

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 003126 – EXISTING HAZARDOUS MATERIALS INFORMATION

PART 1 - GENERAL

1.1 EXISTING HAZARDOUS MATERIAL INFORMATION

- A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.
- B. An Environmental Review Report for Project, referenced as Appendix A, is available for viewing and download on Project Web site.
  - 1. An existing hazardous materials report for Project entitled “Limited Hazardous Materials Building Inspection Report”, prepared by Fuss & O’Neill, dated April 29, 2014 and revised May 27, 2014, is located within Appendix A referenced above.
- C. Related Requirements:
  - 1. Division 02 Section "Selective Demolition" for notification requirements if materials suspected of containing hazardous materials are encountered.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 003126



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Instructions to Bidders, AIA Document A201 "The General Conditions of the Contract for Construction", 1997 Edition as amended, and Division 01 General Requirements, are a part of this Section and shall be binding on the Contractor and all Subcontractors who perform this work.

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Project information.
  - 2. Work covered by the Contract Documents.
  - 3. Project schedule.
  - 4. Coordination activities.
  - 5. Use of premises.
  - 6. Owner's occupancy requirements.
  - 7. Work restrictions.
  - 8. Specification formats and conventions.
  - 9. Codes, standards, permits.
  - 10. OSHA.
- B. Related Sections include the following:
  - 1. Division 01 Section "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

- A. Project Identification: Rehabilitation / Reconstruction Work for Anne Sweeney, Applicant #1479.
  - 1. Project Location: 94 Longdean Road, Fairfield, CT.
- B. Funding: Community Development Block Grant Disaster Recovery Program (CDBG-DR), Owner Occupied Rehabilitation & Rebuilding Program (OORR).
- C. Architect: The Contract Documents were prepared for Project by Quisenberry Arcari Architects, LLC of Farmington, CT.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Project consists of the following:
  - 1. New one story addition including sunroom, laundry room and utility room; new wood stairs for existing deck to remain.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- B. The Work includes, but is not limited to the following:
  - 1. Selective demolition; cast-in-place concrete; miscellaneous carpentry, wood framing and decking; exterior architectural woodwork, sheathing, interior architectural woodwork, vinyl railings; thermal insulation, sheet metal flashing and trim, weather barriers, asphalt shingles, vinyl siding, joint sealants; flush wood doors, fiberglass doors, vinyl windows, door hardware; gypsum board, tiling, wood flooring, cementitious coatings, painting; and flood vents.

1.5 TYPE OF CONTRACT

- A. Project will be constructed under a single contract.

1.6 SCHEDULE

- A. General: The Contractor shall prepare a detailed construction schedule, to be submitted to the Owner, Architect, and Owner's Representative for review and approval. The schedule must clearly demonstrate the proper sequencing of construction activities.
  - 1. The Construction Schedule is critical to the project. All work is required to be Substantially Complete, with a Certificate of Occupancy obtained, and ready for occupancy by the Owner, on or before the date agreed upon in the Contractor/Owner Agreement.

1.7 USE OF PREMISES

- A. General: Contractor shall have limited use of Project site for construction operations as indicated by requirements of this Section.
- B. Use of Site: Limit use of premises to areas determined by the Owner. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  - 1. Confine the parking of workmen's and construction vehicles, and the storage of construction materials to a designated staging area determined by the Owner's Representative.
  - 2. Owner Occupancy: Allow for Owner occupancy of Project site.
  - 3. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.8 COORDINATION WITH OCCUPANTS

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

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
  2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
  2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
  3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of building.
  4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

1.9 WORK RESTRICTIONS

- A. On-Site Work Hours: Work shall be generally performed inside the existing building during normal business working hours of 8:00 a.m. to 4:30 p.m., Monday through Friday, except otherwise indicated.
1. Weekend Hours: Coordinate with Owner.
  2. Hours for Utility Shutdowns: Coordinate with Owner.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Owner not less than two days in advance of proposed utility interruptions.
  2. Do not proceed with utility interruptions without Owner's written permission.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
1. Notify Owner not less than two days in advance of proposed disruptive operations.
  2. Obtain Owner's written permission before proceeding with disruptive operations.
- D. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

1.10 SPECIFICATION FORMATS AND CONVENTIONS

- A. Specification Format: The Specifications are organized into Divisions and Sections using the 16-division format and CSI/CSC's "MasterFormat" numbering system.
1. Section Identification: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete because all available Section numbers are not used. Consult the table of contents at the beginning of the Project Manual to determine numbers and names of Sections in the Contract Documents.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Division 01: Sections in Division 01 govern the execution of the Work of all Sections in the Specifications.
- 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 where applicable as the context of the Contract Documents indicates.
  2. Imperative mood and streamlined language are 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.
- C. In general, the Specifications will describe the quality of the work and the Drawings, the extent of the work. The Drawings and Specifications are cooperative and supplementary; however, each item of the work is not necessarily mentioned in both the Drawings and the Specifications. All work necessary to complete the project, so described, is to be included in this Contract.
- D. In case of disagreement between the Drawings and Specifications, or within either document itself, the Architect shall interpret the Documents to require the better quality or greater quantity of work for the Owner that can reasonably be construed therefrom. Any work performed by the Contractor without consulting the Architect, when the same requires a decision, shall be performed at the Contractor's risk.
- 1.11 CODES, STANDARDS AND PERMITS
- A. All work under this contract shall conform to all codes and standards in effect as of the date of receipt of Bids which are applicable to this Project. All work shall also conform to specific requirements and interpretations of local authorities having jurisdiction over the Project. These Codes, standards, and authorities are referred to collectively as "the governing codes and authorities" and similar terms throughout the Specifications. Determination of applicable codes and standards and requirements of the authorities having jurisdiction shall be the responsibility of the Contractor; as shall be the analysis of all such codes and standards in regard to their applicability to the Project for the purposes of determining necessary construction to conform to such code requirements, for securing all approvals and permits necessary to proceed with construction, and to obtain all permits necessary for the Owner to occupy the facility for their intended use. In the case of conflicts between the requirements of different codes and standards, the most restrictive or stringent requirements shall be met.
- B. The codes that were used in the design of this Project are as follows:
1. 2005 Connecticut State Building Code (CSBC):
    - a. 2009 International Residential Code (IRC)
    - b. 2009 International Energy Conservation Code (IECC)
    - c. 2005, 2009, 2011 and 2013 State of Connecticut Amendments/State Building Code
- C. Code Enforcement and Approvals: Secure and pay for the general building permit for the work, and conform to all conditions and requirements of the permit and code enforcement authorities.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- D. Identify all permits (other than general building permit) required from authorities having jurisdiction over the Project for the construction and occupancy of the work. Prepare the necessary applications and submit required plans and documents to obtain such permits in a timely manner. Permit fees to be paid by the Subcontractor.
1. Display all permit cards as required by the authorities, and deliver legible photocopies of all permits to the Owner promptly upon their receipt.
  2. Arrange for all inspections, testing and approvals required for all permits. Notify the Owner and Architect at least three business days in advance, so they may arrange to observe.
  3. Comply with all conditions and provide all notices required by all permits.
  4. Perform and/or arrange for and pay for all testing and inspections required by the governing codes and authorities, other than those provided by the Owner, and notify the Owner and Architect of such inspections at least three business days in advance, so they may arrange to observe.
  5. Where inspecting authorities require corrective work in conjunction with applicable codes and authorities, promptly comply with such requirements, except in cases where such requirements clearly exceed the requirements of the Contract Documents, in which case proceed in accordance with the procedures for modifications to the Work established in the Contract Documents.

1.12 OCCUPATIONAL SAFETY AND HEALTH ACT

- A. The Contractor and each Subcontractor shall comply with the requirements of the Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, including all standards and regulations which have been promulgated by the Governmental Authorities which administer such Acts. Said requirements, standards and regulations are incorporated herein by reference.
1. In accordance with Connecticut General Statutes Sec. 31-53b, all project on-site personnel must show proof of completing and maintaining the OSHA 10 hour certification requirements in accordance with federal OSHA Training Institute standards.
- B. The Contractor and each Subcontractor shall comply with said regulations, requirements and standards and require and be directly responsible for compliance therewith on the part of his agents, employees material men and Subcontractors; and shall directly receive and be responsible for all citations, assessments, fines or penalties which may be incurred by reason of his agents, employees, material men or Subcontractors failing to so comply.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 012100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Unit-cost allowances.
- C. Related Sections include the following:
  - 1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders for allowances.
  - 2. Divisions 02 through 33 Sections for items of Work covered by allowances.

1.3 SELECTION AND PURCHASE

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.

1.4 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

1.5 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.6 COORDINATION

- A. Coordinate allowance items with other portions of the Work. Furnish templates as required to coordinate installation.

1.7 UNIT-COST ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials under allowance and shall include taxes, freight, and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials under allowance shall be included as part of the Contract Sum and not part of the allowance.

1.8 ADJUSTMENT OF ALLOWANCES

- A. Allowance Adjustment: To adjust allowance amounts, prepare a Change Order proposal based on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place where applicable. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
  - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
  - 2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
  - 3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
  - 4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the purchase order amount or Contractor's handling, labor, installation, overhead, and profit.
  - 1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that 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.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Allowance No. 1: Lump-Sum Allowance: Include the sum of \$10,000 for miscellaneous improvements.

END OF SECTION 012100



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
1. Division 01 Section "Unit Prices" for administrative requirements for using unit prices.
  2. Division 01 Section "Project Management and Coordination" for submitting Requests for Information (RFIs).
  3. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions" or similar form prepared by Architect.

1.4 PROPOSAL REQUESTS

- A. Owner-Initiated Proposal Requests: Architect 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 issued by Architect are for information only. Do not consider them 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 to the Architect, estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by first submitting a "Request for Information" to the Architect. This request will be responded to by the Architect, wherein the Contractor may submit a Change Order Proposal.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  4. Include costs of labor and supervision directly attributable to the change.
  5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, the Architect will issue a Change Order for signatures of Owner and Contractor on CHFA Form 2437 entitled "Request for Construction Change."

