00 - CLOSEOUT SUBMITTALS. Warranty shall include all materials and workmanship for the elevator system and its installation. countersigned by the elevator installer, clearly stating all terms and conditions of the guarantee, and covering all materials and workmanship provided for a period of not less than two (2) years from date of Substantial Completion of the General Contract.

PART 2 - PRODUCTS

2.1 MANUFACTURE AND TYPE

A. Specified manufacturer and model: To establish a standard of quality, design and function desired, Drawings and specifications have been based on Canton Elevator Incorporated, North Canton, OH, product "Passenger Dual Roped".

B. Acceptable Manufacturers: Subject to compliance with the requirements specified herein, manufacturers offering products which may be incorporated in the work include the following:

1. Canton Elevator Incorporated, North Canton, OH
2. ThyssenKrupp Elevator Company, Memphis TN.
3. Otis Elevator Company, Farmington CT.
4. Schindler Elevator Corporation, Gettysburg PA.

C. Proprietary equipment: No proprietary equipment shall be used in the installation. All equipment included in the elevator installation shall have repair or replacement parts readily accessible to the general elevator trade. Without limitation, this shall include diagnostic tools, solid state boards and controller components required for the complete maintenance of the installed equipment.

1. Any costs incurred for changes in the work from that shown on the Drawings, including work of this and other Sections, due to the requirements of the particular equipment furnished thereunder are the sole responsibility of the Elevator manufacturer.

D. Barrier free design: Provide for handicapped requirements in accordance with 521 CMR: ARCHITECTURAL ACCESS BOARD, as amended and ANSI Publication No. A-117.1 Part 4, Series 4.12, Design of Barrier-Free Facilities, Americans with Disabilities Act (ADA) and all applicable Federal, State and Local codes.

E. Elevator characteristics:

Load (rated capacity):	3,000 pounds.
Canoter Speed:	125 feet per minute.
Operation:	Simplex collective, selective.
Rise:	As indicated on Drawings
Number of Stops:	Two (2); First Floor and Second Floor.
Height under car top:	8′-0″
Height under ceiling:	7′-4″
Clear car inside:	7′-8″ wide by 5′-5″ deep.
Car door type:	Single speed center opening.
Platform dimension:	7′-0″ by 5′-6″.
Hoistway dimension:	8′-8″ wide by 6′-3″ deep.
Hoistway entrance:	3′-6″ wide by 7′-0″ high.
Motor:	25 horsepower
Power supply , (heavy-duty):	480 volts, 3 phase, 60 hertz
Lighting supply:	120 volts, 1 phase, 60 hertz
Signal supply:	120 volts, 1 phase, 60 hertz

A. Operation: The car platform with its supporting structure, enclosure and load shall be raised and lowered by hoist cables connected to the supporting structure, the ropes being actuated by cable sheaves fastened to the external end of a direct acting piston. If required, the piston may be externally guided.

B. Load capacity: Safely lower, stop, and hold up to 125 percent rated load.

2.2 HOISTWAY EQUIPMENT

A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed.

B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.

C. Guide Rails: Steel, omega shaped, fastened to the building with steel brackets.

D. Guide Shoes: Slide type, 80 feet per minute guides, shall be mounted on top and bottom of the car and be held in contact with the guide rail by adjustable devices.

E. Guide Rail Lubricators: Provide a leakproof reservoir on top of upper guide shoes. Wool felt wiper shall apply an even, uniform flow of lubricant which shall thoroughly cover face of guide rail.

F. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.

G. Safety: An instantaneous safety shall be provided designed to grip the car guide rails, stop and support the car in the event of broken or slack cables or plunger

failure. The Safety will be actuated by a friction governor and governor tension sheave. The instantaneous safety shall be automatic, and reset by running the car in the up direction.

H. Governor: The governor shall be located in the hoistway overhead. The governor shall include an electrically activated means of manually tripping the governor from the machine room for annual no-load and five-year full-load safety tests. The design shall not require a governor access door.

I. Guide Rail Lubricators: Provide a leakproof reservoir on top of upper guide shoes. Wool felt wiper shall apply an even, uniform flow of lubricant which shall thoroughly cover face of guide rail.

J. Plunger(s) and Cylinder(s) shall consist of the following.

1. Construct each cylinder of steel pipe of sufficient thickness and suitable for the operating pressure.
2. Equip each cylinder head with a top mounted drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing.
3. Construct each plunger of seamless steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. Brittle material, such as gray cast iron, is prohibited in the plunger construction
4. Stop ring shall be electrically welded to the plunger to positively prevent plunger leaving the cylinder.
5. Locate a sheave at the top of each plunger which shall be guided through its travel by a set of plunger rails.
6. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.
7. Cylinder(s) and exposed piping shall be painted to help protect it from chemical corrosion.

K. Ropes: Ropes shall be fastened to the top of the cylinder jackstands, travel over the plunger sheave and attach to the bottom of the elevator carframe.

L. Automatic Terminal Limits: Place electric limit switches in the hoistway near the terminal landings. Limit switches shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.

M. Automatic Self-Leveling: Provide each elevator car with a self-leveling feature to automatically bring the car to the floor landings and correct for overtravel or undertravel. The self-leveling shall, within its zone, be entirely automatic, silent and independent of rope stretch. The car shall be maintained approximately level with the landing irrespective of its load.

N. Failure Protection: Design electrical control circuit so if a malfunction occurs, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will

automatically descend to the lowest terminal landing. If power operated doors are used, the doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the "door open" button in the car station, shall be made inoperative.

O. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary pipe and fittings shall connect the power unit to the jack unit. Provide proper grade oil.

P. Emergency Terminal Stopping Device: Provide emergency terminal stopping devices for speeds over 100 FPM. The emergency terminal stopping device shall operate independently of the normal terminal stopping device if it fails to slow down the car at the terminal as intended. Stopping devices shall not be prevented from functioning by a single short circuit caused by a combination of grounds or by other conditions.

1. Normal and emergency terminal stopping devices shall not control the same controller switches unless two or more separate and independent switches are furnished, two or which shall be closed in either direction of travel to complete the circuit to the control valve solenoids in the down direction and to complete the circuit to the pump motor for the up direction of travel.

2.3 POWER UNIT

A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:

1. Oil reservoir with tank cover and controller compartment with cover.
2. An oil hydraulic pump.
3. An electric motor.
4. Oil control unit with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and magnetic controller.

B. Pump: Positive displacement type pump specifically manufactured for oil-hydraulic elevator service. Pump shall be designed for steady discharge with minimum pulsation to give smooth and quiet operation. Output of pump shall not vary more than 10 percent between no load and full load on the elevator car.

C. Drive: Drive shall be by direct coupling with the pump and motor submerged in the oil reservoir or by multiple V-belts and sheaves of number and size to insure maximum factor of safety. Drive type shall be determined based primarily on the load on the car, travel, and speed.

D. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall comply with specified speeds and loads.

E. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.

1. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
2. Up start and stop valve shall be externally adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
4. Lowering valve and leveling valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling when slowdown is initiated.

F. Power controller shall contain electrical contactors, electro-mechanical switches and thermal overload relays. Mount components in a NEMA 1 enclosure. Logic control system shall be microprocessor based and protected from environmental extremes and excessive vibrations.

G. Reduced Voltage Starting: Provide a solid state starter to limit current inrush during starting and to provide gradual acceleration of the motor. Motor starting shall not be initiated by mechanical contacts. Starter shall include a current limit adjustment range of 200 percent to 450 percent of the overload adjustment range. Provide an integral fault detection and diagnostic system.

2.4 ELECTRICAL COMPONENTS

A. Boxes, conduit, wiring, and devices: As required by ANSI/NFPA 70.

B. Fittings: Steel compression type for electrical metallic tubing. Fittings with set screws are acceptable only when a separate grounding conductor is also installed across the joint.

C. Spare conductors: Provide 10 percent extra conductors and two pairs of shielded audio cables in traveling cables. Do not parallel conductors to increase electric current capacity unless individually fused.

D. Include wiring and connections to elevator devices remote from hoistway and between elevator machine rooms. Provide additional components and wiring to suit machine room layout.

1. Do not use armored flexible metal conduit as a grounding conductor.

2.5 HOISTWAY ENTRANCES

A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening.

1. Manufacturer's standard entrance design, bearing Underwriters' Laboratories "B" labels, and consisting of 14 gauge frames with 2 inch (50 mm) profile, 16 gauge doors, hangers, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
2. Elevator wall interface with hoistway entrance assembly shall comply with elevator manufacturer's requirements.
3. Doors: Flush construction.
   a. Steel: ASTM A 366 formed steel, factory-applied rust-inhibitive prime coat finish.
4. Frames: Formed construction.
   a. Steel: ASTM A 366 formed steel, factory-applied rust-inhibitive prime coat finish.

B. Interlocks: Equip each hoistway entrance with an Underwriters' Laboratories "B" label approved type interlock tested as required by code. Interlock shall be designed to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by code and shall prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.

C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway sliding door.

1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
2. Hangers: Provide an adjustable slide to accommodate the up-thrust of the doors.
3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

D. Hoistway Sills: Extruded, with grooved surface, 1/4 inch (6.4 mm) thickness.

1. Nickel-silver: ASTM B 151 nickel silver, alloy UNS C74500, polished finish.

E. Doors and sight guards: Sight guards shall be furnished on the leading edge of the doors to conceal the hoistway beyond the doors, and finished to match door panels. Fabricate doors from16 gage sheet steel (minimum).

2.6 DOOR OPERATION

A. Door operator: Doors on the car and at the hoistway entrances shall be power-operated by means of an operator mounted on top of the car. The door operators shall have mechanically operated limits and the motor shall have positive control over door movement for smooth operation. Each car door shall be provided with a protective device.

B. Door Protection Devices: Provide a door protection system using 40 microprocessor controlled infra-red light beams. The beams shall project across the car opening detecting the presence of a passenger or object. If door movement is obstructed, the doors shall immediately reopen. A mechanical reopening device is not acceptable.

2.7 CAR ENCLOSURES

A. Car Enclosure:

1. Walls: reinforced 16 gauge cold-rolled steel with #4 stainless steel reveals, with applied vertical 5/8 inch thick composition board core, laminated front and back with plastic laminate. Edges of each panel shall be plastic laminate.
2. Canopy: Reinforced 14 gauge cold-rolled steel with hinged exit. Finish: Factory applied powder coat.
3. Ceiling: suspended downlight type, 16 gauge metal pans with LED lighting fixtures and dimmer switch. Number of downlights shall be dependent on platform size with a minimum of six.
   a. Metal panels: Stainless steel, No. 4 satin finish.
4. Cab Columns, Front, and Transom: Stainless steel, No.4 satin finish.
5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic shoes sliding in a smooth threshold groove.
   a. Door Finish: Stainless steel, No. 4 satin finish
6. Cab Sills: Extruded, with grooved surface, 1/4 inch (6.4 mm) thickness.
   a. Nickel-silver: ASTM B 151 nickel silver, alloy UNS C74500, polished finish.
7. Handrail: Continuous cylindrical metal tube handrail with ends curved to the wall, nominal 1.5 inches (40 mm) in diameter, stainless steel satin finish.
   a. Provide at rear and side walls.
8. Ventilation: Two speed exhaust fan mounted on the car top.
9. Pad Buttons: As manufactured by W.E. Palmer, Boston, MA., or approved equal.
   a. Provide pad buttons on cab front(s) and walls.
   b. Provide one set of quilted vinyl reinforced polyester pads with an impact resistant core equal to Palmer Pads, Boston, MA, product “Palmtuff Vinyl” for the project.
10. Base: Stainless steel satin finish.
11. Finished Floor: Provided under Section 12 48 20 – ENTRANCE FLOOR GRILLES.

B. Car Top Inspection: Provide a car top inspection station with an "emergency stop" switch and constant pressure "up-down" direction buttons to make the normal

operating devices inoperative and give the inspector complete control of the elevator. Mount the car top inspection station in the door operator assembly.

C. Provide rubber isolation pads to dampen vibration or noise from the oil hydraulic system being transmitted to the car frame and platform.

2.8 CAR OPERATING STATION

A. Car Operating Station, General: The main car control in each car shall contain the devices required for specific operation mounted in a No. 4 stainless steel permanently fixed return panel requiring no applied faceplate.

1. The lowest module shall contain the "door open," "door close," "alarm" buttons and a keyed "emergency stop" switch.
2. Intermediate modules shall contain floor buttons which illuminate when a call is registered and remain illuminated until the call is answered. Raised floor indications and handicap symbols shall be located immediately adjacent to the floor buttons and be fully integrated in the module design. No applied symbols or floor indications or symbols on the buttons shall be permitted.
3. The next module shall contain required switches.
4. The top module shall contain fire service features in accordance with ASME A17.1, Rule 211.3, including operating instructions.

B. Position Indicator: An electronic dot matrix position indicator. As the car travels, its position in the hoistway shall be indicated by the illumination of the alpha/numeric character corresponding to the landing which the elevator is stopped or passing.

C. Emergency Light: An emergency light and capacity plate. Emergency light shall illuminate automatically upon loss of the building's normal power supply.

D. Communications systems:

1. General: Provide traveling cables with sufficient shielded wires plus two spares into the car.
2. Intercom at panel connected to set number as determined by the Owner
3. Emergency Communications System: Provide an emergency communications device mounted in the swing return. Emergency communications device shall comply with Americans with Disabilities Act (ADA) requirements.

E. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

F. Special Accessories:

1. Independent service switch.
2. Inspection switch.

3. Telephone jack.
4. Certificate frame.

G. Car operating fixture style: ThyssenKrupp Elevator Company, Memphis TN., “Traditional Series“, (Basis of Design).

2.9 CONTROL SYSTEMS

A. Controller: The elevator control system shall be microprocessor based and software oriented and be linked together for purposes of communication by a serial communications link. Control of the elevator shall be automatic in operation by means of push buttons in the car numbered to correspond to floors served, for registering car stops, and by "up-down" push buttons at each intermediate landing and "call" push buttons at terminal landings.

1. Momentary pressing of one or more buttons shall dispatch the car to the designated landings in the order in which the landings are reached by the car, irrespective of the sequence in which the buttons are pressed. Each landing call shall be canceled when answered.
2. When the car is traveling in the up direction, it shall stop at all floors for which car buttons or "up" hall buttons have been pressed. The car shall not stop at floors where "down" buttons have been pressed, unless the stop for that floor has been registered by a car button or unless the down call is at the highest floor for which any buttons have been pressed. Pressing the "up" button when the car is traveling in the down direction shall not intercept the travel unless the stop for that floor has been registered by a car button or unless the up call is the lowest for which any button has been pressed.
3. When the car has responded to its highest or lowest stop, and stops are registered for the opposite direction, its direction of travel shall reverse automatically and it shall then answer the calls registered for that direction. If both up and down calls are registered at an intermediate floor, only the call corresponding to the direction of car travel shall be canceled upon the stopping of the car at the landing.

B. Microprocessor: Locate the main microprocessor and car controller behind the elevator swing return panel.

1. Microprocessor door operator shall reside in the door operator and control all functions of the elevator door(s).
2. Microprocessor selector shall reside on the car top and contain hall effect transducers that detect magnetic fields. Locate the magnetic fields on a perforated metal tape that runs the length of the hoistway.

2.10 AUXILIARY OPERATION AND CONTROLS

A. General: In addition to primary control system features, provide the following controls or operational features for elevator.