1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. 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.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012600



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 012900 – PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
  - 1. Division 01 Section "Unit Prices" for administrative requirements governing use of unit prices.
  - 2. Division 01 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.
  - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with Continuation Sheets.
    - b. Submittals Schedule.
    - c. Contractor's Construction Schedule.
  - 2. Submit the Schedule of Values to the Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Provide at least one line item for each Specification Section. For major trades with line item values greater than \$25,000, provide a separate line item for units of work within each trade with a value not exceeding \$25,000.
  - 1. Identification: Include the following Project identification on the Schedule of Values:
    - a. Project name and location.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- b. Name of Architect.
  - c. Architect's project number.
  - d. Contractor's name and address.
  - e. Date of submittal.
2. Submit draft of AIA Document G702 and AIA Document G703 Continuation Sheets.
3. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:
  - a. Related Specification Section or Division.
  - b. Description of the Work.
  - c. Name of subcontractor.
  - d. Name of manufacturer or fabricator.
  - e. Name of supplier.
  - f. Change Orders (numbers) that affect value.
  - g. Dollar value.
    - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate. Include the following mandatory line items:
  - a. Mobilization.
  - b. Demobilization.
  - c. Builders Risk Insurance.
  - d. Bonds.
  - e. Coordination Drawings.
  - f. Scheduling.
  - g. Project record documents.
  - h. Operation and Maintenance manuals.
  - i. Field Engineering.
  - j. Daily Building Cleanup.
  - k. Safety Program.
  - l. Full-Time Project Manager.
  - m. Full-Time Project Superintendent.
  - n. Field Offices.
  - o. Dumpsters.
  - p. Cold Weather Protection.
  - q. Temporary Heat.
  - r. General Contract O&P (not to be included in each line item).
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
- 9. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

**1.5 APPLICATIONS FOR PAYMENT**

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
  - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
  - 1. At least ten days before the date established for each formal Application for Payment, the Contractor shall submit to the Architect an itemized preliminary application for payment for review and comment. The Contractor shall then revise the preliminary application and at least two days prior to the date established for formal application, shall submit to the Architect the revised preliminary application, to allow time for the Architect to prepare a written letter of explanation setting forth any objections and recommended changes to be forwarded along with the formal application to the owner.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  - 1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
  - 2. Include amounts of Change Orders executed before last day of construction period covered by application.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  - 1. Requests for payment for on-site stored materials shall be made on CHFA form entitled "Accounting of On-Site Inventory."
  - 2. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  - 3. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - 4. Provide summary documentation for stored materials indicating the following:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
  - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
  - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
5. Provide summary documentation for off-site stored materials indicating the following:
- a. Evidence of insurance (casualty, theft, etc.) for the stored items and the facility itself, if stored other than at the manufacturer's plant.
  - b. Bonding company's consent to the off-site storage.
  - c. UCC-1s for the stored materials creating a security interest for CHFA.
  - d. A CHFA Field Observer's report, which accepts the proposed storage environment, and a report confirming acceptable delivery of the subject item(s) to the facility.
- F. Transmittal: Submit **THREE (3)** signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  5. Waiver Forms: Submit waivers of lien on the CHFA form "Total of Lien Waiver Payments."
    - a. Beginning with the second requisition, each monthly requisition shall include lien waivers for a minimum of 90 percent of the amount indicated on the previous month's Contractor Requisition as "Due This Requisition."
- H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. Contractor's Construction Schedule (preliminary if not final).
  4. Products list.
  5. Schedule of unit prices.
  6. Submittals Schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. List of Contractor's principal consultants.
  9. Copies of building permits.
  10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  11. Initial progress report.
  12. Report of preconstruction conference.
  13. Certificates of insurance and insurance policies.
  14. Performance and payment bonds.
  15. Data needed to acquire Owner's insurance.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  
- J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  - 1. Evidence of completion of Project closeout requirements.
  - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  - 3. Updated final statement, accounting for final changes to the Contract Sum.
  - 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  - 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  - 6. AIA Document G707, "Consent of Surety to Final Payment."
  - 7. Evidence that claims have been settled.
  - 8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 013100 – PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
1. General coordination procedures.
  2. Administrative and supervisory personnel.
  3. Project meetings.
  4. Requests for Information (RFIs).
- B. Related Sections include the following:
1. Division 01 Section "Execution" for procedures for coordinating general installation.
  2. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. RFI: Request from Contractor seeking interpretation or clarification of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
  3. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names: Within 10 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
1. Keep list current at all times, resubmit upon update.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
  - 5. No claim for additional compensation or extension of Contract Time will be permitted for conditions resulting from lack of coordination.
  
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
  
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's Construction Schedule.
  - 2. Preparation of the Schedule of Values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Preinstallation conferences.
  - 6. Progress meetings.
  - 7. Startup and adjustment of systems.
  - 8. Project closeout activities.
  
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.6 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.

1.7 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner, Owner's Representative, and Architect of scheduled meeting dates and times.
  2. Agenda: Prepare the meeting agenda and distribute the agenda to all invited attendees.
  3. Minutes: Record significant discussions and agreements achieved and distribute the meeting minutes to everyone concerned, including Owner, Owner's Representative and Architect, within three days of the meeting.
- B. Preconstruction Conference: Arrange for attendance of subcontractors at Preconstruction Conference convened by Architect, together with any other persons necessary for full review of scheduling and coordination matters for the Project.
1. Attendees: Authorized representatives of Owner, Owner's Representative, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Include the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Procedures for processing field decisions and Change Orders.
    - f. Procedures for RFIs.
    - g. Procedures for testing and inspecting.
    - h. Procedures for processing Applications for Payment.
    - i. Distribution of the Contract Documents.
    - j. Submittal procedures.
    - k. Preparation of Record Documents.
    - l. Use of the premises.
    - m. Work restrictions.
    - n. Owner's occupancy requirements.
    - o. Responsibility for temporary facilities and controls.
    - p. Construction waste management and recycling.
    - q. Parking availability.
    - r. Office, work, and storage areas.
    - s. Equipment deliveries and priorities.
    - t. First aid.
    - u. Security.
    - v. Progress cleaning.
    - w. Working hours.
    - x. Owner-furnished and provided items.
    - y. Work performed under separate contracts.
  3. Minutes: The Architect will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner's Representative of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- a. The Contract Documents.
  - b. Options.
  - c. Related RFIs.
  - d. Related Change Orders.
  - e. Purchases.
  - f. Deliveries.
  - g. Submittals.
  - h. Review of mockups.
  - i. Possible conflicts.
  - j. Compatibility problems.
  - k. Time schedules.
  - l. Weather limitations.
  - m. Manufacturer's written recommendations.
  - n. Warranty requirements.
  - o. Compatibility of materials.
  - p. Acceptability of substrates.
  - q. Temporary facilities and controls.
  - r. Space and access limitations.
  - s. Regulations of authorities having jurisdiction.
  - t. Testing and inspecting requirements.
  - u. Installation procedures.
  - v. Coordination with other work.
  - w. Required performance results.
  - x. Protection of adjacent work.
  - y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present, the Owner, Architect and Owner's Representative, and to parties who should have been present.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Schedule weekly progress meetings. Dates of meetings may coincide with preparation of payment requests.
1. Attendees: In addition to representatives of Owner, Owner's Representative, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review minutes of previous progress meeting. Review other items of significance that could affect progress.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- 1) Interface requirements.
  - 2) Sequence of operations.
  - 3) Deliveries.
  - 4) Access.
  - 5) Site utilization.
  - 6) Temporary facilities and controls.
  - 7) Work hours.
  - 8) Hazards and risks.
  - 9) Progress cleaning.
  - 10) Quality and work standards.
  - 11) Status of correction of deficient items.
  - 12) Field observations.
  - 13) RFIs.
  - 14) Status of proposal requests.
  - 15) Pending changes.
  - 16) Status of Change Orders.
  - 17) Pending claims and disputes.
  - 18) Documentation of information for payment requests.
3. Minutes: The Architect will record and distribute the meeting minutes.
4. Reporting: The Architect will distribute minutes of the meeting to each party present.
- a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: Schedule Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes.
1. Attendees: In addition to representatives of the Contractor, each subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
    - b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
    - c. Review present and future needs of each contractor present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Deliveries.
      - 4) Access.
      - 5) Site utilization.
      - 6) Temporary facilities and controls.
      - 7) Work hours.
      - 8) Hazards and risks.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- 9) Progress cleaning.
  - 10) Quality and work standards.
  - 11) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- 1.8 REQUESTS FOR INFORMATION (RFIs)
- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI, to the Architect, in the form specified.
1. RFIs shall originate with Contractor or Subcontractor. RFIs submitted by entities other than the Contractor will be returned with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
  2. Date.
  3. Name of Contractor.
  4. Name of Architect.
  5. RFI number, numbered sequentially.
  6. Specification Section number and title and related paragraphs, as appropriate.
  7. Drawing number and detail references, as appropriate.
  8. Field dimensions and conditions, as appropriate.
  9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  10. Contractor's signature.
  11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
    - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs:
1. Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow five working days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
    - a. Requests for approval of submittals.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- b. Requests for approval of substitutions.
  - c. Requests for coordination information already indicated in the Contract Documents.
  - d. Requests for adjustments in the Contract Time or the Contract Sum.
  - e. Requests for interpretation of Architect's actions on submittals.
  - f. Incomplete RFIs or RFIs with numerous errors.
- 2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
  - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within five days if Contractor disagrees with response.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log biweekly. Include the following:
- 1. Project name.
  - 2. Name and address of Contractor.
  - 3. Name and address of Architect.
  - 4. RFI number including RFIs that were dropped and not submitted.
  - 5. RFI description.
  - 6. Date the RFI was submitted.
  - 7. Date Architect's response was received.
  - 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 013200 – CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Contractor's Construction Schedule.
  2. Daily construction reports.
  3. Material location reports.
  4. Field condition reports.
  5. Special reports.
- B. Related Sections include the following:
1. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
  2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
  3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
  4. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

- A. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.
- B. Daily Construction Reports: Submit two copies at weekly intervals, to the Architect.
- C. Material Location Reports: Submit two copies at monthly intervals, to the Architect.
- D. Field Condition Reports: Submit two copies at time of discovery of differing conditions, to the Architect.
- E. Special Reports: Submit two copies at time of unusual event, to the Architect.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1.4 QUALITY ASSURANCE

- A. Review and approval by the Owner and Owner's Representative of the Contractor's Construction Schedule is advisory only and does not relieve the Contractor of the responsibility for completing the work within the Contract time.