B. Special emergency service - Phase I: The activation of a key switch in the Level 1 hall button shall return car to Level 1 by-passing all car and hall calls. The car shall park at Level 1 with their doors open and not respond to car or hall calls unless the SES-II key switch in the car is activated. The system shall be in conformance with the current ANSI Code, Section 211.3. The elevator installer shall furnish contacts on the elevator controller to receive alarm signals from smoke/heat detectors furnished by others. If an elevator is on Independent Service, when the elevator is recalled, a continuous buzzer will sound in the car and a warning light shall be illuminated.

C. Special emergency service - Phase II: (SES-II) in-car control of elevator during the emergency operation, by means of a key switch in car shall be provided. Operation shall be per ANSI Code, Rule 211.3.

D. Emergency/secondary power operation: *(Addendum 01)*

1. Emergency/Secondary power will be provided by the same feeder as normal operational power at elevator's controller.
2. The system shall automatically run Elevator down to Level 1 at full speed where it shall park with doors open.
3. The system shall include a manual override for the use of the City of Worcester Fire Department or emergency personnel. Work under this Section shall include manual interlocking switches, (for manual control, automatic operation and off).
4. Furnish and install the necessary equipment and wiring from the respective elevator controllers to the switches in the First Floor call panel.

E. Hydraulic rescuvator Provide hydraulic rescuvator system featuring the following. *(Addendum 01)*

1. Automatically activates during power loss.
2. Supplies power for rescue operation.
3. Causes car to descend quickly and smoothly to lowest landing.
4. Keep doors closed until proper floor level is reached.
5. Automatically opens doors at lowest landing.
6. Safely shut down elevator until normal power is restored.
7. Automatically resets for future emergencies.
8. Differentiates between actual power failure and manual operation of elevator disconnect switch.

F. Provide emergency lighting system for car.

2.11 HALL STATIONS

A. Hall Stations, General: Buttons shall be keyed controlled and will illuminate to indicate call has been registered at that floor for the indicated direction. Faceplates shall be stainless steel No. 4 satin finish. Provide one set of risers.

1. Each terminal station shall contain one illuminating pushbutton.
2. Each intermediate station shall consist of two illuminating pushbuttons, one for the up direction and one for the down position.
3. Phase 1 firefighters service keyswitch, with instructions, shall be incorporated into the hall station at the designated level.

B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

C. . Furnish and install car riding lanterns and keyed on/off switch.

1. Faceplates shall be No. 4 satin stainless steel finish.

2.12 MISCELLANEOUS ELEVATOR COMPONENTS

A. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. Silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blowout proof features will not be acceptable.

B. Vibration Pads: Mount vibration pads under the power unit assembly to isolate the unit from the building structure.

C. Sound Insulating Panels: When pump and motor are not submerged, provide panels manufactured of reinforced 14 gauge steel with 1 inch (25 mm) thick 1-1/2 pound fiberglass core attached to interior and mounted on all four open sides of the power unit frame.

D. Sound Isolating Couplings: When pump and motor are not submerged, install a minimum of two couplings in the oil line in the machine room between pump and jack.

E. Elevator pit ladders: Stringers 3/8-inch by 1-1/2 inch flat bar, rungs 5/8 inch diameter solid steel rods. Offset ladder from wall surface by 7 inches to centerline of rungs, with brackets.

1. Fabricate ladders in accordance with OSHA requirements, and ANSI A14.3 standards.

2.13 FINISHES, GENERAL

A. Structural Metal Surfaces: Clean surfaces of rust, oil or grease; wipe clean with solvent and prime two coats.

B. Machine Room Components: Clean and degrease; prime one coat, finish with two coats of enamel.

C. Galvanized Surfaces: Clean with neutralizing solvent; prime with two coats.

D. Aluminum: Nickel silver finish.

E. Wood Surfaces not Exposed to Public View: One coat primer and one coat enamel.

F. Baked Enamel on Steel: Clean and degrease metal surface; apply one coat of primer sprayed and baked; two finish coats of enamel sprayed and baked.

G. Stainless steel: Number 4 brushed finish.

H. Elevator pit ladders: Assembled elevator pit ladders in finish selected by Architect from manufacturer's standard finishes.

2.14 SCAFFOLDS AND STAGING

A. General: Filed Subcontractors shall obtain required permits for, and provide scaffolds, staging, and other similar raised platforms, required to access their Work as specified in Section 01 50 00 – CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS and herein.

1. Scaffolding and staging required for use by this Filed Subcontractor pursuant to requirements of Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS shall be furnished, erected, maintained in a safe condition, and dismantled when no longer required, by this Filed Sub-Trade requiring such scaffolding.
2. Each Filed Subcontractor is responsible to provide, maintain and remove at dismantling, all tarpaulins and similar protective measures necessary to cover scaffolding for inclement weather conditions other than those required to be provided, maintained and removed by the General Contractor pursuant to MGL (Refer to Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS and as additionally required for dust control).
3. Furnishing portable ladders and mobile platforms of all required heights, which may be necessary to perform the work of this trade, are the responsibility of this Filed Subcontractor.
4. Enclose all exterior scaffolding outside of the construction fence with 8-foot high plywood enclosure at end of each workday to prohibit access to the scaffolding by unauthorized individuals.

2.15 HOISTING MACHINERY AND EQUIPMENT

A. All hoisting equipment, rigging equipment, crane services and lift machinery required for the work by this Filed Subcontractor shall be furnished, installed, operated and maintained in safe conditions by this Filed Subcontractor, as referenced under Section 01 50 00 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS.

PART 3 - EXECUTION

3.3 INSTALLATION

A. Perform the installation in accordance with the approved shop drawings and the manufacturer's written instructions, ANSI/ASME A17.1 and those standards

required by authority having jurisdiction, and with the additional requirements specified herein.

B. Install system components. Connect equipment to building utilities. Install piping between hoistway plunger and pump unit.

C. Furnish and install all internal and operational wiring, conforming to the requirements of the National Electrical Code, as necessary to connect the operating buttons and switches, from the control board to the power unit. Except for short lengths of flexible conduit to moving apparatus, ensure that all wiring is contained in rigid conduit or electrical metal tubing.

D. Mount motor and pump unit on vibration and acoustic isolators, on bed plate and concrete pad. Place unit on structural supports and bearing plates. Securely fasten to building supports. Prevent lateral displacement.

E. Accurately machine and align guide rails. Form smooth joints with machine splice plates. Install guide rails using threaded bolts with metal shims and lock washers under nuts. Compensate for expansion and contraction movement of guide rails.

F. Bolt or weld brackets directly to structural steel hoistway framing. Chip and clean field welds of oxidation and residue, wire brush and spot prime with two coats of primer.

G. Hoistway entrances: Coordinate the entrance work with that of the trades responsible for furnishing and installing the structural enclosure. Ensure that the entire front wall of the hoistway is left open (or a rough opening is provided which is 12 inches greater in width and 6 inches greater in height than the finished opening) until the hoistway entrances have been installed.

1. Install the hoistway entrances in perfect alignment with the guide rails, after guide rails have been installed and aligned. Interface the hoistway entrances with the surrounding conditions as indicated on the approved shop drawings.
2. Refer to Section 04 20 00 – UNIT MASONRY for placement and grouting of elevator door frames into masonry shaft wall work, and installation of hoistway beams.

END OF SECTION 14 24 00

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APPENDIX A

HVAC CATALOG CUTS

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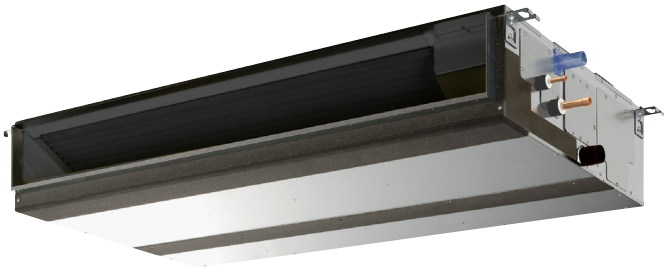
Model: PEFY-P12NMAU-E3

Job Name:	
System Reference:	Date:



GENERAL FEATURES

- Dual set point functionality
- Multiple fan speed settings
- Auto fan mode
- 9-7/8" (250mm) high for low ceiling heights
- Built-in condensate lift; lifts to 27-9/16" (700 mm)
- Ducted fan coil supporting multiple configurations for flexible installation

OPTIONS

- ☐ External Heater Adapter……CN24RELAY-KIT-CM3
- ☐ Filter Box (Includes 2" MERV 13 filter)……FBM2-1

SPECIFICATIONS

Capacity*

Cooling……12,000 Btu/h
Heating……13,500 Btu/h

Power

Power Source…….....208 / 230V, 1-phase, 60Hz

Power Consumption

Cooling……0.09 kW
Heating……0.07 kW

Current

Cooling…….....…….0.66 / 0.62 A
Heating…….....…….0.55 / 0.51 A

Minimum Circuit Ampacity (MCA)……...……...……...1.20 A
Maximum Overcurrent Protection (MOCP) Fuse.....…..15 A

External Finish……...…..…..Galvanized-steel Sheet

External Dimensions

Inches……9-7/8 H x 27-9/16 W x 28-7/8 D
mm……250 H x 700 W x 732 D

Net Weight……..…...…….....49 lbs. / 22 kg

Coil Type…….....….Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan

Type x Quantity……Sirocco Fan x 1
Airflow Rate (Low-Mid-High)…… 265 - 318 - 371 CFM
External Static Pressure…..0.14 - 0.20 - 0.28 - 0.40 - 0.60"WG
Motor Type……..……..……DC Motor

Air Filter..……Polypropylene Honeycomb

Refrigerant Piping Dimensions

Liquid (High Pressure)….....1/4" / 6.35 mm (Brazed)
Gas (Low Pressure)……..1/2" / 12.7 mm (Brazed)

Drainpipe Dimension….....……...…O.D. 1-1/4" / 32 mm

Sound Pressure Levels

Low-Mid-High…..……..……28 - 30 - 34 dB(A)

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB,
Cooling | Indoor: Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB,
Heating | Outdoor 47° F (8° C) DB / 43° F (6° C) WB

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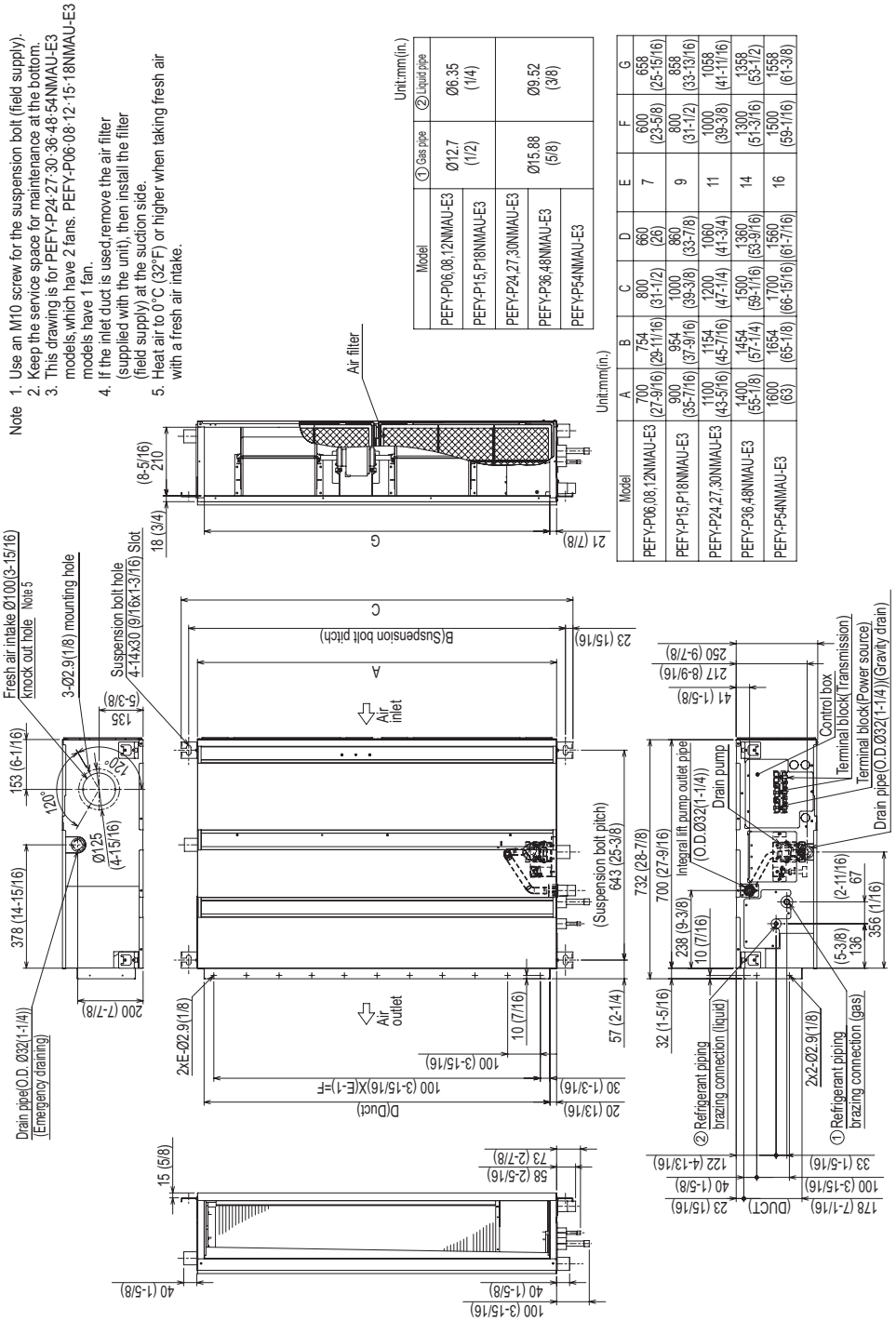
Model: PEFY-P12NMAU-E3 – DIMENSIONS

Unit: mm (in)



Note
1. Use an M10 screw for the suspension bolt (field supply).
2. Keep the service space for maintenance at the bottom.
3. This drawing is for PEFY-P24·27·30·36·48·54NMAU-E3 models, which have 2 fans. PEFY-P06·08·12·15·18NMAU-E3 models have 1 fan.
4. If the inlet duct is used, remove the air filter (supplied with the unit), then install the filter (field supply) at the suction side.
5. Heat air to 0°C (32°F) or higher when taking fresh air with a fresh air intake.

Unit:mm(in.)

Model	① Gas pipe	② Liquid pipe
PEFY-P06,08,12NMAU-E3	Ø12.7 (1/2)	Ø6.35 (1/4)
PEFY-P15,P18NMAU-E3		
PEFY-P24,27,30NMAU-E3	Ø15.88 (5/8)	Ø9.52 (3/8)
PEFY-P36,48NMAU-E3		
PEFY-P54NMAU-E3		

Unit:mm(in.)

Model	A	B	C	D	E	F	G
PEFY-P06,08,12NMAU-E3	700 (27-9/16)	754 (29-11/16)	800 (31-1/2)	660 (26)	7	600 (23-5/8)	658 (25-15/16)
PEFY-P15,P18NMAU-E3	900 (35-7/16)	954 (37-9/16)	1000 (39-3/8)	860 (33-7/8)	9	800 (31-1/2)	858 (33-13/16)
PEFY-P24,27,30NMAU-E3	1100 (43-5/16)	1154 (45-7/16)	1200 (47-1/4)	1060 (41-3/4)	11	1000 (39-3/8)	1058 (41-11/16)
PEFY-P36,48NMAU-E3	1400 (55-1/8)	1454 (57-1/4)	1500 (59-1/16)	1360 (53-9/16)	14	1300 (51-3/16)	1358 (53-1/2)
PEFY-P54NMAU-E3	1600 (63)	1654 (65-1/8)	1700 (66-15/16)	1560 (61-7/16)	16	1500 (59-1/16)	1558 (61-3/8)

1340 Satellite Boulevard. Suwanee, GA 30024
Toll Free: 800-433-4822 www.mehvac.com

FORM# PEFY-P12NMAU-E3 - 201507

Specifications are subject to change without notice.

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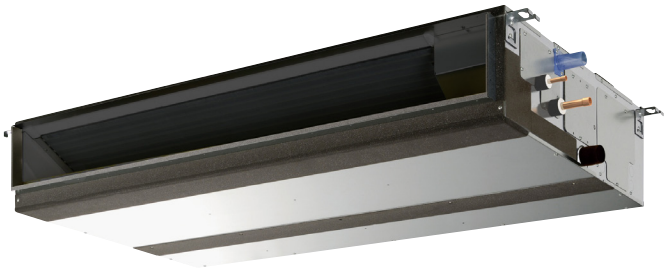
CITY MULTI® Model: PEFY-P15NMAU-E

MITSUBISHI ELECTRIC

Job Name: Location:

Drawing Reference: Schedule No.

System No.: Date:



GENERAL FEATURES

- R410A refrigerant
- 9-7/8" (250mm) high for low ceiling heights
- Eleven sizes from 6,000 to 54,000 Btu/h
- Ducted fan coil supporting multiple configurations for flexible installation
- Five static pressure settings from 0.14"WG up to 0.60"WG
- Choice of fan speed settings
- Built-in condensate lift; lifts to 27-9/16" (700mm)
- Auto fan mode
- Quiet operation from 26 to 45 dB(A)

SPECIFICATIONS

Capacity*
Cooling……15,000 Btu/h
Heating……17,000 Btu/h

Power
Power Source……208 / 230V, 1-phase, 60Hz

Power Consumption
Cooling……0.09 kW
Heating……0.07 kW

Current
Cooling……0.67 A
Heating……0.56 A

Minimum Circuit Ampacity (MCA)……1.45 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Galvanized-steel Sheet

External Dimensions
Inches……9-7/8 H x 35-7/16 W x 28-7/8 D
mm……250 H x 900 W x 732 D

Net Weight
Unit……58 lbs. / 26 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan
Type x Quantity……Sirocco Fan x 1
Airflow Rate (Low-Mid-High)……353 - 424 - 494 CFM
External Static Pressure…..0.14 - 0.20 - 0.28 - 0.40 - 0.60"WG
(External static pressure is factory set to 0.20"WG)

Motor
Type……DC Brushless Motor
Output……0.085 kW

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions
Liquid (High Pressure)……1/4" / 6.35 mm (Brazed)
Gas (Low Pressure)……1/2" / 12.7 mm (Brazed)

Drainpipe Dimension……O.D. 1-1/4" / 32 mm

Sound Pressure Levels
Low-Mid-High……28 - 30 - 34 dB(A)

OPTIONS

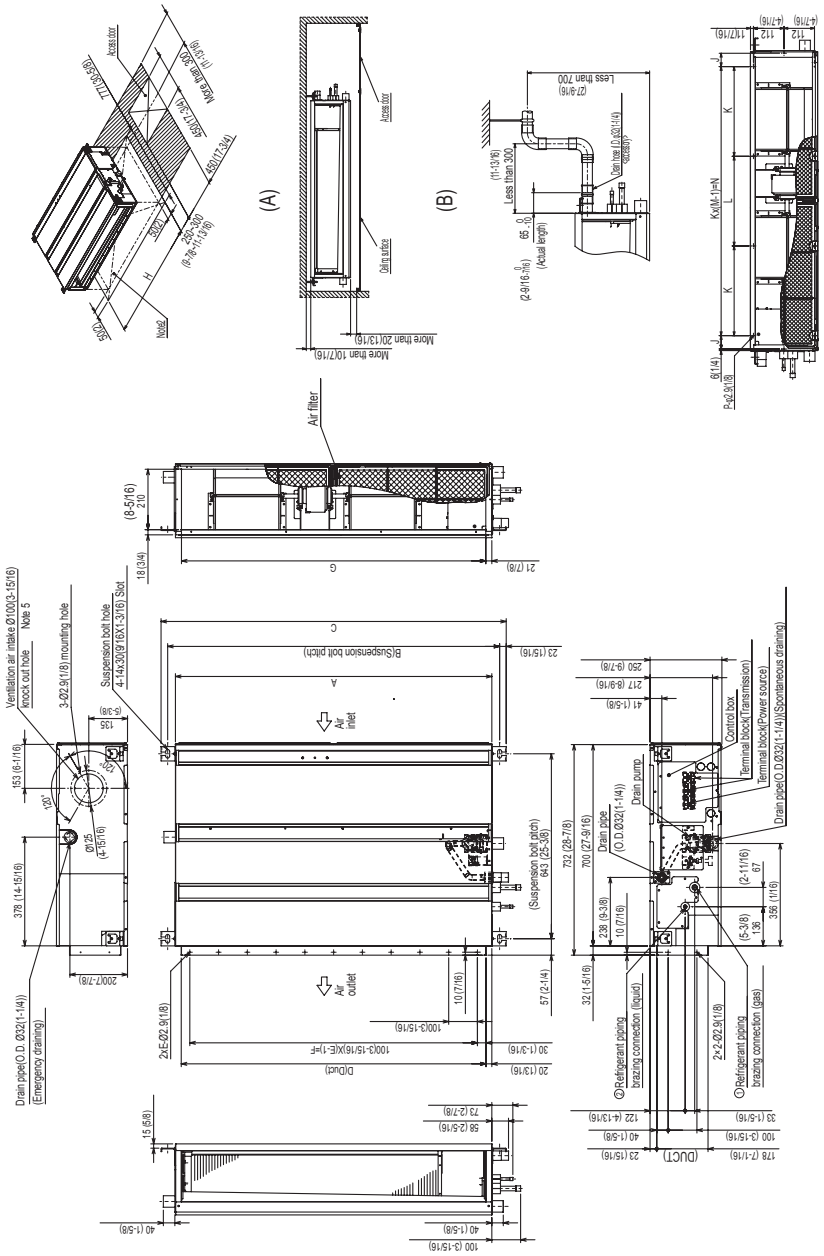
- External Heater Adapter……CN24RELAY-KIT-CM3
- Filter Box (Includes 2" MERV 13 filter)……FBM2-2

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling: Indoor 80°F (27°C) DB / 67°F (19°C) WB, Outdoor 95°F (35°C) DB
Heating: Indoor 70°F (21°C) DB, Outdoor 47°F (8°C) DB / 43°F (6°C) WB

Note: Ventilation air: Providing sufficient ventilation air is an important part of every building design. ASHRAE Standard 62 provides the minimum ventilation air requirement. Also, check local codes.

R410A

Model: PEFY-P15NMAU-E – DIMENSIONS



Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	⊙Gas pipe	⊙Liquid pipe
PEFY-P06,08,12NMAU-E	700 (27-9/16)	754 (29-11/16)	800 (31-1/2)	660 (26)	7	600 (23-5/8)	658 (25-15/16)	800 (31-1/2)	44 (1-3/4)	150 (5-15/16)	300 (11-13/16)			10	Ø12.7 (1/2)	Ø6.35 (1/4)
PEFY-P15,P18NMAU-E	900 (35-7/16)	954 (37-9/16)	1000 (39-3/8)	860 (33-7/8)	9	800 (31-1/2)	858 (33-13/16)	1000 (39-3/8)	54 (2-3/16)	260 (10-1/4)		4	780 (30-3/4)	10		
PEFY-P24,27,30NMAU-E	1100 (43-5/16)	1154 (45-7/16)	1200 (47-1/4)	1060 (41-3/4)	11	1000 (39-3/8)	1058 (41-11/16)	1200 (47-1/4)	49 (1-15/16)	330 (13)		4	990 (39)	10	Ø15.88 (5/8)	Ø9.52 (3/8)
PEFY-P36,48NMAU-E	1400 (55-1/8)	1454 (57-1/4)	1500 (59-1/16)	1360 (53-9/16)	14	1300 (51-3/16)	1358 (53-1/2)	1500 (59-1/16)	54 (2-3/16)	320 (12-5/8)		5	1280 (50-7/16)	12		
PEFY-P54NMAU-E	1600 (63)	1654 (65-1/8)	1700 (66-15/16)	1560 (61-7/16)	16	1500 (59-1/16)	1558 (61-3/8)	1700 (66-15/16)	54 (2-3/16)	370 (14-5/8)		5	1480 (58-5/16)	12		

(A) Space required for service and maintenance.

(B) Provide an access door for maintenance at the bottom.

Note
1. Use M10 suspension bolts. (not supplied)
2. Provide an access door for maintenance at the bottom.
3. The dimensions in the table are those of the PEFY-P24, 27, 30, 36, 48, 54NMAU-E models, which have 2 fans. The PEFY-P06, 08, 12, 15, 18NMAU-E model have 1 fan.
4. To connect an intake duct, uninstall the air filter on the unit, and install a field supplied air filter on the intake duct on the intake side.
5. If using a ventilation air connection, air temperature must be at neutral conditions.

Certificate Number FM33568

Mitsubishi Electric Air Conditioning & Refrigeration Systems Works acquired ISO 9001 certification under Series 9000 of the International Standard Organization (ISO) based on a review of quality warranties for the production of refrigeration and air conditioning equipment.

ISO Authorization System
The ISO 9000 series is a plant authorization system relating to quality warranties as stipulated by the ISO. ISO 9001 certifies quality warranties based on the "design, development, production, installation and auxiliary services" for products built at an authorized plant.

Mitsubishi Electric Air Conditioning & Refrigeration Systems Works acquired environmental management system standard ISO 14001 certification.

The ISO 14000 series is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

Certificate Number EC97J1227

HVAC Advanced Products Division
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Toll Free: 800-433-4822 (#4)
www.mehvac.com

Specifications are subject to change without notice.

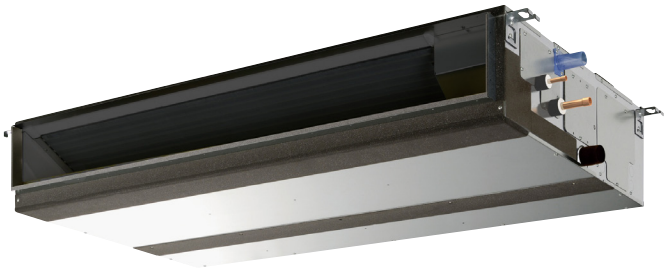
CITY MULTI® Model: PEFY-P18NMAU-E

MITSUBISHI ELECTRIC

Job Name: Location:

Drawing Reference: Schedule No.

System No.: Date:



GENERAL FEATURES

- R410A refrigerant
- 9-7/8" (250mm) high for low ceiling heights
- Eleven sizes from 6,000 to 54,000 Btu/h
- Ducted fan coil supporting multiple configurations for flexible installation
- Five static pressure settings from 0.14"WG up to 0.60"WG
- Choice of fan speed settings
- Built-in condensate lift; lifts to 27-9/16" (700mm)
- Auto fan mode
- Quiet operation from 26 to 45 dB(A)

SPECIFICATIONS

Capacity*
Cooling……18,000 Btu/h
Heating……20,000 Btu/h

Power
Power Source……208 / 230V, 1-phase, 60Hz
Power Consumption
Cooling……0.11 kW
Heating……0.09 kW
Current
Cooling……0.77 A
Heating……0.66 A
Minimum Circuit Ampacity (MCA)……1.56 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Galvanized-steel Sheet

External Dimensions
Inches……9-7/8 H x 35-7/16 W x 28-7/8 D
mm……250 H x 900 W x 732 D

Net Weight
Unit……58 lbs. / 26 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan
Type x Quantity……Sirocco Fan x 1
Airflow Rate (Low-Mid-High)……424 - 512 - 600 CFM
External Static Pressure…..0.14 - 0.20 - 0.28 - 0.40 - 0.60"WG
(External static pressure is factory set to 0.20"WG)
Motor
Type……DC Brushless Motor
Output……0.085 kW

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions
Liquid (High Pressure)……1/4" / 6.35 mm (Brazed)
Gas (Low Pressure)……1/2" / 12.7 mm (Brazed)

Drainpipe Dimension……O.D. 1-1/4" / 32 mm

Sound Pressure Levels
Low-Mid-High……28 - 32 - 35 dB(A)

OPTIONS

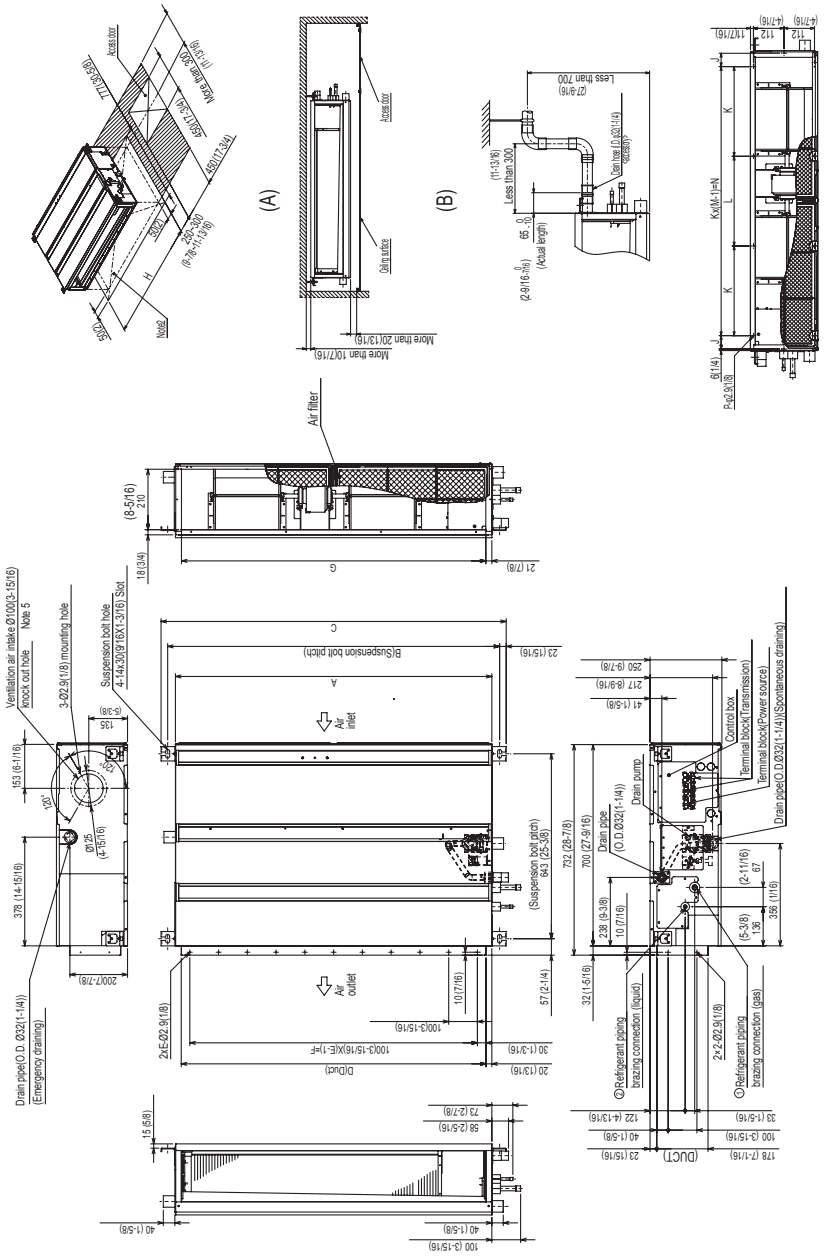
- ◻ External Heater Adapter……CN24RELAY-KIT-CM3
- ◻ Filter Box (Includes 2" MERV 13 filter)……FBM2-2

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling: Indoor 80°F (27°C) DB / 67°F (19°C) WB, Outdoor 95°F (35°C) DB
Heating: Indoor 70°F (21°C) DB, Outdoor 47°F (8°C) DB / 43°F (6°C) WB

Note: Ventilation air: Providing sufficient ventilation air is an important part of every building design. ASHRAE Standard 62 provides the minimum ventilation air requirement. Also, check local codes.