1.5 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.
  - 1. Secure time commitments for performing critical elements of the Work from parties involved.
  - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.
- C. Calendar: Compile a project calendar for use in scheduling. Incorporate all limitations on working days and working hours, including the following:
  - 1. Legal Holidays.
  - 2. Other non-working days determined by the Contractor.
  - 3. Optional working days determined by the Contractor.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
  - 1. Activity Duration: Define activities so no activity is longer than 10 days, unless specifically allowed by Architect.
  - 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with Submittals Schedule.
  - 4. Startup and Testing Time: Include not less than one day for startup and testing.
  - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Owner's Representative's administrative procedures necessary for certification of Substantial Completion.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Work under More Than One Contract: Include a separate activity for each contract.
  2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  3. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Partial occupancy before Substantial Completion.
    - b. Use of premises restrictions.
    - c. Provisions for future construction.
    - d. Seasonal variations.
    - e. Environmental control.
  4. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - l. Startup and placement into final use and operation.
  5. Other Constraints: Include the following specific activities in each trade in each phase.
    - a. Interface between Contractor and Subcontractor.
    - b. Electrical connections to each piece of equipment.
    - c. Mechanical connections to each piece of equipment.
    - d. Concrete finishing.
    - e. Site work constraints on other activities.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and Final Completion.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project schedule.
- F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
  2. Unanswered Requests for Information.
  3. Rejected or unreturned submittals.
  4. Notations on returned submittals.
  5. Pending modifications affecting the Work and Contract Time.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- G. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- H. Computer Software: Prepare schedules using a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
  - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
  - 1. List of subcontractors at Project site.
  - 2. List of separate contractors at Project site.
  - 3. Approximate count of personnel at Project site.
  - 4. Equipment at Project site.
  - 5. Material deliveries.
  - 6. High and low temperatures and general weather conditions.
  - 7. Accidents.
  - 8. Meetings and significant decisions.
  - 9. Unusual events (refer to special reports).
  - 10. Stoppages, delays, shortages, and losses.
  - 11. Meter readings and similar recordings.
  - 12. Emergency procedures.
  - 13. Orders and requests of authorities having jurisdiction.
  - 14. Change Orders received and implemented.
  - 15. Construction Change Directives received and implemented.
  - 16. Services connected and disconnected.
  - 17. Equipment or system tests and startups.
  - 18. Partial Completions and occupancies.
  - 19. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a request for interpretation. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: 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. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before submission of Application for Payment.
  - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  - 3. As the Work progresses, indicate Actual Completion percentage for each activity.
  - 4. Evaluate progress of the work jointly with the Owner and Owner's Representative at the end of each week to show progress and identify conflicts.
- B. Distribution: Distribute two copies each of approved schedule to Architect, Owner, Owner's Representative, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
  - 1. Post copies in Project meeting rooms and temporary field offices.
  - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 013200



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 013300 – SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Sections include the following:
  - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
  - 2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
  - 3. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
  - 4. Division 01 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
  - 5. Division 01 Section "Closeout Procedures" for submitting warranties.
  - 6. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 7. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 8. Divisions 02 through 26 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.
- C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.
- D. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
  4. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Architect's final release or approval.
    - g. Scheduled date of fabrication.
    - h. Scheduled dates for purchasing.
    - i. Scheduled dates for installation.
    - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. General: Electronic copies of CAD Drawings of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals, except as permitted in Division 01 Section "Project Management and Coordination" for use in preparing coordination drawings.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
1. Initial Review: Allow two weeks for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow two weeks for review of each resubmittal.
    - a. Resubmittals will be reviewed no more than two times at the Owner's expense. Resubmittals which fail to comply with Contract requirements will be reviewed at the Contractor's expense, based on an hourly rate of \$75 per hour, not to exceed \$600 for each subsequent submittal.
    - b. The Owner reserves the right to deduct said reimbursement from the Contractor's application for payment on a monthly basis.
  4. Concurrent Consultant Review: Submittals may be transmitted simultaneously to Architect and to Architect's consultants, as required. Allow two weeks for review of each submittal. Consultant will return submittal to Architect before being returned to Contractor.
- D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
  3. Include the following information on label for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name and address of Contractor.
    - e. Name and address of subcontractor.
    - f. Name and address of supplier.
    - g. Name of manufacturer.
    - h. Submittal number or other unique identifier, including revision identifier.
      - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
    - i. Number and title of appropriate Specification Section.
    - j. Drawing number and detail references, as appropriate.
    - k. Location(s) where product is to be installed, as appropriate.
    - l. Other necessary identification.
- E. Paper Submittals: Place a permanent label or title block on each submittal item for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
  3. Include the following information for processing and recording action taken:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- a. Project name.
  - b. Date.
  - c. Name of Architect.
  - d. Name of Contractor.
  - e. Name of subcontractor.
  - f. Name of supplier.
  - g. Name of manufacturer.
  - h. Submittal number or other unique identifier, including revision identifier.
    - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
  - i. Number and title of appropriate Specification Section.
  - j. Drawing number and detail references, as appropriate.
  - k. Location(s) where product is to be installed, as appropriate.
  - l. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
- a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.
5. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
- a. Transmittal Form: Provide locations on form for the following information:
    - 1) Revise list below to suit Project.
    - 2) Project name.
    - 3) Date.
    - 4) Destination (To:).
    - 5) Source (From:).
    - 6) Names of subcontractor, manufacturer, and supplier.
    - 7) Category and type of submittal.
    - 8) Submittal purpose and description.
    - 9) Specification Section number and title.
    - 10) Drawing number and detail references, as appropriate.
    - 11) Transmittal number, numbered consecutively.
    - 12) Submittal and transmittal distribution record.
    - 13) Remarks.
    - 14) Signature of transmitter.
6. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.

F. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
    - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Contractor.
    - e. Name of firm or entity that prepared submittal.
    - f. Names of subcontractor, manufacturer, and supplier.
    - g. Category and type of submittal.
    - h. Submittal purpose and description.
    - i. Specification Section number and title.
    - j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    - k. Drawing number and detail references, as appropriate.
    - l. Location(s) where product is to be installed, as appropriate.
    - m. Related physical samples submitted directly.
    - n. Indication of full or partial submittal.
    - o. Transmittal number.
    - p. Submittal and transmittal distribution record.
    - q. Other necessary identification.
    - r. Remarks.
- G. Options: Identify options requiring selection by Architect.
- H. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- I. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  1. Note date and content of previous submittal.
  2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  3. Resubmit submittals until they are marked "Approved" or "Approved as Corrected."
- J. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- K. Use for Construction: Use only final submittals with mark indicating "No Exception Taken" or "Make Corrections Noted" taken by Architect.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Submit electronic submittals via email as PDF electronic files.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before or concurrent with Samples.
  6. Submit Product Data in one of the following formats:
    - a. PDF electronic file.
    - b. Five paper copies of Product Data, unless otherwise indicated. Architect will return four copies. Mark up and retain one returned copy as a Project Record Document.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
  - f. Shopwork manufacturing instructions.
  - g. Templates and patterns.
  - h. Schedules.
  - i. Design calculations.
  - j. Compliance with specified standards.
  - k. Notation of coordination requirements.
  - l. Notation of dimensions established by field measurement.
  - m. Relationship to adjoining construction clearly indicated.
  - n. Seal and signature of professional engineer if specified.
  - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
  3. Number of Copies: Submit five paper copies of each submittal, unless copies are required for operation and maintenance manuals. Submit six copies where copies are required for operation and maintenance manuals. Architect will retain two copies; remainder will be returned. Mark up and retain one returned copy as a Project Record Drawing.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of appropriate Specification Section.
  3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
  5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a Project Record Sample.
  - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
  - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
  
- E. Product Schedule or List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  1. Type of product. Include unique identifier for each product.
  2. Number and name of room or space.
  3. Location within room or space.
  4. Number of Copies: Submit five copies of product schedule or list, unless otherwise indicated. Architect will return four copies.
    - a. Mark up and retain one returned copy as a Project Record Document.
  
- F. Contractor's Construction Schedule: Comply with requirements specified in Division 01 Section "Construction Progress Documentation" for Architect's action.
  
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
  
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
  
- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
  
- J. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
  
- K. Coordination Drawings: Comply with requirements specified in Division 01 Section "Project Management and Coordination."
  
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
  
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- N. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- U. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- W. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- Y. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
  2. Required substrate tolerances.
  3. Sequence of installation or erection.
  4. Required installation tolerances.
  5. Required adjustments.
  6. Recommendations for cleaning and protection.
- Z. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- AA. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- BB. Material Safety Data Sheets (MSDSs): Submit information as required by law.

2.2 DELEGATED DESIGN

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit five copies of a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
  - 1. "No Exception Taken"; Submittal is approved without changes or corrections.
  - 2. "Make Corrections Noted"; Submittal is approved based on changes or corrections noted. Contractor should resubmit one copy for record.
  - 3. "Rejected"; Submittal was incomplete or did not meet the requirements of the Contract Documents. New submission is required. Contractor is responsible for any delays caused by unacceptable submittals.
  - 4. "Revise and Resubmit"; Significant changes or corrections are required prior to approval of this submittal. Complete resubmittal addressing all notes is required. Contractor is responsible for any delays caused by incomplete submittals.
  - 5. "Reviewed"; Used for Informational Submittals.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Incomplete or partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 013300



SECTION 014000 – QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Owner’s Representative, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
  - 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
  - 2. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
  - 3. Divisions 02 through 26 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Owner’s Representative.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- C. Mockups: Full-size, physical assemblies that are constructed on-site. Mockups are used to verify selections made under sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples.
  - 1. Approved mockups establish the standard by which the Work will be judged.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespeople of the corresponding generic name.
- J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

#### 1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Description of test and inspection.
  - 3. Identification of applicable standards.
  - 4. Identification of test and inspection methods.
  - 5. Number of tests and inspections required.
  - 6. Time schedule or time span for tests and inspections.
  - 7. Entity responsible for performing tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. 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.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Connecticut and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
    - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
  - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect and Owner's Representative seven days in advance of dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
  - a. Allow seven days for initial review and each re-review of each mockup.
5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
6. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
7. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Payment for these services will be made by the Owner.
  3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  2. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Retesting to be performed by the Inspection and Testing Agency that performed the original tests.
  2. Retest original failed test and perform two additional tests at new locations to be determined by Architect and Testing Agency.
  3. Continue retesting until compliance is achieved.
- E. Testing Agency Responsibilities: Cooperate with Architect, Owner's Representative, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect, Owner's Representative, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
  7. Do not permit the Contractor to deviate from the requirements of the Contract Documents.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
  2. Provide the Testing Agency with a complete set of Contract Documents.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for commencement of the Work.
1. Distribution: Distribute schedule to Owner, Architect, Owner's Representative, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.8 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified testing agency and special inspector to conduct special tests and inspections required by the Connecticut State Building Code and by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
  2. Notifying Architect, Owner's Representative, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
  4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  6. Retesting and reinspecting corrected work.
    - a. Costs associated with retesting and reinspecting are the responsibility of the Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
  2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 014200 – REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": 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.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.
- D. Abbreviations and Acronyms for Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the organizations responsible for the standards and regulations.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
  - 1. Division 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
  - 2. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
  - 3. Division 01 Section "Execution" for progress cleaning requirements.
  - 4. Divisions 02 through 26 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.

1.3 USE CHARGES

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

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Installer of each permanent service shall assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 6 feet high with galvanized steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide galvanized steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

- A. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
  - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- B. Lumber and Plywood: Comply with requirements in Division 06 Section "Miscellaneous Rough Carpentry."
- C. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- D. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.
- E. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Use of Owner's existing water service facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
  - 1. Where installations below an outlet might be damaged by spillage or leakage, provide a drip pan of suitable size to minimize water damage. Drain accumulated water promptly from pans.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
  - 1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
  - 2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
  - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
  - 2. Maintain access for fire-fighting equipment.
- C. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Identification Signs: Provide Project identification sign as indicated.
    - a. Comply with requirements included in the sketch attached at the end of this Section.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  3. Maintain and touchup signs so they are legible at all times.
- D. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to rise above 80 deg F (27 deg C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly.
1. Comply with Division 01 Section "Execution" for progress cleaning requirements.
  2. Provide sufficient quantity of dumpsters at strategic locations within the Contract limit lines for collection of waste from the work of all Subcontractors.
  3. Do not pass materials through open windows, or through window openings when any portion of the window remains in the opening.
- E. Temporary Lifts and Hoists: The Contractor shall provide, operate and maintain in safe operating order facilities for hoisting materials, rubbish, employees and to otherwise carry out the Work. Truck cranes, fork lifts, man lifts and similar devices required for the performance of the Work by each Subcontractor shall be provided by the Subcontractor.
1. Provide temporary lifts and hoists that comply in all respects with the most stringent of all applicable Federal (including OSHA), state and local laws, rules, regulations, codes and ordinances, and provisions of Division 01 of this Specification.
  2. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- F. Staging and Scaffolding: Where staging and scaffolding is required, the Contractor shall provide the entire installation.
1. Staging shall be of approved design, erected and removed by experienced stage builders and shall have all accident prevention devices required by State and local laws.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Division 01 Section "Summary."
- B. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner with one set of keys.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Security Enclosure and Lockup: Install substantial temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Enclosures: Provide all temporary enclosures for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.
  - 1. Install tarpaulins securely, with fire-retardant-treated wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.
  - 2. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.
  - 3. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.
  - 4. Do not use new permanent doors and frames for temporary enclosures until finishing work is begun, and then only if carefully protected from damage. Prior to installation of permanent doors and frames, provide temporary wood or plywood doors with wood frames and proper hardware to make the doors self-closing.
    - a. Close and lock all openings accessible from ground level at end of each day's work to prevent entry of unauthorized persons.
- F. Protection: Protect the Work at all times from damages. Provide all pumps, equipment and enclosures to ensure this protection.
  - 1. Remove all snow and ice as may be required for proper protection and prosecution of the work.
  - 2. Provide all shoring, bracing and sheeting as required for safety and for proper execution of work.
  - 3. Protect all work from damage during cold weather. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, cease work and notify Architect. Repair and/or replacement of all work damaged from frost, freezing or any elements of the weather are the responsibility of the Contractor responsible for temporary protection of the Work.
  - 4. Should high wind warnings be issued by the U.S. Weather Advisory Bureau, take every precaution to minimize danger to persons, to the Work, and to adjacent properties, including, but not limited to, removing all loose materials, tools and/or equipment from exposed locations, and removing or securing scaffolding or other temporary work.
  - 5. Protect the building and the site from damage, loss or liability due to theft or vandalism when the work is not in progress at night, weekends, or holidays.
  - 6. Exercise precaution for the protection of persons and property at all times. Observe the provisions of applicable laws and construction codes. Take additional safety and health measures, or cause such measures to be taken as reasonably necessary. Maintain guards on machinery, equipment and other hazards as set forth in the safety provisions of the Manual of Accident Prevention in Construction, published by the Associated General Contractors of America, to the extent that such provisions are not in contravention of applicable laws.
  - 7. Protect and preserve in operating conditions all utilities traversing the work area. Repair all damages to any utility due to work performed under this Contract, the satisfaction of the Architect at no additional cost to the Owner.
- G. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
  - 1. Prohibit smoking in construction areas.
  - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

3.5 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are property of Contractor.
  2. At Substantial Completion, clean and renovate permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
  - 1. Division 01 Section "References" for applicable industry standards for products specified.
  - 2. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
  - 3. Divisions 02 through 26 Sections for specific requirements for warranties on products and installations specified to be warranted.

1.3 DEFINITIONS

- A. Products: Items purchased for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
- C. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Substitution Request Form: Use CSI Form 13.1A or other form acceptable to Architect.
  2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified material or product cannot be provided.
    - b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.
    - f. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
    - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    - i. Detailed comparison of Contractor's Construction Schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating lack of availability or delays in delivery.
    - j. Cost information, including a proposal of change, if any, in the Contract Sum.
    - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.
    - l. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
  3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
    - a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
    - b. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.
- B. Comparable Product Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
  - b. Use product specified if Architect cannot make a decision on use of a comparable product request within time allocated.
- C. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

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

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
- 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
  - 4. Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- C. Storage:
- 1. Store products to allow for inspection and measurement of quantity or counting of units.
  - 2. Store materials in a manner that will not endanger Project structure.
  - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 4. Store cementitious products and materials on elevated platforms.
  - 5. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  - 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  - 7. Protect stored products from damage and liquids from freezing.
  - 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using appropriate form properly executed.
  3. Refer to Divisions 02 through 26 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. List of Warranties: Provide warranties for products and installations as specified, including but not limited to the following:
1. Decking: Division 06 Section "Wood Patio Decking."
  2. PVC Trim: Division 06 Section "Exterior Finish Carpentry."
  3. Vinyl Railings: Division 06 Section "Vinyl Railings."
  4. Asphalt Shingles: Division 07 Section "Asphalt Shingles."
  5. Vinyl Siding: Division 07 Section "Siding."
  6. Sealant: Division 07 Section "Joint Sealants."
  7. Wood Doors: Division 08 Section "Flush Wood Doors."
  8. Fiberglass Doors: Division 08 Section "Fiberglass Doors."
  9. Vinyl Windows: Division 08 Section "Vinyl Windows."
  10. Flooring: Division 09 Section "Laminate Flooring."
- D. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- 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.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

5. Where products are accompanied by the term "match sample," sample to be matched is Architect's.
6. Descriptive, performance, and reference standard requirements in the Specifications establish "salient characteristics" of products.
7. Or Equal: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in Part 2 "Comparable Products" Article to obtain approval for use of an unnamed product.

**B. Product Selection Procedures:**

1. **Products:** Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
2. **Manufacturers:** Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
3. **Product Options:** Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 2 "Product Substitutions" Article for consideration of an unnamed product or system.
4. **Basis-of-Design Product:** Where Specifications name a product and include a list of manufacturers, provide the specified product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with provisions in Part 2 "Comparable Products" Article for consideration of an unnamed product by the other named manufacturers.
5. **Visual Matching Specification:** Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
  - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 2 "Product Substitutions" Article for proposal of product.
6. **Visual Selection Specification:** Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product that complies with other specified requirements.
  - a. **Standard Range:** Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
  - b. **Full Range:** Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

**2.2 PRODUCT SUBSTITUTIONS**

- A. Substitutions for Cause:** Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. **Conditions:** Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- b. Substitution request is fully documented and properly submitted.
  - c. Requested substitution will not adversely affect Contractor's construction schedule.
  - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - e. Requested substitution is compatible with other portions of the Work.
  - f. Requested substitution has been coordinated with other portions of the Work.
  - g. Requested substitution provides specified warranty.
  - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
  - b. Requested substitution does not require extensive revisions to the Contract Documents.
  - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - d. Substitution request is fully documented and properly submitted.
  - e. Requested substitution will not adversely affect Contractor's construction schedule.
  - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - g. Requested substitution is compatible with other portions of the Work.
  - h. Requested substitution has been coordinated with other portions of the Work.
  - i. Requested substitution provides specified warranty.
  - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

### 2.3 COMPARABLE PRODUCTS

- A. Conditions: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  - 3. Evidence that proposed product provides specified warranty.
  - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  - 5. Samples, if requested.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 3 - EXECUTION (Not Used)

END OF SECTION 016000



SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. General installation of products.
  - 3. Coordination of Owner-installed products.
  - 4. Progress cleaning.
  - 5. Starting and adjusting.
  - 6. Protection of installed construction.
  - 7. Correction of the Work.
- B. Related Sections include the following:
  - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
  - 2. Division 01 Section "Submittal Procedures" for submitting surveys.
  - 3. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
  - 4. Division 01 Section "Closeout Procedures" for final cleaning.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
  - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
  2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Examination and Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
  2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.
- D. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
1. Description of the Work.
  2. List of detrimental conditions, including substrates.
  3. List of unacceptable installation tolerances.
  4. Recommended corrections.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  3. Inform installers of lines and levels to which they must comply.
  4. Check the location, level and plumb, of every major element as the Work progresses.
  5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
  4. Maintain minimum headroom clearance of 7'-6" in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

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

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

I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.5 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction forces.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction forces.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction forces at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.

### 3.6 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

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

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

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

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 017329 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

- A. Cutting: Penetration of in-place construction necessary to permit installation or performance of other Work, including the removal of debris.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other Work.

1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
  - 1. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
  - 3. Products: List products to be used and firms or entities that will perform the Work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utility Services and Mechanical/Electrical Systems: List services/systems that cutting and patching procedures will disturb or affect. List services/systems that will be relocated and those that will be temporarily out of service. Indicate how long services/systems will be disrupted.
  - 6. Structural Elements: Where cutting and patching involve adding reinforcement to structural elements, submit details and engineering calculations showing integration of reinforcement with original structure.
  - 7. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive Architect's right to later require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio. Structural elements include, but are not limited to the following:
1. Concrete foundation construction.
  2. Bearing and retaining walls, including architectural precast panels.
  3. Lintels.
  4. Structural steel frame.
  5. Structural decking.
  6. Miscellaneous structural metals.
  7. Interior and/or exterior load bearing masonry wall construction.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operating elements include the following:
1. Primary operational systems and equipment.
  2. Air or smoke barriers.
  3. Mechanical systems piping and ducts.
  4. Control systems.
  5. Communication systems.
  6. Electrical wiring systems.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Miscellaneous elements include the following:
1. Water, moisture, or vapor barriers.
  2. Membranes and flashings.
  3. Piping, ductwork, vessels, and equipment.
  4. Noise- and vibration-control elements and systems.
  5. Roofing systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 PREPARATION

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

#### 3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  4. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

5. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION 017329

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 017700 – CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.
- B. Related Sections include the following:
  - 1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
  - 2. Division 01 Section "Execution" for progress cleaning of Project site.
  - 3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
  - 4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 5. Divisions 02 through 26 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 ACTION SUBMITTALS

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

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

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

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Divisions 2 through 16 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Divisions 2 through 16 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
  - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
5. Submit test/adjust/balance records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

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

1. Perform preventive maintenance on equipment used prior to Substantial Completion.
2. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
3. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
4. Complete final cleaning requirements, including touchup painting.
5. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