R410A

Model: PEFY-P18NMAU-E – DIMENSIONS



Unit:mm(in.)

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Gas pipe	Liquid pipe
PEFY-P06,08,12NMAU-E	700 (27-9/16)	754 (29-11/16)	800 (31-1/2)	660 (26)	7	600 (23-5/8)	658 (25-15/16)	800 (31-1/2)	44 (1-3/4)	150 (5-15/16)	300 (11-13/16)			10	Ø12.7 (1/2)	Ø6.35 (1/4)
PEFY-P15,P18NMAU-E	900 (35-7/16)	954 (37-9/16)	1000 (39-3/8)	860 (33-7/8)	9	800 (31-1/2)	858 (33-13/16)	1000 (39-3/8)	54 (2-3/16)	260 (10-1/4)		4	780 (30-3/4)	10		
PEFY-P24,27,30NMAU-E	1100 (43-5/16)	1154 (45-7/16)	1200 (47-1/4)	1060 (41-3/4)	11	1000 (39-3/8)	1058 (41-11/16)	1200 (47-1/4)	49 (1-15/16)	330 (13)		4	990 (39)	10	Ø15.88 (5/8)	Ø9.52 (3/8)
PEFY-P36,48NMAU-E	1400 (55-1/8)	1454 (57-1/4)	1500 (59-1/16)	1360 (53-9/16)	14	1300 (51-3/16)	1358 (53-1/2)	1500 (59-1/16)	54 (2-3/16)	320 (12-5/8)		5	1280 (50-7/16)	12		
PEFY-P54NMAU-E	1600 (63)	1654 (65-1/8)	1700 (66-15/16)	1560 (61-7/16)	16	1500 (59-1/16)	1558 (61-3/8)	1700 (66-15/16)	54 (2-3/16)	370 (14-5/8)		5	1480 (58-5/16)	12		

(A) Space required for service and maintenance.

(B) Provide an access door for maintenance at the bottom.

Note
1. Use M10 suspension bolts. (not supplied)
2. Provide an access door for maintenance at the bottom.
3. The dimensions in the table are those of the PEFY-P24, 27, 30, 36, 48, 54NMAU-E models, which have 2 fans. The PEFY-P06, 08, 12, 15, 18NMAU-E model have 1 fan.
4. To connect an intake duct, uninstall the air filter on the unit, and install a field supplied air filter on the intake duct on the intake side.
5. If using a ventilation air connection, air temperature must be at neutral conditions.

Certificate Number FM33568

Mitsubishi Electric Air Conditioning & Refrigeration Systems Works acquired ISO 9001 certification under Series 9000 of the International Standard Organization (ISO) based on a review of quality warranties for the production of refrigeration and air conditioning equipment.

ISO Authorization System
The ISO 9000 series is a plant authorization system relating to quality warranties as stipulated by the ISO. ISO 9001 certifies quality warranties based on the "design, development, production, installation and auxiliary services" for products built at an authorized plant.

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Certificate Number EC97J1227

MITSUBISHI ELECTRIC

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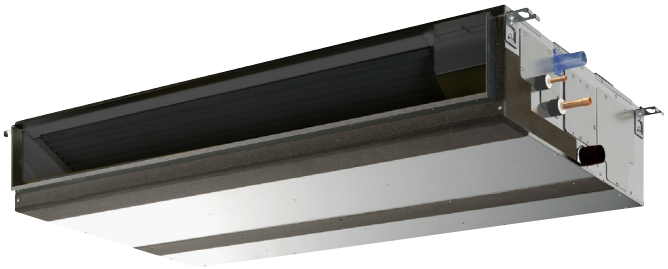
Toll Free: 800-433-4822 (#4)
www.mehvac.com

Specifications are subject to change without notice.

Model: PEFY-P18NMAU-E3

Job Name:	
System Reference:	Date:



GENERAL FEATURES

- Dual set point functionality
- Multiple fan speed settings
- Auto fan mode
- 9-7/8" (250mm) high for low ceiling heights
- Built-in condensate lift; lifts to 27-9/16" (700 mm)
- Ducted fan coil supporting multiple configurations for flexible installation

OPTIONS

- ☐ External Heater Adapter……CN24RELAY-KIT-CM3
- ☐ Filter Box (Includes 2" MERV 13 filter)……FBM2-2

SPECIFICATIONS

Capacity*

Cooling……18,000 Btu/h
Heating……20,000 Btu/h

Power

Power Source……208 / 230V, 1-phase, 60Hz

Power Consumption

Cooling……0.11 kW
Heating……0.09 kW

Current

Cooling……0.77 / 0.73 A
Heating……0.66 / 0.62 A

Minimum Circuit Ampacity (MCA)……1.56 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Galvanized-steel Sheet

External Dimensions

Inches……9-7/8 H x 35-7/16 W x 28-7/8 D
mm……250 H x 900 W x 732 D

Net Weight……58 lbs. / 26 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan

Type x Quantity……Sirocco Fan x 1
Airflow Rate (Low-Mid-High)…… 424 - 512 - 600 CFM
External Static Pressure…..0.14 - 0.20 - 0.28 - 0.40 - 0.60"WG
(External static pressure is factory set to 0.20"WG)
Motor Type……DC Motor

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions

Liquid (High Pressure)……1/4" / 6.35 mm (Brazed)
Gas (Low Pressure)……1/2" / 12.7 mm (Brazed)

Drainpipe Dimension……O.D. 1-1/4" / 32 mm

Sound Pressure Levels

Low-Mid-High……28 - 32 - 35 dB(A)

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB,
Cooling | Indoor: Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB,
Heating | Outdoor 47° F (8° C) DB / 43° F (6° C) WB

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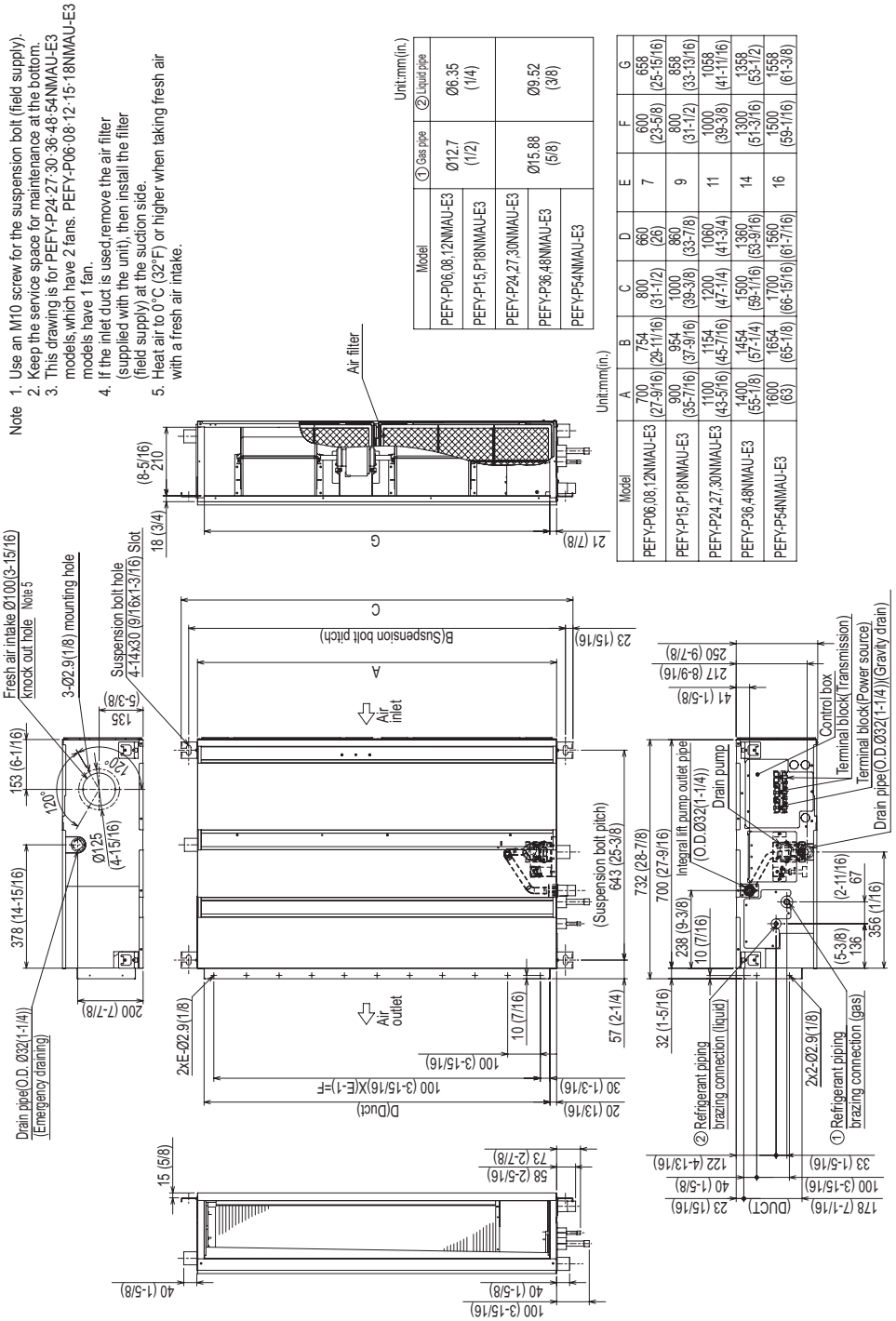
Model: PEFY-P18NMAU-E3 – DIMENSIONS

Unit: mm (in)



Note
1. Use an M10 screw for the suspension bolt (field supply).
2. Keep the service space for maintenance at the bottom.
3. This drawing is for PEFY-P24·27·30·36·48·54NMAU-E3 models, which have 2 fans. PEFY-P06·08·12·15·18NMAU-E3 models have 1 fan.
4. If the inlet duct is used, remove the air filter (supplied with the unit), then install the filter (field supply) at the suction side.
5. Heat air to 0°C (32°F) or higher when taking fresh air with a fresh air intake.

Unit:mm(in.)

Model	① Gas pipe	② Liquid pipe
PEFY-P06,08,12NMAU-E3	Ø12.7 (1/2)	Ø6.35 (1/4)
PEFY-P15,P18NMAU-E3		
PEFY-P24,27,30NMAU-E3	Ø15.88 (5/8)	Ø9.52 (3/8)
PEFY-P36,48NMAU-E3		
PEFY-P54NMAU-E3		

Unit:mm(in.)

Model	A	B	C	D	E	F	G
PEFY-P06,08,12NMAU-E3	700 (27-9/16)	754 (29-11/16)	800 (31-1/2)	660 (26)	7	600 (23-5/8)	658 (25-15/16)
PEFY-P15,P18NMAU-E3	900 (35-7/16)	954 (37-9/16)	1000 (39-3/8)	860 (33-7/8)	9	800 (31-1/2)	858 (33-13/16)
PEFY-P24,27,30NMAU-E3	1100 (43-5/16)	1154 (45-7/16)	1200 (47-1/4)	1060 (41-3/4)	11	1000 (39-3/8)	1058 (41-11/16)
PEFY-P36,48NMAU-E3	1400 (55-1/8)	1454 (57-1/4)	1500 (59-1/16)	1360 (53-9/16)	14	1300 (51-3/16)	1358 (53-1/2)
PEFY-P54NMAU-E3	1600 (63)	1654 (65-1/8)	1700 (66-15/16)	1560 (61-7/16)	16	1500 (59-1/16)	1558 (61-3/8)

MITSUBISHI ELECTRIC

COOLING & HEATING

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Intertek

Specifications are subject to change without notice.

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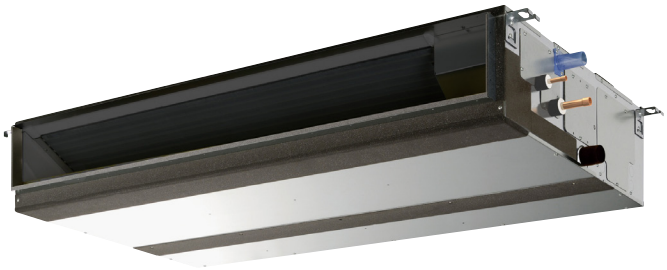
CITY MULTI® Model: PEFY-P24NMAU-E

MITSUBISHI ELECTRIC

Job Name: Location:

Drawing Reference: Schedule No.

System No.: Date:



GENERAL FEATURES

- R410A refrigerant
- 9-7/8" (250mm) high for low ceiling heights
- Eleven sizes from 6,000 to 54,000 Btu/h
- Ducted fan coil supporting multiple configurations for flexible installation
- Five static pressure settings from 0.14"WG up to 0.60"WG
- Choice of fan speed settings
- Built-in condensate lift; lifts to 27-9/16" (700mm)
- Auto fan mode
- Quiet operation from 26 to 45 dB(A)

SPECIFICATIONS

Capacity*
Cooling……24,000 Btu/h
Heating……27,000 Btu/h

Power
Power Source……208 / 230V, 1-phase, 60Hz
Power Consumption
Cooling……0.12 kW
Heating……0.10 kW
Current
Cooling……1.04 A
Heating……0.93 A
Minimum Circuit Ampacity (MCA)……2.25 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Galvanized-steel Sheet

External Dimensions
Inches……9-7/8 H x 43-5/16 W x 28-7/8 D
mm……250 H x 1,100 W x 732 D

Net Weight
Unit……71 lbs. / 32 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan
Type x Quantity……Sirocco Fan x 2
Airflow Rate (Low-Mid-High)……477 - 565 - 671 CFM
External Static Pressure…..0.14 - 0.20 - 0.28 - 0.40 - 0.60"WG
(External static pressure is factory set to 0.20"WG)
Motor
Type……DC Brushless Motor
Output……0.121 kW

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions
Liquid (High Pressure)……3/8" / 9.52 mm (Brazed)
Gas (Low Pressure)……5/8" / 15.88 mm (Brazed)

Drainpipe Dimension……O.D. 1-1/4" / 32 mm

Sound Pressure Levels
Low-Mid-High……29 - 32 - 36 dB(A)

OPTIONS

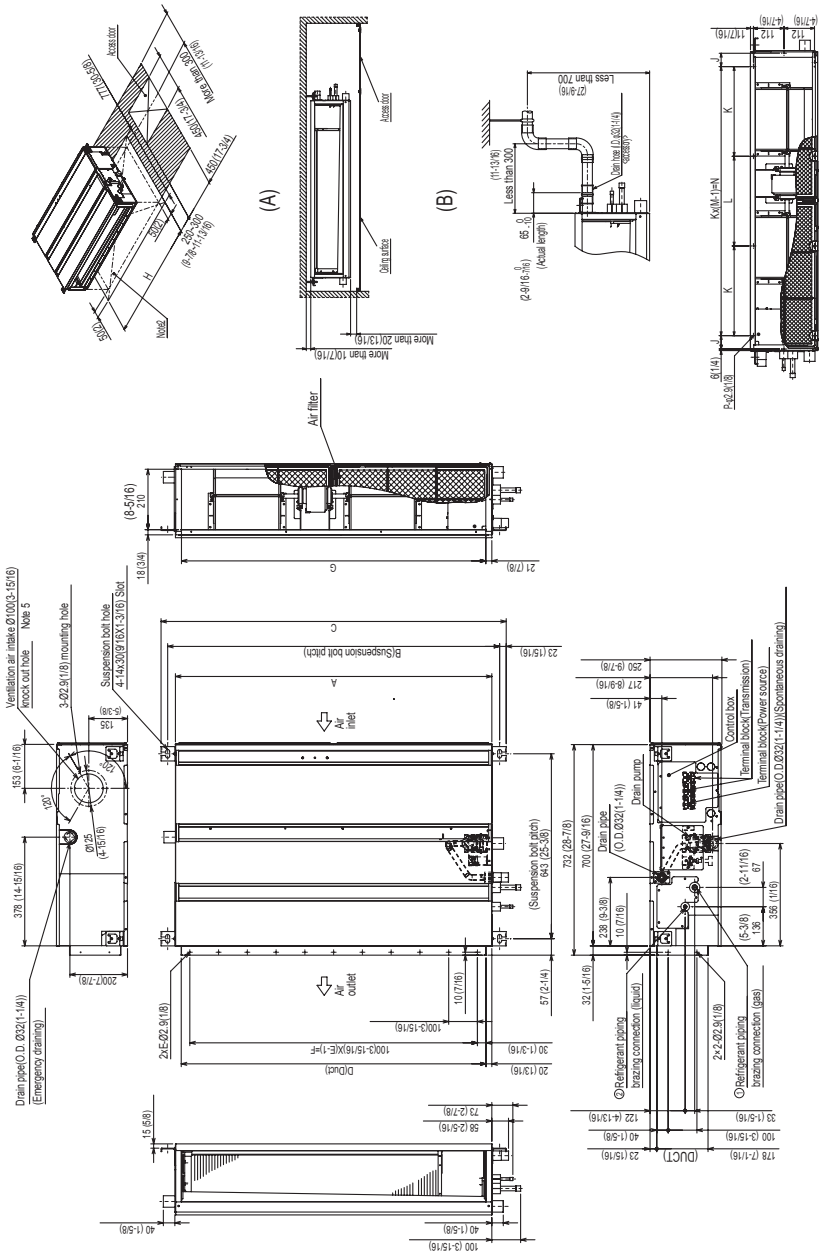
- External Heater Adapter……CN24RELAY-KIT-CM3
- Filter Box (Includes 2" MERV 13 filter)……FBM2-3

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling: Indoor 80°F (27°C) DB / 67°F (19°C) WB, Outdoor 95°F (35°C) DB
Heating: Indoor 70°F (21°C) DB, Outdoor 47°F (8°C) DB / 43°F (6°C) WB

Note: Ventilation air: Providing sufficient ventilation air is an important part of every building design. ASHRAE Standard 62 provides the minimum ventilation air requirement. Also, check local codes.

R410A

Model: PEFY-P24NMAU-E – DIMENSIONS



Unit:mm(in.)

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Gas pipe	Liquid pipe
PEFY-P06,08,12NMAU-E	700 (27-9/16)	754 (29-11/16)	800 (31-1/2)	660 (26)	7	600 (23-5/8)	658 (25-15/16)	800 (31-1/2)	44 (1-3/4)	150 (5-15/16)	300 (11-13/16)			10	Ø12.7 (1/2)	Ø6.35 (1/4)
PEFY-P15,P18NMAU-E	900 (35-7/16)	954 (37-9/16)	1000 (39-3/8)	860 (33-7/8)	9	800 (31-1/2)	858 (33-13/16)	1000 (39-3/8)	54 (2-3/16)	260 (10-1/4)		4	780 (30-3/4)	10		
PEFY-P24,27,30NMAU-E	1100 (43-5/16)	1154 (45-7/16)	1200 (47-1/4)	1060 (41-3/4)	11	1000 (39-3/8)	1058 (41-11/16)	1200 (47-1/4)	49 (1-15/16)	330 (13)		4	990 (39)	10	Ø15.88 (5/8)	Ø9.52 (3/8)
PEFY-P36,48NMAU-E	1400 (55-1/8)	1454 (57-1/4)	1500 (59-1/16)	1360 (53-9/16)	14	1300 (51-3/16)	1358 (53-1/2)	1500 (59-1/16)	54 (2-3/16)	320 (12-5/8)		5	1280 (50-7/16)	12		
PEFY-P54NMAU-E	1600 (63)	1654 (65-1/8)	1700 (66-15/16)	1560 (61-7/16)	16	1500 (59-1/16)	1558 (61-3/8)	1700 (66-15/16)	54 (2-3/16)	370 (14-5/8)		5	1480 (58-5/16)	12		

(A) Space required for service and maintenance.

(B) Provide an access door for maintenance at the bottom.

Note
1. Use M10 suspension bolts. (not supplied)
2. Provide an access door for maintenance at the bottom.
3. The dimensions in the table are those of the PEFY-P24, 27, 30, 36, 48, 54NMAU-E models, which have 2 fans. The PEFY-P06, 08, 12, 15, 18NMAU-E model have 1 fan.
4. To connect an intake duct, uninstall the air filter on the unit, and install a field supplied air filter on the intake duct on the intake side.
5. If using a ventilation air connection, air temperature must be at neutral conditions.

Certificate Number FM33568

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Certificate Number EC97J1227

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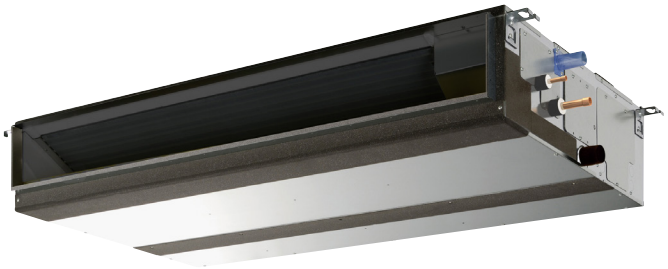
Toll Free: 800-433-4822 (#4)
www.mehvac.com

Specifications are subject to change without notice.

Model: PEFY-P54NMAU-E3

Job Name:	
System Reference:	Date:



GENERAL FEATURES

- Dual set point functionality
- Multiple fan speed settings
- Auto fan mode
- 9-7/8" (250mm) high for low ceiling heights
- Built-in condensate lift; lifts to 27-9/16" (700 mm)
- Ducted fan coil supporting multiple configurations for flexible installation

OPTIONS

- ☐ External Heater Adapter……CN24RELAY-KIT-CM3
- ☐ Filter Box (Includes 2" MERV 13 filter)……FBM2-5

SPECIFICATIONS

Capacity*

Cooling……54,000 Btu/h
Heating……60,000 Btu/h

Power

Power Source……208 / 230V, 1-phase, 60Hz

Power Consumption

Cooling……0.36 kW
Heating……0.34 kW

Current

Cooling……2.24 / 2.2 A
Heating……2.13 / 2.09 A

Minimum Circuit Ampacity (MCA)……3.31 A
Maximum Overcurrent Protection (MOCP) Fuse……15 A

External Finish……Galvanized-steel Sheet

External Dimensions

Inches……9-7/8 H x 63 W x 28-7/8 D
mm……250 H x 1,600 W x 732 D

Net Weight……86 lbs. / 39 kg

Coil Type……Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan

Type x Quantity……Sirocco Fan x 2
Airflow Rate (Low-Mid-High)……1,042 - 1,254 - 1,483 CFM
External Static Pressure……0.14 - 0.20 - 0.28 - 0.40 - 0.60"WG
Motor Type……DC Motor

Air Filter……Polypropylene Honeycomb

Refrigerant Piping Dimensions

Liquid (High Pressure)……3/8" / 9.52 mm (Brazed)
Gas (Low Pressure)……5/8" / 15.88 mm (Brazed)

Drainpipe Dimension……O.D. 1-1/4" / 32 mm

Sound Pressure Levels

Low-Mid-High……36 - 41 - 45 dB(A)

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 80° F (27° C) DB / 67° F (19° C) WB,
Cooling | Indoor: Outdoor 95° F (35° C) DB
Heating | Indoor: 70° F (21° C) DB,
Heating | Outdoor 47° F (8° C) DB / 43° F (6° C) WB

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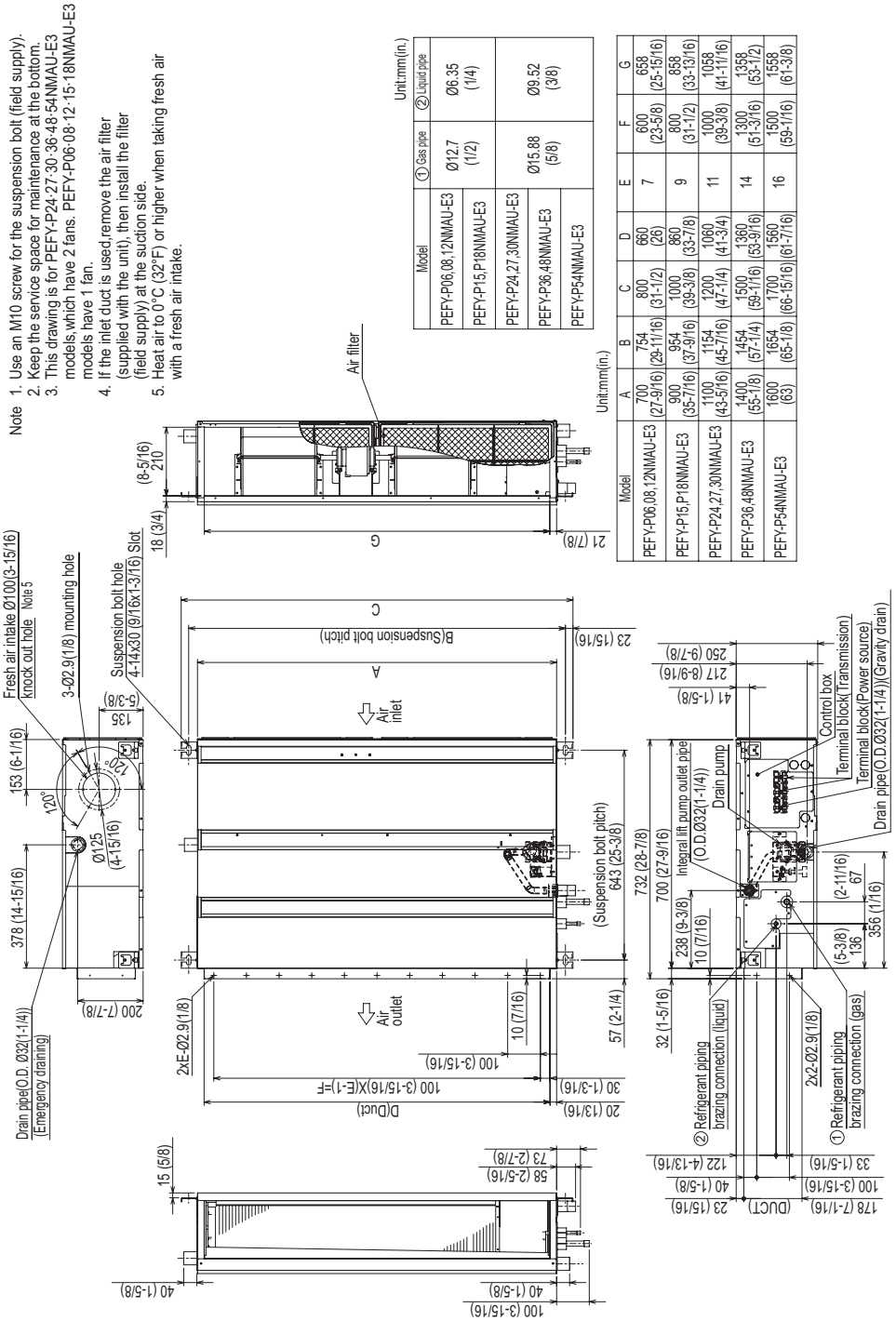
Model: PEFY-P54NMAU-E3 – DIMENSIONS

Unit: mm (in)



Note
1. Use an M10 screw for the suspension bolt (field supply).
2. Keep the service space for maintenance at the bottom.
3. This drawing is for PEFY-P24·27·30·36·48·54NMAU-E3 models, which have 2 fans. PEFY-P06·08·12·15·18NMAU-E3 models have 1 fan.
4. If the inlet duct is used, remove the air filter (supplied with the unit), then install the filter (field supply) at the suction side.
5. Heat air to 0°C (32°F) or higher when taking fresh air with a fresh air intake.

Unit:mm(in.)

Model	① Gas pipe	② Liquid pipe
PEFY-P06,08,12NMAU-E3	Ø12.7 (1/2)	Ø6.35 (1/4)
PEFY-P15,P18NMAU-E3		
PEFY-P24,27,30NMAU-E3	Ø15.88 (5/8)	Ø9.52 (3/8)
PEFY-P36,48NMAU-E3		
PEFY-P54NMAU-E3		

Unit:mm(in.)