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

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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

1.7 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  3. Submit lien waivers and/or certificate of payment received, as required by Owner, from all subcontractors.
  4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order.
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Owner's Representative.
    - e. Name of Contractor.
    - f. Page number.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Remove labels that are not permanent.
    - j. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

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- 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
- k. Leave Project clean and ready for occupancy.
2. Before requesting final inspection for determining date of Final Completion, complete cleaning operations listed above as required following Substantial Completion and completion of all punch list items.
- C. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 017700



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Maintenance manuals for the care and maintenance of products, materials, and finishes, systems and equipment.
- B. Related Sections include the following:
  - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
  - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
  - 4. Divisions 02 through 26 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Submittals: **Submit three (3) draft copies** of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return two copies of draft and mark whether general scope and content of manual are acceptable.
  - 1. Correct or modify each manual to comply with Architect's comments. Submit 2 copies of each corrected manual within 15 days of receipt of Architect's comments.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1.5 COORDINATION

- A. Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

PART 2 - PRODUCTS

2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name, address, and telephone number of Contractor.
  6. Name and address of Architect.
  7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.2 PRODUCT MAINTENANCE MANUAL

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

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
  - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- C. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
  - 1. Do not use original Project Record Documents as part of operation and maintenance manuals.
- D. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
1. Record Drawings.
  2. Record Specifications.
  3. Record Product Data.
  4. Miscellaneous record submittals.
- B. Related Sections include the following:
1. Division 01 Section "Closeout Procedures" for general closeout procedures.
  2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  3. Divisions 02 through 26 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
1. Number of Copies: Submit copies of record Drawings as follows:
    - a. Initial Submittal: Submit one paper copy set of marked-up record prints and one set(s) of plots from corrected record digital data files. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
    - b. Final Submittal: Submit one paper copy set of marked-up record prints, one set(s) of record digital data files, and three set(s) of record digital data file plots. Plot each drawing file, whether or not changes and additional information were recorded.
      - 1) Electronic Media: DVD-R.
- B. Record Specifications: Submit two (2) copies of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit two (2) copies of each Product Data submittal.
1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of black-line white prints of the Contract Drawings and Shop Drawings.
1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an understandable drawing technique.
    - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
  - 1. Record Prints: Organize Record Prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  - 2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  - 3. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.

## 2.2 RECORD SPECIFICATIONS

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

## 2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  - 1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  - 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  - 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- B. Format: Submit record Product Data as paper copy.
  - 1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
- B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.
  - 1. Acceptance of Application for payment is contingent upon acceptance of maintained and up-to-date record documents.

END OF SECTION 017839

SECTION 018119 – INDOOR AIR QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes the following:
1. Microbial and fungal contamination control.
  2. Indoor air quality and pollution control.
  3. Heating, ventilating, and air conditioning.
  4. Description of Indoor Air Quality (IAQ) Construction Plan.
  5. IAQ Construction requirements.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 01 Section “Temporary Facilities and Controls” for temporary facility requirements.
  2. Division 01 Section “Closeout Procedures” for final cleaning.

1.3 INDOOR AIR QUALITY

- A. Goals: The Owner has set the following goals to maintain indoor air quality for jobsite operations for this Project, within the limits of the construction schedule, Contract sum, and utilizing available materials, equipment, products, and services.
1. Protect workers on-site from undue health risks during construction.
  2. Prevent residual problems with indoor air quality in the completed building.
- B. Product Emission Rate Standards: Test to ASTM D 5116 for Maximum Indoor Air Concentration Levels.
1. Formaldehyde:
    - a. 0.03 parts per million where no other requirements are specified.
    - b. 0.005 parts per million where products are specified as formaldehyde free.
  2. Total VOC Emissions for Carpet Tile, Adhesives, and Sealers: 0.05 mg/m<sup>2</sup> per hour.
  3. 4 Phenyl Cyclohexene (4-PC) Particulate Emissions for Carpet: 1 part per billion.
  4. Total Particulate Emission Rate Levels: 50 ug/m<sup>3</sup>.
  5. Primary and Secondary Regulated Pollutants: Conform to USEPA, Code of Federal Regulations, Title 40, Part 50 National Air Ambient Air Quality Standard. Refer to EPA Web Site: <http://www.epa.gov/epahome/rules.html#codified>.
  6. Other Pollutants not Listed: Not greater than 1/10 of Threshold Limit Value - Time Weighted Average (TLV-TWA) Industrial workplace standard.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Architectural Coatings - Volatile Organic Compound (VOC) Content Limits: Conform to US Environmental Protection Agency (EPA) Federal Register 48886/Vol. 63, No. 176 Friday, September 11, 1998/Rules and Regulations. Refer to EPA Web Site: <http://www.epa.gov/>.

1.4 SUBMITTALS

- A. Indoor Air Quality Construction Plan: Within fourteen (14) days of Notice to Proceed, prior to any waste removal by the Contractor, the Contractor shall develop and submit for review an indoor air quality plan, including the following:
  - 1. List of IAQ protective measures to be instituted on the site.
  - 2. Schedule for inspections and maintenance of IAQ measures.
- B. Substitutions: If the Contractor elects to use procedures, materials, equipment or products that are not specified, but meet the intent of these specifications, submit an alternative solution for approval.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Do not use products in combination with or in contact with other products that can be identified as combining to form toxic fumes or sustained odors.
- B. Do not use solvents within interior areas that may penetrate and be retained in absorptive materials such as concrete, gypsum board, wood, cellulose products, fibrous material, and textiles.

PART 3 - EXECUTION

3.1 GENERAL

- A. Protect construction materials from contamination and pollution from contact with construction dust, debris, fumes, solvents, and other environmentally polluting materials.
- B. Conduct regular inspection and maintenance of indoor air quality measures including ventilation system protection, and ventilation rate.
- C. Use low-toxic cleaning supplies for surfaces, equipment, and worker's personal use. Options include soybean-based solvents and cleaning options and citrus-based cleaners.
- D. Use safety meetings, signage, and subcontractor agreements to communicate the goals of the indoor air quality construction plan.
- E. Clean spills immediately involving solvents or cleaners.

3.2 HEATING, VENTILATING, AND AIR CONDITIONING

- A. The Contractor is required to meet or exceed the minimum requirements of the Sheet Metal and Air conditioning National Contractor's Association (SMACNA) IAQ Guidelines for Occupied Buildings Under Construction, 1995, and the following:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Do not run HVAC system during course of construction. Seal ductwork intake and exhaust vents as required.
2. Heat, dehumidify and ventilate building during course of Work as necessary to maintain environmental conditions suitable for drying and curing materials and for prevention of conditions suitable for mold and mildew growth.
  - a. Ventilate building removing moisture, dust, fumes, and odors.
  - b. Temper and dehumidify air as needed to remove excess moisture.
  - c. Refer to Division 01 Section "Temporary Facilities and Controls" for temporary heating requirements.
3. Flush out building prior to Substantial Completion.
  - a. Install new filters and run air handling units using 100 percent outside air for a two week period, or until five air exchanges of the building have been completed. Maintain indoor air temperature at 60 deg F during this period.
  - b. Install new filters following flush out.

3.3 MICROBIAL AND FUNGAL CONTAMINATION CONTROL

- A. Perform, schedule, and sequence Work as required to limit conditions supporting formations of microbes, molds, and fungi.
  1. Control water penetration, dampness, and humidity to prevent products not treated for exterior use from becoming soaked or damp.
- B. When visible formations are observed and when formations completely removed by non-abrasive surface cleaning:
  1. Remove and replace materials identified as food sources for microbes, molds, and fungi.
  2. Correct conditions supporting microbial, mold, and fungal growth.
- C. Remove interior products and finishes, identified as food sources, that have absorbed sufficient moisture to become damp whether or not microbial, mold, or fungal growth is observed. Products may include, but not be limited to, the following:
  1. Gypsum board cores.
  2. Organic materials composed of cellulose fiber or paper.
  3. Materials containing sucrose or other binders identified as supporting microbial growth.
- D. Remove fibrous insulation materials subject to retaining moisture such as duct liner, insulation, and other materials that are made wet or damp and cannot immediately be made dry.
- E. Repair or replace ductwork, pans, and other conditions where moisture condensation, water penetration, or drained water has caused damage to such materials.
  1. Remove conditions that have become an environment for microbes, molds, or fungi.
  2. Do not permit conditions leading to standing water.
- F. Remedial Action: Notify Owner, Owner's Representative, and Architect prior to beginning remedial action where continuation by hazardous chemicals, microbes, and fungi is suspected.

3.4 DUST CONTROL

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- A. Levels of airborne respirable dust in excess of 15pg/m<sup>3</sup> are considered excessive. Should such levels be reached or exceeded, discontinue activities which are creating dust, clean all surfaces, and take action to reduce the level of dust being created to within acceptable limits.

END OF SECTION 018119

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:
1. Demolition and removal of portion of existing building, including foundation, roofing, decking, windows, and exterior walls as indicated.
  2. Demolition and removal of gutters and downspouts, as indicated.
  3. Demolition and removal of wood deck stairs and railings as indicated.
  4. Demolition and removal of exterior basement windows as indicated.
  5. Demolition and removal of portions of interior wall framing, as indicated.
- B. Related Sections include the following:
1. Division 00 Section "Existing Hazardous Materials Information."
  2. Division 01 Section "Summary" for use of premises and Owner-occupancy requirements.
  3. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
  4. Division 01 Section "Cutting and Patching" for cutting and patching procedures.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site, unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Detach items from existing construction and deliver them to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare them for reuse, and reinstall them where indicated.
- D. Existing to Remain: Existing items of construction that are not to be removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

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

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1.5 PRE-DEMOLITION MEETING

- A. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of stairs.
  - 5. Locations of proposed dust- and noise-control temporary partitions and means of egress.
  - 6. Coordination of Owner's continuing occupancy of portions of existing building.
  - 7. Means of protection for items to remain and items in path of waste removal from building.
- C. Predemolition Photographs or Video: Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI A10.6 and NFPA 241.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.9 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
  - 1. Comply with requirements specified in Division 01 Section "Summary."
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are present in construction to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
  - 1. Hazardous material remediation is specified in other Division 02 Sections.
  - 2. If unidentified hazardous materials are encountered during the work, do not disturb hazardous materials or items suspected of containing hazardous materials. Stop all work on the project and immediately notify Architect.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
  - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
  - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

**3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
  - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
    - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.

**3.3 PREPARATION**

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Comply with requirements for access and protection specified in Division 01 Section "Temporary Facilities and Controls."