Model	A	B	C	D	E	F	G
PEFY-P06,08,12NMAU-E3	700 (27-9/16)	754 (29-11/16)	800 (31-1/2)	660 (26)	7	600 (23-5/8)	658 (25-15/16)
PEFY-P15,P18NMAU-E3	900 (35-7/16)	954 (37-9/16)	1000 (39-3/8)	860 (33-7/8)	9	800 (31-1/2)	858 (33-13/16)
PEFY-P24,27,30NMAU-E3	1100 (43-5/16)	1154 (45-7/16)	1200 (47-1/4)	1060 (41-3/4)	11	1000 (39-3/8)	1058 (41-11/16)
PEFY-P36,48NMAU-E3	1400 (55-1/8)	1454 (57-1/4)	1500 (59-1/16)	1360 (53-9/16)	14	1300 (51-3/16)	1358 (53-1/2)
PEFY-P54NMAU-E3	1600 (63)	1654 (65-1/8)	1700 (66-15/16)	1560 (61-7/16)	16	1500 (59-1/16)	1558 (61-3/8)

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CITYMULTI®

Model: PFFY-P06NEMU-E

MITSUBISHI ELECTRIC

Job Name:	
System Reference:	Date:

GENERAL FEATURES:

- Dual set point functionality
- Compact floor-mount
- Two-speed settings
- Controls can be wall-mounted or unit-mounted in a hidden case

ACCESSORIES:

CN24 Relay Kit (CN24RELAY-KIT-CM3)

SPECIFICATIONS:

Capacity*		
Cooling	Btu/h	6,000
Heating	Btu/h	6,700

* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor : 80° F (27° C) DB / 67° F (19° C) WB
Cooling | Outdoor : 95° F (35° C) DB
Heating | Indoor : 70° F (21° C) DB
Heating | Outdoor : 47° F (8° C) DB / 43° F (6°C) WB

Electrical		
Electrical Power Requirements	208 / 230V, 1-phase, 60Hz	
Minimum Circuit Ampacity (MCA)	A	0.32 / 0.34 (60Hz)

External Dimensions	
Unit (H x W x D) In. (mm)	24-13/16 x 41-11/32 x 8-11/16 (630 x 1,050 x 220)

Net Weight		
Unit	Lbs.(kg)	67 (30)

External Finish	Acrylic painted
Coil Type	Cross fin (Aluminium fin and copper tube)

Fan		
Type x Quanity	Sirocco fan x 1	
Airflow rate (Low-High)	CFM	194 - 229
Motor Type	1-phase induction motor	

Air Filter	Standard filter

Refrigerant Piping Diameter		
Liquid (High Pressure)	In.(mm)	1/4 (6.35) Flare
Gas (Low Pressure)	In.(mm)	1/2 (12.70) Flare

Field Drain Pipe Size	In.(mm)	I.D. 1 (26)

Sound Level			
Low-High	dB(A)	208/230V	36 - 41

Notes:

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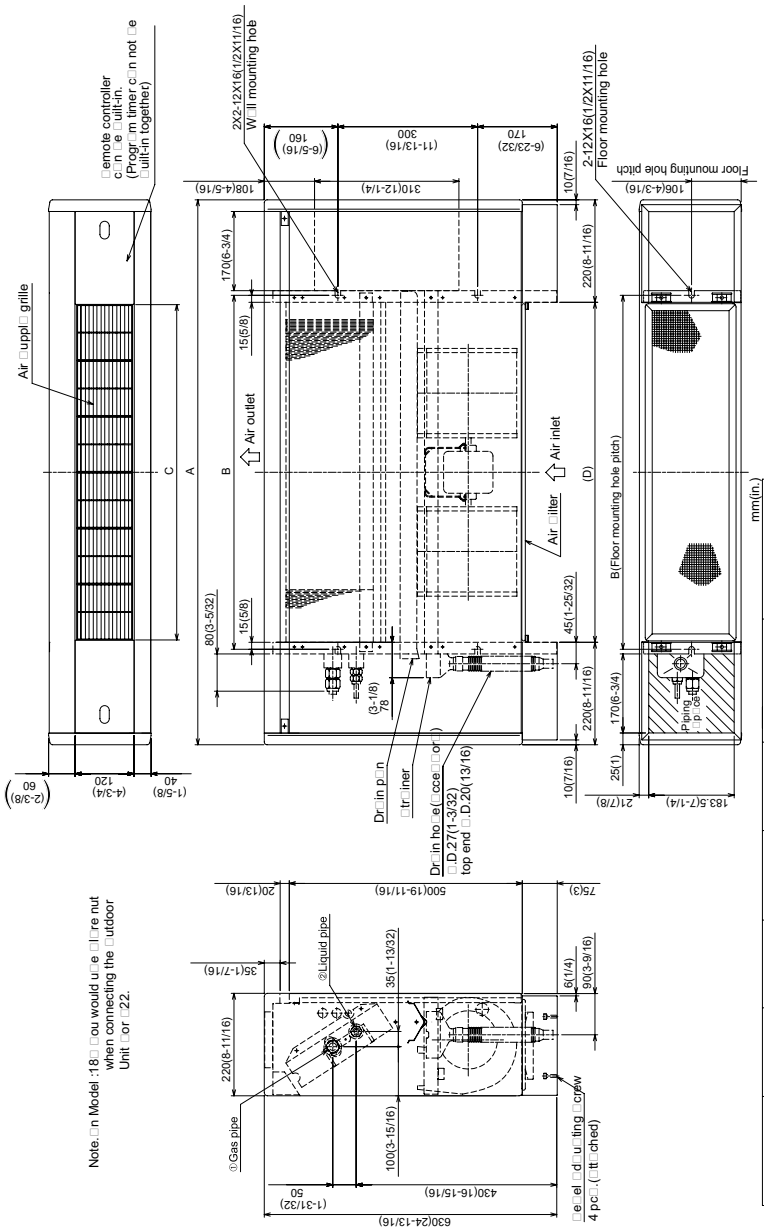
Model:PFFY-P06NEMU-E- DIMENSIONS

Drw. : IU-W660125
Unit : mm(in)



Model	A	B	C	D	① Gas pipe <flare>	② Liquid pipe <flare>
					mm(in.)	
PFFY-P06NEMU-E	1050(41-11/32)	640(25-7/32)	600(23-5/8)	610(24-1/16)	ø12.7(1/2)	ø6.35(1/4)
PFFY-P09NEMU-E	1050(41-11/32)	640(25-7/32)	600(23-5/8)	610(24-1/16)	ø12.7(1/2)	ø6.35(1/4)
PFFY-P12NEMU-E	1170(46-1/16)	760(29-15/16)	720(28-3/4)	730(28-3/4)	ø12.7(1/2)	ø6.35(1/4)
PFFY-P15NEMU-E	1170(46-1/16)	760(29-15/16)	720(28-3/8)	730(28-3/4)	ø12.7(1/2)	ø6.35(1/4)
PFFY-P18NEMU-E	1410(55-17/32)	1000(39-3/8)	960(37-13/16)	970(38-1/4)	ø12.7(1/2)	ø6.35(1/4)
PFFY-P24NEMU-E	1410(55-17/32)	1000(39-3/8)	960(37-13/16)	970(38-1/4)	ø15.88(5/8)	ø9.52(3/8)

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FORM# PFFY-P06NEMU-E-20160304

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CITY**MULTI**®

MODEL: PLFY-P05NFMU-E

MITSUBISHI ELECTRIC

Job Name:	
System Reference:	Date:

GENERAL FEATURES

- Square edge, sleek design
- 3D i-see Sensor™ available as an option
- Improved installation features[1]
- Occupancy detection[1]
- Energy saving features[1]
- Improved occupant comfort
- Four fan speed settings including auto-fan
- Individual vane settings
- 2' x 2' size matches size of many ceiling tiles
- Corner-pocket design for simplified installation
- Built-in condensate lift mechanism designed to provide up to 33" of lift
- Ventilation air intake supported

[1]Requires a PAR-33MAA-J controller

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SPECIFICATIONS: PLFY-P05NFMU-E

Model		PLFY-P05NFMU-E
Nominal Capacity[1]		
Cooling	Btu/h	5,000
Heating	Btu/h	5,600
Electrical		
Electrical Power Requirements		1-phase 208-230V 60Hz
Minimum Circuit Ampacity (MCA)	A	0.24
Recommended Fuse Size	A	15
External Dimensions (H x W x D)		
Unit	in. (mm)	8-3/16 x 22-7/16 x 22/7-16 (208 x 570 x 570)
Grill (SLP-18FAU)	in. (mm)	13/32 x 24-19/32 x 24-19/32 (10 x 625 x 625)
Net Weight		
Unit	lbs (kg)	28.9 (13.1)
Grill (SLP-18FAU)	lbs (kg)	5.3 (2.4)
External Finish		
Unit		Galvanized steel sheet
Grill (SLP-18FAU)		Munsell 1.0Y 9.2/0.2
Coil Type		Cross fin (Aluminum fin and copper tube)
Fan		
Type x Quantity		Turbo fan x 1
Airflow rate	CFM	230-265-280
Motor Type		DC motor
Motor Output	kW	0.05
Motor F.L.A.	A	0.19
Air Filter		PP honeycomb fabric (long life type)
Refrigerant Piping Diameter		
Liquid (High Pressure)	in. (mm)	1/4 (6.35) Flare
Gas (Low Pressure)	in. (mm)	1/2 (12.7) Flare
Field Drain Pipe Size	in. (mm)	O.D. 1-1/4 (32)
Sound Pressure Level (Low-Mid-High)	dB(A)	26-28-30

[1] Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling | Indoor: 81° F (27° C) DB / 66° F (19°C) WB; Outdoor 95° F (35° C) DB
Heating | Indoor: 68° F (20° C) DB; Outdoor 45° F (7° C) DB / 43° F (6° C) WB

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ACCESSORIES: PLFY- P05NFMU-E

Grille (required)	□ SLP-18FAU
Grille with 3D i-see Sensor™	□ SLP-18FAEU
Corner Panel with 3D i-see Sensor™	□ PAC-SF1ME-E
Signal Receiver Corner Panel	□ PAR-SF9FA-E
Wireless Remote Controller	□ PAR-FL32MA-E
Wireless Remote Controller	□ PAR-SL100A-E
Wireless Remote Receiver	□ PAR-FA32MA-E
Wired MA Controller	□ PAR-33MAA-J
Simple MA Controller	□ PAC-YT53CRAU
Smart ME Remote Controller	□ PAR-U01MEDU-K
Wired Remote Sensor	□ PAC-SE41TS-E
Thermostat Interface	□ PAC-US444CN-1
Wireless Interface	□ PAC-WHS01WF-E
Connector cable for remote display	□ PAC-SA88HA-EP
Connector for CN32 (remote on/off)	□ PAC-SE55RA-E
Remote Operation Adapter (with wire terminals for remote ON/OFF and operation status/ error)	□ PAC-SF40RM-E[1]
External Fan / Heater Control Relay Adapter	□ CN24RELAY-KIT-CM3
Drain Pan Level Sensor (Control for indoor unit shut off to prevent drain pan overflow)	□ DPLS2

[1] Unable to use with wireless remote controller

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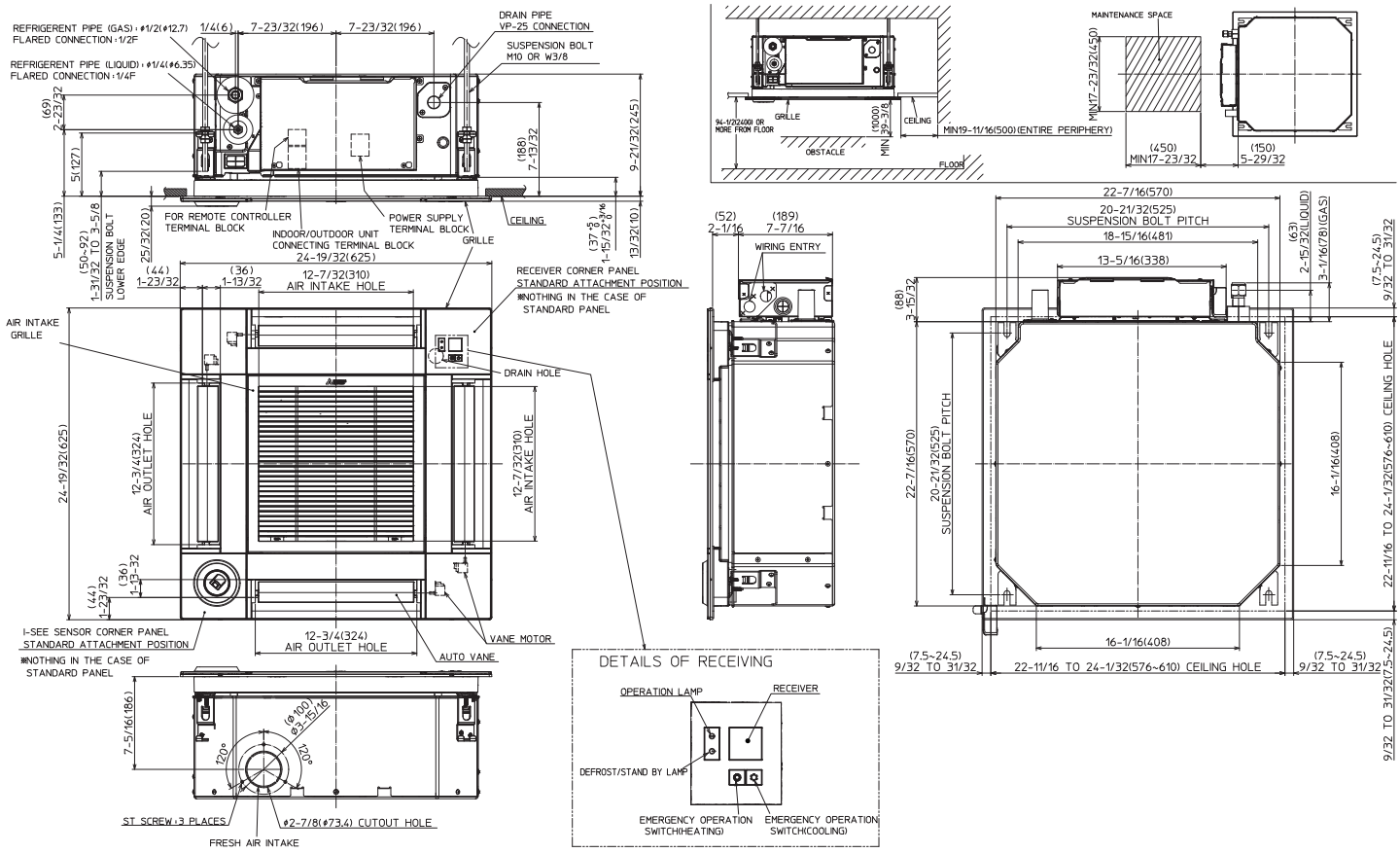
DIMENSIONS: PLFY-P05NFMU-E

Unit: inch(mm)



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FORM# PLFY-P05NFMU-E - 201806

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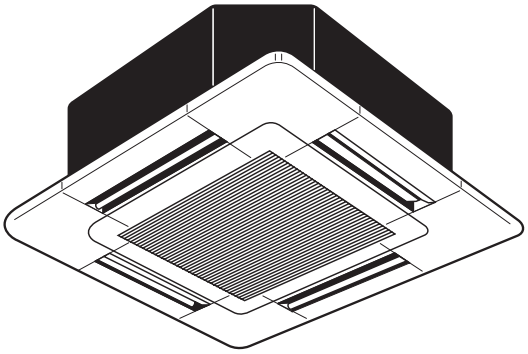
CITY MULTI® **Model: PLFY-P08NCMU-E** MITSUBISHI ELECTRIC

Job Name:

Drawing Reference: Schedule No.