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Division 01 Section "Temporary Facilities and Controls."
  6. Comply with indoor air quality requirements specified in Division 01 Section "Indoor Air Quality Construction Plan."
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

### 3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. 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.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. 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. Temporarily cover openings to remain.
  3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  5. Maintain adequate ventilation when using cutting torches.
  6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  9. Dispose of demolished items and materials promptly.
- B. Removed and Salvaged Items:
1. Clean salvaged items.
  2. Pack or crate items after cleaning. Identify contents of containers.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3. Store items in a secure area until delivery to Owner.
4. Transport items to Owner's storage area 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 reinstalled in their original locations after selective demolition operations are complete.

### 3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Cut concrete to a depth of at least 3/4 inch 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.
- B. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

### 3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated 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.
1. Do not allow demolished materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property.
1. Include cost of all transportation and disposal.
  2. Provide verification of all disposal trips.
  3. Hazardous materials are to be handled and disposed of in accordance with all State, Local, and Federal regulations.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 024119



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 028200 – ASBESTOS ABATEMENT

**PART 1 - GENERAL**

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Supplementary Conditions apply to this Section.
- B. Fuss & O’Neill EnviroScience, LLC Limited Hazardous Materials Inspection Report (Revised May 2014).
- C. Hazardous Materials Abatement Drawing HM-01, HM-02, and HM-03.

1.2 CONSULTANT

- A. The Owner and Architect shall retain a Consultant for the purposes of project management and monitoring during Asbestos Abatement. The Consultant will represent the Owner and Architect in all phases of the abatement project at the discretion of the Owner. The Asbestos Abatement Contractor (the “Contractor”) will regard the Consultant's direction as authoritative and binding as provided herein, in matters particularly but not limited to:
  - 1. Work area approval;
  - 2. Monitoring results review;
  - 3. Segment of work completion;
  - 4. Abatement completion;
  - 5. Submission of data, and
  - 6. Daily field punch list items.
- B. The State of Connecticut licensed Asbestos Consultant – Project Designer is Mr. Kevin J. McCarthy (license no. 000274).

1.3 SCOPE OF WORK

- A. Work outlined in this Section includes all work necessary for the removal and disposal of asbestos-containing materials (ACM) impacted during the renovations (the “Work”) to 94 Longdean Road in Fairfield, Connecticut (the “Site”). The Work includes, but is not limited to, asbestos abatement of:
  - 1. Black floor mastic,
  - 2. Chimney flue cement,
  - 3. Roof flashing, and
  - 4. Sheetrock and joint/taping compound.

1.4 USE OF THE CONTRACT DOCUMENTS

- A. It shall be incumbent upon the Contractor to visit the Site and determine what exists, its condition, and what will be required to accomplish the Work intended by the Contract Documents. No increase in the

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

Contract Sum will be permitted as a result of the Contractor's failure to visit the Site and understand the existing conditions.

- B. All work shall comply with the Contract Documents and with applicable codes, laws, regulations, and ordinances wherever applicable. The most stringent of all the foregoing shall govern.
- C. It is not intended that the Specifications show every detail of the Work, but the Contractor shall be required to furnish within the Contract Sum all material and labor necessary for the completion of the Work in accordance with the intent of the Specifications.
- D. In case of ambiguity among the Contract documents, the more stringent requirement as determined by the Consultant shall prevail.
- E. The Work of this Contract includes making modifications as necessary, subject to approval by Owner in consultation with the Consultant, to correct any conflicts.
- F. All items, not specifically mentioned in the Specifications but implied by trade practices to complete the work, shall be included.

1.5 EXAMINATION OF THE SITE

- A. It is understood that the Contractor has examined the Site and made their own estimates of the facility, conditions, locations and quantities of all building materials and difficulties attending the execution of the Work, and has based their price thereon.
- B. Except for unforeseeable concealed conditions as determined by the Consultant, the Contractor shall make no claim for additional cost due to the existing site conditions.

1.6 CONTRACTOR QUALIFICATIONS

- A. All bidders shall submit a record of prior experience in asbestos abatement projects, listing no less than three completed jobs in the past year, with all projects of similar size and scope. The Contractor shall list the experience and training of the project foremen and all on-site personnel. The information that should be included is as follows:
  - 1. Project Name and Address
  - 2. Owner's Name and Address
  - 3. Architect/Consultant
  - 4. Contract Amount
  - 5. Date of Completion
  - 6. Extras and Changes
- B. The Contractor selected must appear on the approved list of Asbestos Abatement Contractors on file at the State of Connecticut Department of Public Health (CTDPH) and hold a valid license for asbestos abatement within the State of Connecticut. The Owner and Architect reserve the right to disqualify a Contractor that has been cited for CTDPH violations based on their own independent review.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

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- C. Submit a written statement regarding whether the Contractor has ever been cited for non-compliance with federal or state asbestos and/or lead regulations pertaining to worker protection, removal, transport, or disposal.

**1.7 CONSTRUCTION PROGRESS SCHEDULE**

- A. To assure adequate planning and execution of the Work, and to assist the Consultant in reviewing the justification for the Contractor's applications for payment, the Contractor shall prepare and maintain a detailed Progress Schedule.
- B. Schedule of work for this Contract shall include the notification requirements to regulatory agencies for the Work.
- C. The Contractor shall supervise and direct all work of theirs and other trades using their best skill and attention. The Contractor shall be solely responsible for all construction means, methods, techniques, sequences, and procedures and for coordinating all portions of the work under the Contract.
- D. Due to the nature of this construction work, the scheduling or phasing of work under this Contract may be adjusted by the Owner. As long as the Scope of Work is not altered, adjustments to the project phasing shall have no effect on the contract price.
- E. The Contractor shall attend a pre-construction meeting and any sub-contractors. The assigned Supervisor must attend this meeting.

**1.8 TESTING LABORATORY SERVICES**

- A. The Contractor shall submit to the Consultant the name; address and qualifications of proposed laboratories intended to be utilized for sample analysis as required by this section.

**1.9 ADDITIONAL GENERAL REQUIREMENTS**

- A. The Contractor shall employ a competent State of Connecticut licensed Asbestos Abatement Supervisor with at least three years of experience on projects of similar scope and magnitude who shall be responsible for all work involving asbestos abatement as described in the specifications and defined in applicable regulations, and have full time daily supervision of the same. The Supervisor shall be the competent person as defined by OSHA regulations.
- B. The Contractor shall allow the work of this contract to be inspected if required by local, state, federal, and any other authorities having jurisdiction over such work. The Contractor shall immediately notify the Owner and Consultant and shall maintain written evidence of such inspection for review by the Owner and Consultant.
- C. The Contractor shall incur the cost of all fines resulting from regulatory non-compliance as issued by federal, state, and local agencies. The Contractor shall incur the cost of all work requirements mandated by federal, state, and local agencies as a result of regulatory non-compliance or negligence.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

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- D. The Contractor shall immediately notify the Owner, the Architect, and the Consultant of the delivery of all permits, licenses, certificates of inspection, of approval, or occupancy, etc., and any other such instruments required under codes by authorities having jurisdiction, regardless of who issued, and shall cause them to be displayed to the Owner, the Architect, and the Consultant for verification and recording.

1.10 PROJECT DESCRIPTION

- A. The base bid includes removing, packaging, transporting, and disposing all ACM identified in the scope of work for the Site as identified herein by workers meeting requirements of OSHA Title CFR 1926, Part 1101 for Class 2 work.
- B. Additional materials as discovered outside of the quantities listed will be covered by unit prices. In addition materials that are below the quantities listed will be covered by unit prices for credit to the Owner.
- C. The quantities are estimates only and should be verified by the Contractor. Discrepancies shall be identified in the bid documents.
- D. This bid includes the following asbestos containing materials:

**BASE BID - ASBESTOS**

<b>LOCATION</b>	<b>MATERIAL TYPE</b>	<b>ESTIMATED QUANTITY</b>
Basement	Black Floor Mastic	700 SF
Basement	Chimney Flue Cement	2 SF
Basement	Sheetrock & Joint/Taping Compound	500 SF
First Floor, Bedroom & Bathroom	Sheetrock & Joint/Taping Compound in Areas Scheduled to Be Impacted by Addition Construction <i>See Architect's Specifications and Drawings for Exact Locations</i>	200 SF
Exterior Roof	Roof Flashing	10 SF

- E. Some of the Work will be performed in multiple mobilizations, at different periods of time, in conjunction with other trades (i.e., other trades work, demolition work, etc.).
- F. Safety Data Sheets (SDS) for chemicals to be used during the project must be submitted to the Consultant prior to Site delivery.
- G. Encapsulants applied to any surface that will receive a new finish that requires an adhesive must be compatible with the application of the new finish.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- H. The Contractor shall be responsible for providing temporary water, power, and heat as needed at the Site. Temporary lighting within the work areas must be connected to Ground Fault Circuit Interrupter (GFCI) power panels, installed by a State of Connecticut-licensed electrician, and located outside of the work areas.
- I. If work practices result in ACM breaching the interior of the building during abatement, then the Contractor shall be responsible for providing preparation of negative pressure enclosures (NPE), cleaning, etc. at no additional cost to the Owner.

1.11 DEFINITIONS

- A. The following definitions relative to asbestos abatement apply:
  - 1. Abatement - Procedures to control fiber release from asbestos-containing materials; includes removal, encapsulation, and enclosure.
  - 2. Air Monitoring - The process of measuring the fiber concentration of an area or of a person.
  - 3. Amended Water - Water to which a surfactant has been added.
  - 4. Architect - Quisenberry Arcari Architects, LLC
  - 5. Asbestos - The name given to a number of naturally occurring fibrous silicates. This includes the serpentine forms and the amphiboles and includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite, or any of these forms, which have been chemically altered.
  - 6. Asbestos Felt - A product made by saturating felted asbestos with asphalt or other suitable bindery, such as a synthetic elastomer.
  - 7. Asbestos Fibers - Those particles with a length greater than five (5) microns and a length to diameter ratio of 3:1 or greater.
  - 8. Asbestos Work Area - A regulated area as defined by OSHA Title 29 CFR, Part 1926.1101 where asbestos abatement operations are performed which is isolated by physical barriers to prevent the spread of asbestos dust, fibers, or debris. The regulated area shall comply with requirements of regulated area for demarcation, access, respirators, prohibited activities, competent persons and exposure assessments and monitoring.
  - 9. Caulking - Resilient mastic compound often having a silicone bituminous or rubber base; used to seal cracks, fill joints, and prevent leakage. Typical applications: around windows, and doors. Caulking is at joints between two dissimilar materials. (i.e., masonry to wood, masonry to steel)
  - 10. Clean Room - An uncontaminated area or room, which is a part of the worker decontamination system with provisions for storage of workers' street clothes and protective equipment.
  - 11. Clearance Sampling - Final air sampling performed aggressively after the completion of the abatement project in a regulated area. Air samples collected by the air sampling professional having a fiber concentration of less than 0.01 fibers/cc of air in each of five (5) samples collected inside the containment will denote acceptable clearance sampling by Phase Contrast Microscopy or Five air samples collected inside the containment by the air sampling professional having an average asbestos concentration of less than 70 structures per square millimeter of air ( $S/mm^2$ ) will denote acceptable clearance sampling for Transmission Electron Microscopy (TEM).
  - 12. Competent Person - As defined by OSHA Title 29 CFR, Part 1926.1101, a representative of the Abatement Contractor who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure & who has authority to take prompt corrective measures to eliminate such hazards during asbestos removal. Competent person