GENERAL FEATURES

- R410A or R22 refrigerant-compatible
- Lightweight, low-profile compact design
- 2' x 2' size matches size of many ceiling tiles
- Four-speed fan settings and auto fan speed adjustment mode
- Corner-pocket design for simplified installation
- Built-in condensate lift mechanism; lifts to 19-11/16 in.
- Three-speed fan settings
- Outside air capability
- Quiet operation: 29-40 dB(A)

SPECIFICATIONS

Capacity*

Cooling…….....8,000 Btu/h
Heating…….....9,000 Btu/h

Power

Power Source…….....208 / 230V, 1-phase, 60Hz
Power Consumption
Cooling……0.05 kW
Heating……0.05 kW
Current
Cooling…….....0.23 A
Heating…….....0.23 A
Minimum Circuit Ampacity (MCA)……...0.29 A
Maximum Overcurrent Protection (MOCP) Fuse.….....15 A

External Finish…Grille (White; Munsell No. 6.4Y 8.9 / 0.4)

External Dimensions

Inches……..8-3/16 h x 22-7/16 w x 22-7/16 d
mm…….....208 h x 570 w x 570 d

Grille (SLP-15AAUW):
Inches…….....13/16 h x 25-5/8 w x 25-5/8 d
mm…….....20 h x 650 w x 650 d

Net Weight

Unit…….....34 lbs. / 15.5 kg
Grille…….....7 lbs. / 3 kg

Coil Type…….....Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan

Type x Quantity…….....Turbo Fan x 1
Airflow Rate
(Low - Med - High)……...280 - 320 - 350 cfm
Motor
Type……Single-phase Induction
Output…….....0.015 kW

Air Filter…….....……..Polypropylene Honeycomb

Refrigerant Piping Dimensions

R410A or R22
Liquid (High Pressure)……..1/4" / 6.35 mm Flare
Gas (Low Pressure)……..1/2" / 12.7 mm Flare

Drainpipe Dimension……...O.D. 1-1/4" / 32 mm

Sound Level

(Low - Med - High)……...……...29 - 32 - 38 dB(A)

Required Accessory**

□ Grille……..……...SLP-15AAUW

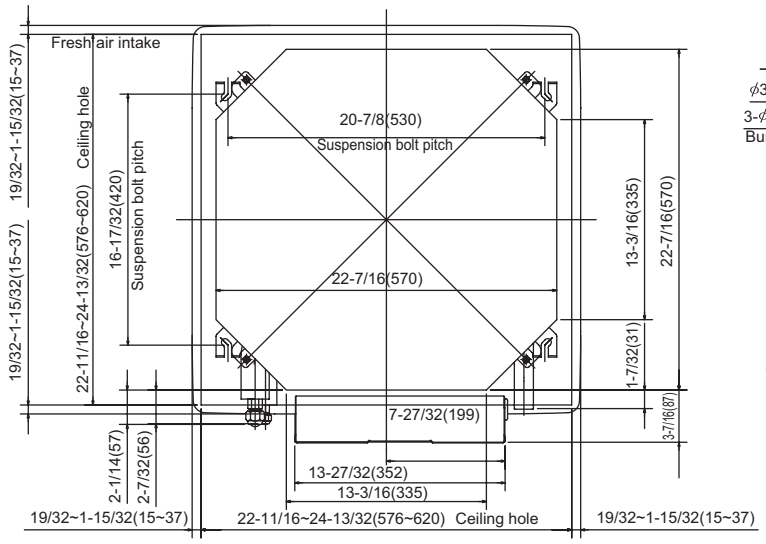
* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling: Indoor 80°F (27°C) DB / 67°F (19°C) WB, Outdoor 95°F (35°C) DB
Heating: Indoor 70°F (21°C) DB, Outdoor 47°F (8°C) DB / 43°F (6°C) WB

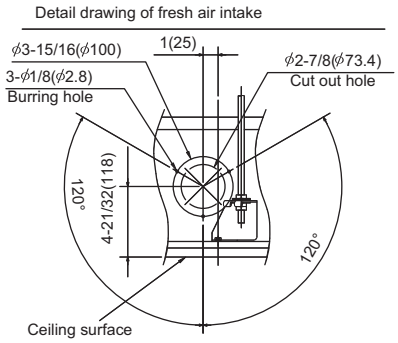
** PLFY-P-NCMU-E should be used with the SLP-15AAUW.

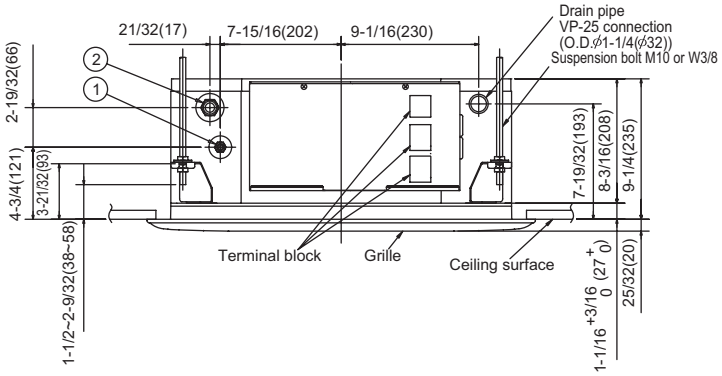
Note: Ventilation air: Providing sufficient ventilation air is an important part of every building design. ASHRAE Standard 62 provides the minimum ventilation air requirement. Also, check local codes.

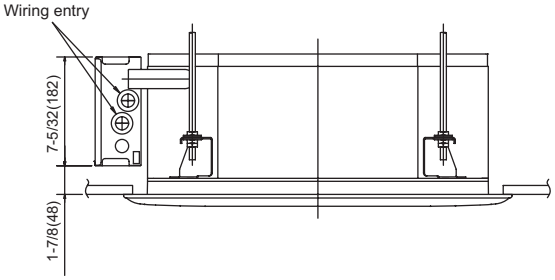
Notes:

Model: PLFY-P08NCMU-E – DIMENSIONS





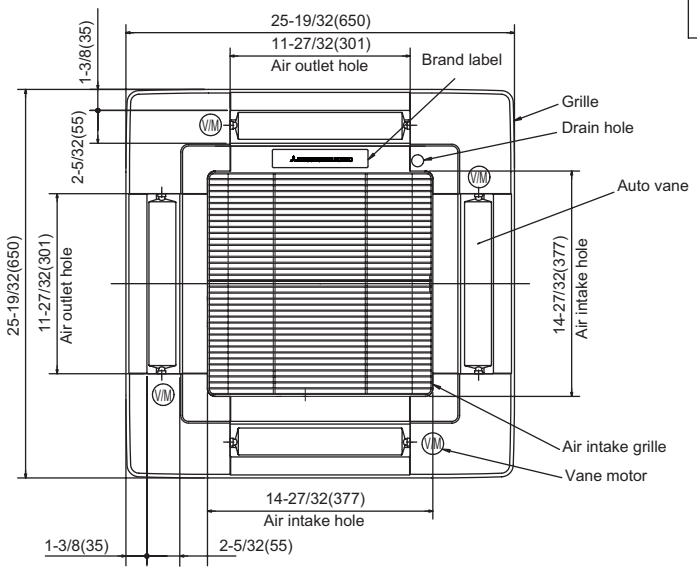




Unit : in.(mm)

Models	①	②
PLFY-P08NCMU-E.TH PLFY-P12NCMU-E.TH PLFY-P15NCMU-E.TH	Refrigerant pipe (1/4 (6.35) dia.) flared connection 1/4F	Refrigerant pipe (1/2 (12.7) dia.) flared connection 1/2F

Suspension bolt lower edge



Certificate Number FM33568

Mitsubishi Electric Air Conditioning & Refrigeration Systems Works acquired ISO 9001 certification under Series 9000 of the International Standard Organization (ISO) based on a review of quality warranties for the production of refrigeration and air conditioning equipment.

ISO Authorization System
The ISO 9000 series is a plant authorization system relating to quality warranties as stipulated by the ISO. ISO 9001 certifies quality warranties based on the "design, development, production, installation and auxiliary services" for products built at an authorized plant.

Mitsubishi Electric Air Conditioning & Refrigeration Systems Works acquired environmental management system standard ISO 14001 certification.

The ISO 14000 series is a set of standards applying to environmental protection set by the International Standard Organization (ISO).

Certificate Number EC97J1227

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CITY MULTI® Model: PLFY-P12NCMU-E

MITSUBISHI ELECTRIC

Job Name: Location:

Drawing Reference: Schedule No.

System No.: Date:

GENERAL FEATURES

- R410A or R22 refrigerant-compatible
- Lightweight, low-profile compact design
- 2' x 2' size matches size of many ceiling tiles
- Four-speed fan settings and auto fan speed adjustment mode
- Corner-pocket design for simplified installation
- Built-in condensate lift mechanism; lifts to 19-11/16 in.
- Three-speed fan settings
- Outside air capability
- Quiet operation: 29-40 dB(A)

SPECIFICATIONS

Capacity*

Cooling…….....12,000 Btu/h
Heating…….....13,500 Btu/h

Power

Power Source…….....208 / 230V, 1-phase, 60Hz
Power Consumption
Cooling……0.06 kW
Heating……0.06 kW
Current
Cooling…….....0.28 A
Heating…….....0.28 A
Minimum Circuit Ampacity (MCA)……...0.35 A
Maximum Overcurrent Protection (MOCP) Fuse.….....15 A

External Finish…Grille (White; Munsell No. 6.4Y 8.9 / 0.4)

External Dimensions

Inches……. 9-1/4 H x 22-7/16 W x 22-7/16 D
mm……...235 H x 570 W x 570 D

Grille

Inches…….....13/16 H x 25-5/8 W x 25-5/8 D
mm…….....20 H x 650 W x 650 D

*** Service Access Note:** If the PLFY-NCMU-E indoor unit is to be installed in a non-accessible location, such as a gypsum ceiling, an access panel meeting the minimum size requirements shown on the dimension page shall be required for service and maintenance.

Net Weight

Unit…….....37 lbs. / 17 kg
Grille…….....7 lbs. / 3 kg

Coil Type…….....Cross Fin
(Aluminum Plate Fin and Copper Tube)

Fan

Type x Quantity…….....Turbo Fan x 1
Airflow Rate
(Low - Med - High)……...320 - 350 - 390 cfm
Motor
Type……Single-phase Induction
Output…….....0.020 kW

Air Filter…….....……..Polypropylene Honeycomb

Refrigerant Piping Dimensions

R410A or R22
Liquid (High Pressure)……..1/4" / 6.35 mm Flare
Gas (Low Pressure)……..1/2" / 12.7 mm Flare

Drainpipe Dimension……...O.D. 1-1/4" / 32 mm

Sound Pressure Level

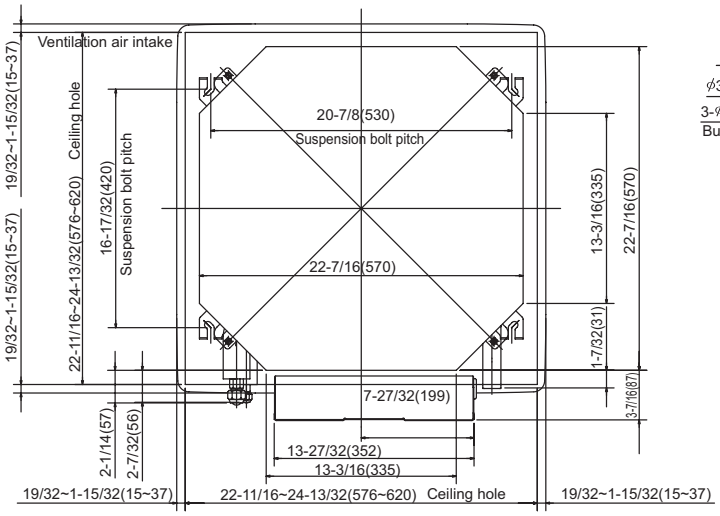
(Low - Med - High)……...……...30 - 34 - 39 dB(A)

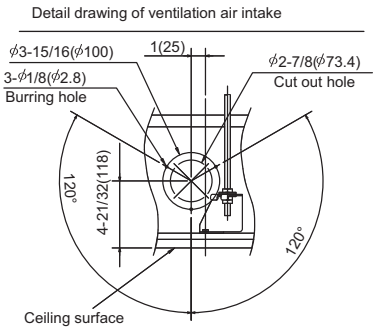
* Cooling / Heating capacity indicated at the maximum value at operation under the following conditions:
Cooling: Indoor 80°F (27°C) DB / 67°F (19°C) WB, Outdoor 95°F (35°C) DB
Heating: Indoor 70°F (21°C) DB, Outdoor 47°F (8°C) DB / 43°F (6°C) WB

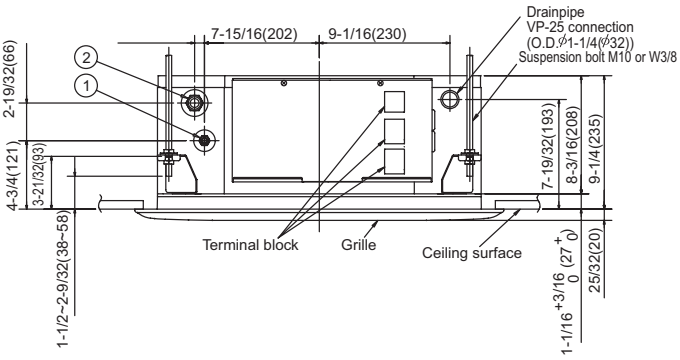
** PLFY-P-NCMU-E should be used with the SLP-15AAUW.

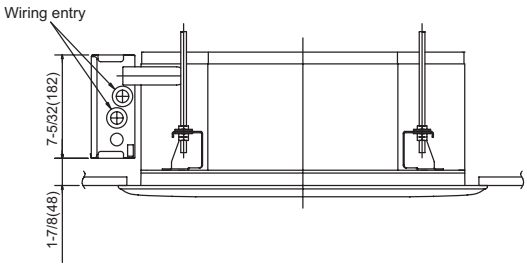
Note: Ventilation air: Providing sufficient ventilation air is an important part of every building design. ASHRAE Standard 62 provides the minimum ventilation air requirement. Also, check local codes.

Model: PLFY-P12NCMU-E – DIMENSIONS



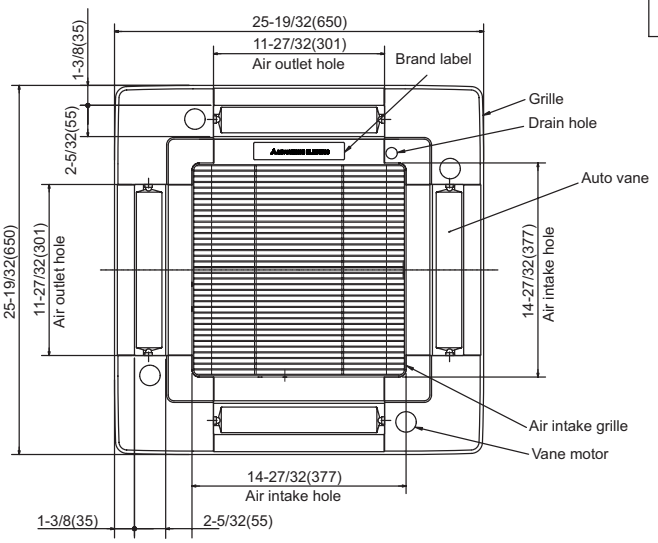


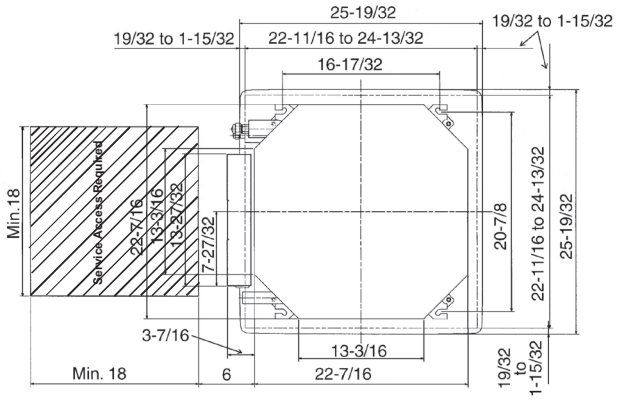




Unit : in.(mm)

Models	①	②
PLFY-P08NCMU-E PLFY-P12NCMU-E PLFY-P15NCMU-E	Refrigerant pipe (1/4 (6.35) dia.) flared connection 1/4F	Refrigerant pipe (1/2 (12.7) dia.) flared connection 1/2F





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Certificate Number EC97J1227

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CITYMULTI®

Outdoor Unit: 28-TON PURY-EP336TSNU-A (-BS)

(Consists of Two PURY-EP168TNU-A (-BS) and One CMY-R300NCBK Twinning Kit)

MITSUBISHI ELECTRIC

Job Name:

System Reference: Date:

OUTDOOR VRF HEAT PUMP WITH HEAT RECOVERY SYSTEM

UNIT OPTION

☐ Standard Model.....PURY-EP336TSNU-A
☐ Seacoast (BS) Model.....PURY-EP336TSNU-A-BS

ACCESSORIES

☐ Twinning Kit (required).....CMY-R300NCBK
☐ Joint Kit.....for details see Pipe Accessories Submittal
☐ BC Controller (required).....for details see BC Controller Submittals
☐ Low Ambient Kit.....for details see Low Ambient Kit Submittal
☐ Snow/Hail Guards Kit.....for details see Snow/Hail Guards Kit Submittal
☐ Panel Heater Kit.....for details see Panel Heater Kit Submittal

Specifications		System	Module 1	Module 2
Unit Type		PURY-EP336TSNU-A (-BS)	PURY-EP168TNU-A (-BS)	PURY-EP168TNU-A (-BS)
Nominal Cooling Capacity	Btu/h	336,000	168,000	168,000
Nominal Heating Capacity	Btu/h	378,000	188,000	188,000
Guaranteed Operating Range *1	Cooling (Outdoor) *2	Refer to Module Data	23~126°F (-5~52°C)	
	Heating (Outdoor) *3		-13~60°F (-25~15.5°C)	
Extended Operating Range *4	Heating (Outdoor)		-25~60°F (-31.5~15.5°C)	
External Dimensions (H x W x D)	In. (mm)	Refer to Module Data	71-5/8 x 68-29/32 x 29-5/32 (1,818 x 1,750 x 740)	71-5/8 x 68-29/32 x 29-5/32 (1,818 x 1,750 x 740)
Net Weight	Lbs. (kg)	1554 (704)	777 (352)	777 (352)
External Finish		Refer to Module Data	Pre-coated galvanized steel sheet (+powder coating for -BS type) <MUNSELL 5Y 8/1>	
Electrical Power Requirements	Voltage, Phase, Hertz	Refer to Module Data	3-phase 3-wire 208-230 V ±10% 60 Hz	
Minimum Circuit Ampacity (MCA, 208/230V)	A		57/53	57/53
Maximum Overcurrent Protection (MOP, 208/230V)	A		90/80	90/80
Recommended Fuse Size (208/230V)	A		70/70	70/70
Recommended Minimum Wire Size (208/230V)	AWG (mm)		4 (21.2) / 4 (21.2)	4 (21.2) / 4 (21.2)
Short-circuit Current Rating (SCCR)	kA		5	5
Piping Diameter (Brazed) (In. / mm)	Liquid (High Pressure)	1-1/8 (28.58) Brazed	Refer to System Data	
	Gas (Low Pressure)	1-5/8 (41.28) Brazed		
Max. Total Refrigerant Line Length	Ft.	3,936		
Max. Refrigerant Line Length (Between ODU & IDU)	Ft.	541		
Max. Control Wiring Length	Ft.	1,640		
Indoor Unit	Total Capacity	50~150% of outdoor unit capacity	Refer to System Data	
	Model / Quantity	P05~P96/2~50		
Sound Pressure Levels	dB(A)	65.5/69.5	Refer to System Data	
Sound Power Levels	dB(A)	84.0/88.5		
Fan: Type x Quantity		Refer to Module Data	Propeller fan x 2	Propeller fan x 2
Fan: Airflow Rate	CFM		14,850	14,850
Fan: External Static Pressure	In. WG		Selectable; 0, 0.12, 0.24, 0.32 in.WG; factory set to 0 in.WG	
Compressor Operating Range		7.5% to 100%	Refer to System Data	
Compressor Type x Quantity		Refer to Module Data	Inverter scroll hermetic compressor x 1	Inverter scroll hermetic compressor x 1
Refrigerant		Refer to Module Data	R410A 23 lbs + 12 oz (10.8 kg)	R410A 23 lbs + 12 oz (10.8 kg)
Protection Devices	High Pressure	Refer to Module Data	High pressure sensor, High pressure switch at 4.15 MPa (601 psi)	
	Inverter Circuit (Comp. / Fan)		Over-heat protection, Over-current protection	
	Fan Motor		Over-current protection	
AHRI Ratings (Ducted/Non-Ducted)	EER	10.5 / 10.3	Refer to System Data	
	IEER	22.5 / 24.9		
	COP	3.20 / 3.29		
	SCHE	20.4 / 23.4		

NOTES:
Nominal cooling conditions (Test conditions are based on AHRI 1230) Indoor: 80°FD.B./67°FW.B. (26.7°CD.B./19.4°CW.B.), Outdoor: 95°FD.B. (35°CD.B.)
Nominal heating conditions (Test conditions are based on AHRI 1230) Indoor: 70°FD.B. (21.1°CD.B.), Outdoor: 47°FD.B./43°FW.B. (8.3°CD.B./6.1°CW.B.)
** Each individual module requires a separate electrical connection. Refer to electrical data for each individual module.

1. Harsh weather environments may demand performance enhancing equipment. Ask your Mitsubishi Electric representative for more details about your region
2. For details on extended cooling operation range down to -10° F DB, see Low Ambient Kit Submittal
3. When applying product below -4°F, consult your design engineer for cold climate application best practices, including the use of a backup source for heating
4. Unit will continue to operate in extended operating range, but capacity is not guaranteed

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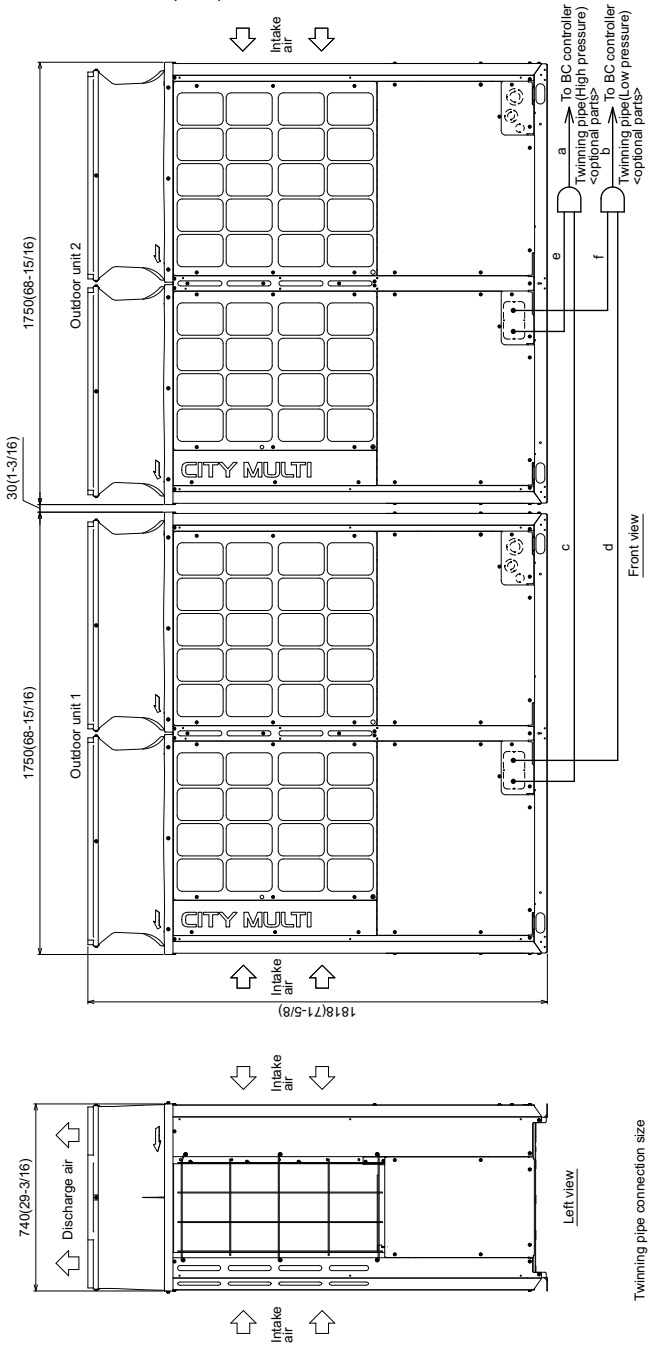
2. EXTERNAL DIMENSIONS

R2-Series (High efficiency)

PURY-EP336TSNU-A(-BS)

Unit: mm(in)



	Unit model	High pressure	Low pressure
Twinning pipe~Outdoor unit	EP168	c or e	d or f
		ø22.2(7/8)	ø28.58(1-1/8)

Twinning pipe connection size

Package unit name		PURY-EP336TSNU-A(-BS)
Component unit name	Outdoor unit 1	PURY-EP168TNU-A(-BS)
	Outdoor unit 2	PURY-EP168TNU-A(-BS)
Outdoor Twinning Kit(optional parts)		CMY-R300NCBK
BC controller ~Twinning pipe	High pressure a	ø28.58(1-1/8)
	Low pressure b	ø41.28(1-5/8)

Note 1. Connect the pipes as shown in the figure above. Refer to the table above for the pipe size.
2. Twinning pipes should not be tilted more than 15 degrees from the horizontal plane.
Be sure to see the Installation Manual for details of Twinning pipe installation.
3. The pipe section before the Twinning pipe (section "a"and "b"in the figure) must have at least 500mm(19-11/16) of straight section (*including the straight pipe that is supplied with the Twinning pipe).
4. Only use the Twinning pipe by Mitsubishi (optional parts).

NOTES:
SEACOAST PROTECTION
- Anti-corrosion Protection: A coating treatment is applied to condenser coil for protection from air contaminants.
- Standard: Salt Spray Test Method - no unusual rust development to 480 hours.
- Sea Coast (BS): Salt Spray Test Method (JRA 9002) - no unusual rust development to 960 hours.

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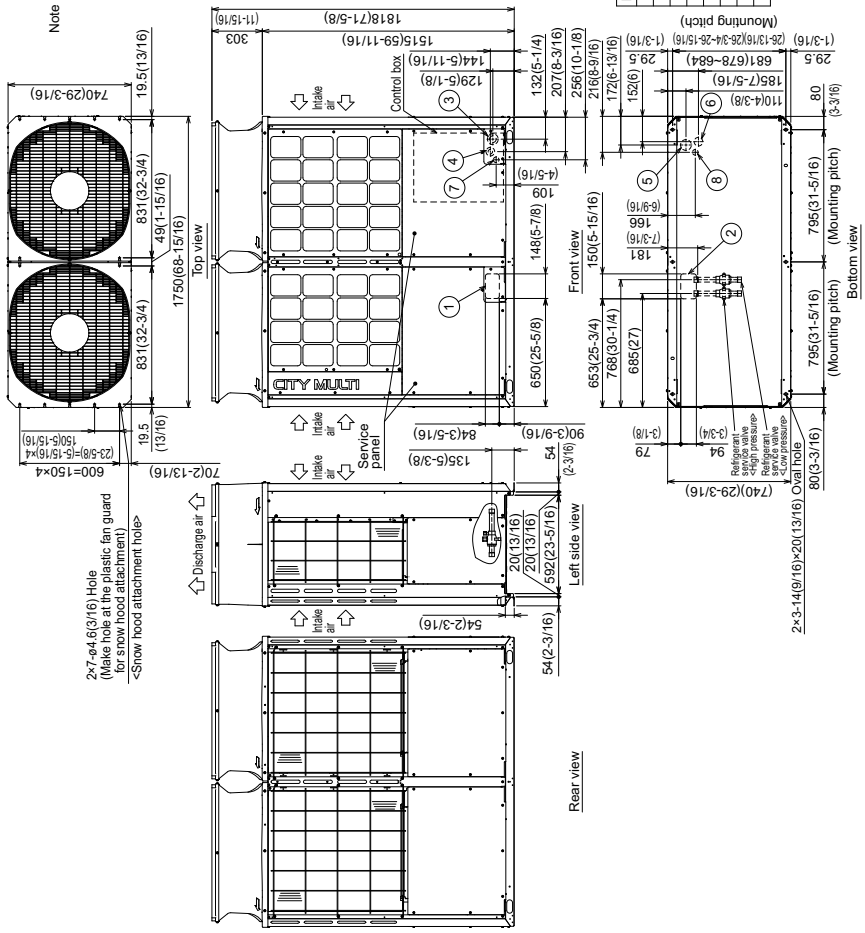
2. EXTERNAL DIMENSIONS

R2-Series (High efficiency)

PURY-EP168TNU-A(-BS)

Unit: mm(in)



NOTES:

SEACOAST PROTECTION

- Anti-corrosion Protection: A coating treatment is applied to condenser coil for protection from air contaminants.
- Standard: Salt Spray Test Method - no unusual rust development to 480 hours.
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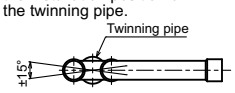
Twinning Kit: CMY-R300NCBK

Unit: mm (inch)

CMY-R300NCBK

Unit: mm (in.)

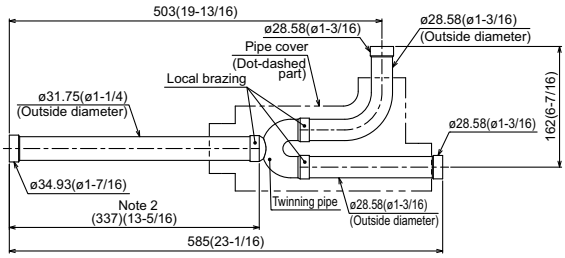
Note:
1. Refer to the figure below for the installation position of the twinning pipe.



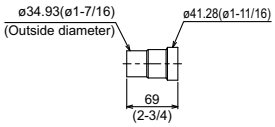
Slope of the twinning pipes are at an angle within ±15° to the horizontal plane.

2. Use the attached pipe to braze the port-opening of the twinning pipe.
3. Pipe diameter is indicated by inside diameter.

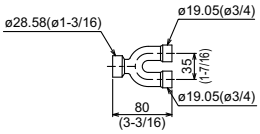
Low-pressure twinning pipe



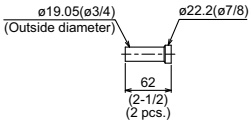
<Deformed pipe(Accessory)>



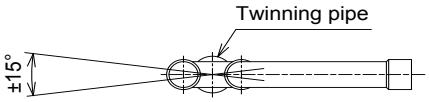
High-pressure twinning pipe



<Deformed pipe(Accessory)>



Note 1. Reference the attitude angle of the twinning pipe below the fig.



The angle of the twinning pipe is within ±15° against the horizontal plane.

2. Use the attached pipe to braze the port-opening of the twinning pipe.
3. Pipe diameter is indicated by inside diameter.
4. Only use the Twinning pipe by Mitsubishi (optional parts) .

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FORM# PUHY-EP96TNU-A (-BS) - 201912

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