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- shall be properly trained in accordance with United States Environmental Protection Agency's (EPA) Model Accreditation Plan (MAP).
13. Consultant – Fuss & O'Neill EnviroScience, LLC
  14. Curtained Doorway - A device to allow ingress and egress from one area to another while permitting minimal air movement between the areas. Two curtained doorways spaced a minimum of six feet apart can form an airlock.
  15. Damproofing - Application of a water impervious material to surface such as wall to prevent penetration of moisture, typically at foundation or below grade surface.
  16. Decontamination System - A series of connected areas, with curtained doorways between any two adjacent areas, for the decontamination of workers and equipment. A decontamination system always contains at least one airlock and is adjacent and connected to the regulated area, where possible.
  17. Encapsulant - A liquid material which can be applied to ACM which controls the possible release of asbestos fibers from the materials either by creating a membrane over the surface (bridging encapsulant) or penetrating the material and binding its components together (penetrating encapsulant).
  18. Equipment Room - Any contaminated area or a room that is part of the worker decontamination system with provisions for storage of contaminated clothing and equipment.
  19. Fixed Object - Unit of equipment or furniture in the work areas that cannot be removed from the work area.
  20. Friable Asbestos Materials - Any material that contains more than 1% asbestos by weight, that can be crumbled, pulverized or reduced to powder by hand pressure.
  21. GFCI – Ground Fault Circuit Interrupter
  22. Glazing Compound - Any compound used to hold window glass in place, also referred to as putty, or glazier's putty. It is not field-applied; usually installed during manufacture of windows.
  23. HEPA - High Efficiency Particulate Air filtering system capable of filtering out particles of 0.3 microns diameter from a body of air at 99.97% efficiency or greater
  24. HEPA Filter - HEPA filter in compliance with ANSI Z9.2 1979.
  25. HEPA Vacuum Equipment - Vacuum equipment equipped with a HEPA filter system for filtering the effluent air from the unit.
  26. Moveable Object - Unit of equipment of furniture in the work area that can be removed from the work area.
  27. Negative Air Pressure Equipment - A portable local exhaust system equipped with HEPA filtration used to create negative pressure in a regulated area (negative with respect to adjacent unregulated areas) and capable of maintaining a constant, low velocity air flow into regulated areas from adjacent unregulated areas.
  28. NESHAPs - National Emissions Standard for Hazardous Air Pollutants regulations enforced by the EPA.
  29. Owner – Anne Sweeney
  30. Permissible Exposure Limit (PEL) - The maximum airborne concentration of total airborne fibers to which an employee is allowed to be exposed. The new level established by OSHA Title 29 CFR, Part 1926.1101 is 0.1 fibers per cubic centimeter (fibers/cc) of air as an eight-hour time weighted average and 1.0 fibers/cc averaged over a sampling period of 30 minutes as an Excursion Limit. The Contractor is responsible for maintaining work areas in a manner that this standard is not exceeded.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

31. Project Monitor - A professional capable of conducting air monitoring and analysis of schemes. This individual should be an industrial hygienist, an environmental scientist, or an engineer with experience in asbestos air monitoring and worker protection equipment and procedures. This individual should have demonstrated proficiency in conducting air sample collection in accordance with Title 29 CFR, Parts 1910.1001 and Part 1926.1101.
32. Regulated Area - An area established by the employer to demarcate where Class I, II, and III asbestos work is conducted and any adjoining area where debris and waste from such asbestos work accumulate, and a work area within which total airborne fiber concentrations exceed, or there is a reasonable possibility that they may exceed the PEL.
33. Shower Room - A room between the clean room and the equipment room in the work decontamination system with hot and cold running water and suitably arranged for employee showering during decontamination. The shower room is located in an airlock between the contaminated area and the clean area.
34. Waterproofing - Material, usually a membrane or applied compound (tar/mastic), used to make a surface impervious to water, includes concealed conditions (applications around doors, windows, and in wall cavities). Sometimes combined with felts.

1.12 PRE-CONSTRUCTION SUBMITTALS

- A. The Contractor shall submit the following to the Consultant in one complete package prior to the pre-construction meeting, and no later than 10 business days prior to the anticipated start of the Work:
  1. A schedule to the Owner and the Consultant that defines a timetable for executing and completing the project, including work area preparations, removal, cleanup, decontamination, and final clearance air monitoring (if applicable).
  2. The current valid State of Connecticut Asbestos Abatement Contractor CTDPH license and certificate of insurance.
  3. The name and address of the hauling contractor and location of the landfill to be used and current valid operating permits and certificates of insurance for the transporter and landfill.
  4. Video documentation showing the conditions of the building prior to the start of work. The Contractor shall be held responsible for all damage to the building and its contents not shown on the pre-construction video documentation.
  5. The plans and construction details for the construction of the decontamination systems and the isolation of the work areas as may be necessary for compliance with this specification and applicable regulations.
  6. The training, medical, respirator fit test records, and CTDPH licenses of each employee who may be on the project Site.
  7. The qualifications of the air sampling professional that the Contractor proposed to use for this project to perform OSHA-required employee exposure monitoring.
  8. Detailed product information on all materials and equipment proposed for asbestos abatement work on this project.
  9. Pertinent information regarding the qualifications of the Project Supervisor (competent person) for this project, as well as a list of past projects completed.
  10. A chain-of-command for the project.
  11. A site-specific Emergency Action Plan for the project.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

12. A written site-specific Respiratory Protection Program for employees for the Work, including make, model and National Institute of Occupational Safety and Health (NIOSH) approval numbers of respirators to be used at the Site (if applicable).
13. No work on the Site will be allowed to begin until the Owner and the Consultant as listed herein approve the Pre-Construction Submittals. Any delay caused by the Contractor's refusal or inability to submit this documentation in a timely manner does not constitute a cause for change order or a time extension.

B. The Contractor shall submit the following to the Consultant during the work:

1. Copies of personal air sampling results (Consultant will not review or provide any direction or advice regarding results. The Contractor is responsible for proper review and personal protective equipment (PPE). Records are retained solely for project record).
2. Copies of training, CTDPH licenses, fit test records and medical records for new employees to start work (24-hours in advance) and prior to the new employee arriving at the Site.
3. Carbon copies from waste shipment record, waste manifest records, bill of lading or other waste tracking record for all specified materials.
4. Copies of daily log sheets, daily sign-in sheets, and containment sign-in sheets.

C. The Contractor shall submit the following to the Consultant at the completion of work. Owner reserves right to retain payment(s) until all items are received in completion:

1. Original final completed copies of the waste shipment records, signed by all transporters and the designated disposal site owner/operator.
2. Original final completed copies of bill of lading, weight tickets, recycling tickets and manifests for all specified materials.
3. Contractor's logs (daily activity logs, daily sign in sheets, containment sign-in sheets) and all worker training, CTDPH licenses, medical records and respirator fit tests.
4. Copies of all OSHA personal monitoring results.

#### 1.13 REGULATIONS AND STANDARDS

A. The Contractor shall be solely responsible for conducting this project and supervising all work in a manner that will be in conformance with all federal, state, and local regulations and guidelines pertaining to asbestos abatement. Specifically, the Contractor shall comply with the requirements of the following:

1. EPA National Emissions Standards for Hazardous Air Pollutants (NESHAPS) Regulations (Title 40 CFR, Part 61, Subpart M);
2. OSHA Asbestos Regulations (Title 29 CFR, Parts 1910.1001 and 1926.1101);
3. Connecticut Department of Energy and Environmental Protection (DEEP) Regulations (Section 22a 209 8(i) and Section 22a 220 of the Connecticut General Statutes);
4. CTDPH Standards for Asbestos Abatement (Sections 19a-332a- 1 to 19a-332a-16);
5. CTDPH Licensing and Training Requirements for Persons Engaged in Asbestos Abatement and Asbestos Consultant Services (Sections 20-440-1 to 20-440-9 and Section 20-441);
6. United States Department of Transportation (DOT) Hazardous Materials Regulations (Title 49 CFR, Parts 171 – 180)

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

7. 2003 International Building Code as adopted by the 2005 State of Connecticut Building Code including the 2009, 2011, and 2013 amendments;
8. Life Safety Code (National Fire Protection Association [NFPA]);
9. Local health and safety codes, ordinances or regulations pertaining to asbestos remediation and all national codes and standards including ASTM, ANSI, and Underwriter's Laboratories.

**1.14 EXEMPTIONS**

- A. Any deviations from these specifications require the prior written approval and authorization from the Owner and Consultant. Any deviations that may impact the bid cost shall be delineated in the bid for the Owner and Consultant to review.
- B. Any modifications from the standard work practices identified in the State of CTDPH Standards for Asbestos Abatement, Sections 19a-332a-1 to 19a-332a-16, must be requested in writing, and approved in writing from the CTDPH. The Consultant shall develop an Alternate Work Practice (AWP) on behalf of the Owner if necessary to address any variance. If the Contractor plans to request a variance for this project, it shall be disclosed in the bid documents and the cost savings associated with such a variance shall be provided.

**1.15 FINAL RE-OCCUPANCY AIR CLEARANCE SAMPLING**

- A. Following the completion of the encapsulation phase of the Work, the Consultant shall collect final re-occupancy clearance air samples inside the work area per CTDPH Standards for Asbestos Abatement (19a-332-1 to 19a-332-16).
- B. The Owner shall be responsible for payment of the air sampling and analysis of the initial final clearance air samples, only. If the first set of samples fail to satisfy the re-occupancy criteria stated herein, the Contractor shall be responsible for payment of all costs associated with the collection and analysis of additional final clearance air samples. This shall include all Consultant, shipping, and laboratory costs

**1.16 NOTIFICATIONS, POSTINGS, SUBMITTALS, AND PERMITS**

- A. The Contractor shall make the following notifications, and provide the submittals to the following state agencies prior to the commencement of abatement. This notification is required 10 calendar days prior to the start of the abatement project:
  1. Connecticut Department of Energy and Environmental Protection  
Health Services and Solid Waste Management Unit  
79 Elm St.  
Hartford, CT 06106  
(Only if asbestos waste is disposed in Connecticut)
  2. Connecticut Department of Public Health  
410 Capital Avenue  
MS #51 AIR  
P.O. Box 340308  
Hartford, CT 06134

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. The minimum information included in the notification to these agencies includes:
1. Name and address of building Owner/Operator
  2. Building location
  3. Building size, age, and use
  4. Amount of asbestos
  5. Work schedule, including proposed start and completion date
  6. Asbestos removal procedures to be used
  7. Name and location of disposal site for generated asbestos waste, residue, and debris
  8. If landfill opens in Connecticut to accept ACM waste, Consultant will notify DEEP prior to utilizing said landfill.

1.17 WORK SITE SAFETY PLAN

- A. The Contractor shall establish a set of emergency procedures and shall post them in a conspicuous place at the Site. The safety plan should include provisions for the following:
1. Evacuation of injured workers.
  2. Emergency and fire exit routes from all work areas.
  3. Emergency first aid treatment.
  4. Local telephone numbers for emergency services including ambulance, fire, and police.
  5. A method to notify occupants of the building in the event of a fire or other emergency requiring building evacuation.
- B. The Contractor shall be responsible for properly training all workers in these procedures.

1.18 CONTRACTOR'S AIR SAMPLING RESPONSIBILITY

- A. The Contractor shall independently retain an air sampling professional to monitor total airborne fiber concentrations in the workers' breathing zone and to establish conditions and work procedures for maintaining compliance with OSHA Title 29 CFR, Parts 1910.1001 and 1926.1101.
- B. The Contractor's air sampling professional shall document all air sampling results and provide a report to the Consultant within 48-hours after sample collection.
- C. All air sampling shall be conducted in accordance with methods described in OSHA Title 29 CFR, Parts 1910.1001 and 1926.1101.

1.19 PROPER WORKER PROTECTION

- A. This Section describes the equipment and procedures required for protecting workers against asbestos contamination, and other workplace hazards except for respiratory protection.
- B. All workers are to be accredited as Abatement Workers and Supervisors as required by the CTDPH Licensing and Training Requirements for Persons Engaged in Asbestos Abatement and Asbestos Consultant Services (Sections 20-440-1 to 20-440-9 and 20-441)
- C. The Contractor shall be required to be certified and accredited, as required by the CTDPH.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. In accordance with Title 29 CFR, Part 1926, all workers shall receive a training course covering the dangers inherent in handling asbestos, the dangers of breathing asbestos dust, proper work procedures, and proper worker protective measures. This course must include, but is not limited to the following:
1. Methods of recognizing asbestos
  2. Health effects associated with asbestos
  3. Relationship between smoking and asbestos in producing lung cancer
  4. Nature of operations that could result in exposure to asbestos
  5. Importance of and instruction in the use of necessary protective controls, practices and procedures to minimize exposure including:
    - a. Engineering controls
    - b. Work Practices
    - c. Respirators
    - d. Housekeeping procedures
    - e. Hygiene facilities
    - f. Protective clothing
    - g. Decontamination procedures
    - h. Emergency procedures
    - i. Waste disposal procedures
  6. Purpose, proper use, fitting, instructions, and limitations of respirators as required by OSHA Title 29 CFR, Part 1910.134
  7. Appropriate work practices for the work
  8. Requirements of medical surveillance program
  9. Review of OSHA Title 29 CFR, Part 1926
  10. Pressure Differential Systems
  11. Work practices including hands on or on job training
  12. Personal Decontamination procedures
  13. Air monitoring, personal and area
- E. The Contractor shall provide medical examinations for all workers who may encounter a total airborne fiber concentration of 0.1 fibers/cc or greater for an 8-hour Time-Weighted Average (TWA). In the absence of specific airborne fiber data, provide medical examinations for all workers who will enter the work area for any reason. Examination shall, at a minimum, meet OSHA requirements as set forth in OSHA Title 29 CFR, Part 1926. In addition, provide an evaluation of the individual's ability to work in environments capable of producing heat stress in the worker.
- F. Submit the following to the Consultant for review. The Contractor shall not start work until these submittals are returned with Consultant action stamp indicating that they are accepted.
1. Submit copies of certificates from an EPA-approved AHERA Abatement Workers course for each worker as evidence that each Asbestos Abatement Worker is accredited as required by the EPA's AHERA Regulation Title 40 CFR, Part 763 Appendix C to Subpart E, February 3, 1994.
  2. Submit evidence that the Contractor is currently certified to perform asbestos abatement work by CTDPH.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3. Submit documents verifying that each worker has undergone a medical examination within the last 12 months as part of compliance with OSHA medical surveillance requirements. Submit, at a minimum, for each worker the following:
    - a. Name and Social Security Number
    - b. Physicians Written Opinion from examining physician including at a minimum the following:
      - 1) Whether worker has any detected medical conditions that would place the worker at an increased risk of material health impairment from exposure to asbestos.
      - 2) Any recommended limitations on the worker or on the use of personal protective equipment such as respirators.
      - 3) Statement that the worker has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
  4. Copy of information that was provided to physician in compliance with OSHA Title 29 CFR, Part 1926.
  5. Statement that worker is able to wear and use the type of respiratory protection proposed for the project, and is able to work safely in an environment capable of producing heat stress in the worker.
  6. Submit copies of certificates for the site supervisor and the workers issued by CTDPH.
- G. Submit certification signed by an officer of the abatement-contracting firm and notarized that personal exposure measurements, medical surveillance, and worker training records are in compliance with OSHA Title 29 CFR, Part 1926.
- H. The Contractor shall maintain control of and shall be responsible for access to all work areas to ensure the following requirements:
1. Non-essential personnel are prohibited from entering the area.
  2. All authorized personnel entering the work area shall read the “Worker Protection Procedures” which are posted at the entry points to the system, and shall be equipped with properly fitted respirators and protective clothing.
  3. All personnel who are exiting from the decontamination system shall be properly and thoroughly decontaminated.
  4. Asbestos waste that is removed from the work area must be properly bagged and labeled in accordance with these specifications. The surface of the bags shall be decontaminated. Asbestos waste leaving the system must be immediately transported off site or immediately placed in locked, posted temporary storage located on site, and removed within 24-hours of project completion.
  5. Any material, equipment, or supplies that are removed from the decontamination system shall be thoroughly cleaned and decontaminated by wet cleaning and/or HEPA vacuuming of all surfaces.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- A. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name and product technical description.
- B. Damaged or deteriorating materials shall not be used and shall be removed from the Site. Material that becomes contaminated with asbestos shall be decontaminated or disposed as asbestos waste.
- C. Polyethylene (poly) sheeting in a roll size to minimize the frequency of joints shall be delivered to the Site with a factory label indicating 4 or 6-mil thickness.
- D. Poly disposable bags shall be 6-mil thickness with pertinent pre-printed label. Tie wraps for bags shall be plastic, five-inches long (minimum), pointed and looped to secure filled plastic bags.
- E. Tape or spray-adhesive will be capable of sealing joints in adjacent poly sheets and for attachment of poly sheet to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.
- F. Surfactant (wetting agent), shall consist of 50 percent polyoxyethylene ether and 50 percent polyoxyethylene ester, or equivalent, and shall be mixed with water to provide a concentration of one ounce surfactant to five-gallons of water or as directed by manufacturer.
- G. Removal encapsulant shall be non-flammable factory prepared penetrating chemical encapsulant deemed acceptable to Consultant. Usage shall be in accordance with manufacturer's printed technical data.
- H. The Contractor shall have available spray equipment capable of mixing wetting agent with water and capable of generating sufficient pressure and volume and having sufficient hose length to reach all areas with asbestos.
- I. Impermeable containers are to be used to received and retain any asbestos-containing or contaminated materials until disposal at an acceptable disposal site. The containers shall be labeled in accordance with OSHA Title 29 CFR, Part 1926.1101. Containers must be both air and watertight.
- J. OSHA-required asbestos labels and warning signs shall be used.
- K. Encapsulant shall be bridging or penetrating type that has been deemed acceptable to the Consultant. Usage shall be in accordance with manufacturer's printed technical data.
- L. HEPA-filtered local exhaust ventilation shall be utilized during the installation of enclosures and supports where ACM may be disturbed.

**2.2 TOOLS AND EQUIPMENT**

- A. The Contractor shall provide all tools and equipment necessary for asbestos removal, encapsulation and enclosure.
- B. The Contractor's air monitoring professional shall have air-monitoring equipment of type and quantity to monitor operations and conduct personnel exposure surveillance per OSHA requirements.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. The Contractor shall have available sufficient inventory or dated purchase orders for materials necessary for the job including protective clothing, respirators, filter cartridges, poly sheeting of proper size and thickness, tape and air filters.
- D. The Contractor shall provide (as needed) temporary electrical power panels, electrical power cables, and electrical power sources (such as generators). Any electrical connection work affecting the building electrical power system shall be performed by a State of Connecticut-licensed electrician.
- E. The Contractor shall have available shower stalls and plumbing to support same to include sufficient hose length and drain system or an acceptable alternate.
- F. Exhaust air filtration system units shall contain HEPA filter(s) capable of sufficient air exhaust to create negative pressure of -0.02 inches of the water column within the enclosure with respect to outside area. Equipment shall be checked for proper operation by smoke tubes or differential pressure gauge before the start of each shift and at least twice during the shift. Adequate exhaust air shall be provided for a minimum of four air changes per hour within the enclosure. Exhaust shall be vented directly to the building exterior; no air movement system or air filtering equipment shall discharge unfiltered air outside.
- G. Vacuum units, of suitable size and capacities for the project, shall have HEPA filter(s) capable of trapping and retaining at least 99.97 percent of all monodispersed particles of 0.3 micrometers in diameter or larger.
- H. The Contractor shall have reserve exhaust air filtration system units, so that the station system will operate continuously.

**PART 3 - EXECUTION**

**3.1 PRE-CONSTRUCTION MEETING**

- A. At least one week prior to the start of work, a Pre-Construction Meeting will be scheduled and must be attended by the Contractor and any Subcontractors. The assigned Contractor Site Supervisor is also required to attend this meeting.
- B. The Contractor shall present a detailed project schedule and project submittal package at the Pre-Construction Meeting. Variations, amendments, and corrections to the presented schedule will be discussed, and the Owner, Architect, and Consultant will inform the Contractor of any scheduling adjustments for this project.
- C. Following the Pre-Construction Meeting, the Contractor shall submit a revised schedule (if needed) no later than one week after the meeting.

**3.2 WORK AREA PREPARATION**

- A. Where necessary, deactivate electrical power, including receptacles and light fixtures. Under no circumstances during the decontamination procedures will lighting fixtures be permitted to be operating while spraying of amended water may contact the fixture. Provide GFCI devices, temporary power, and temporary lighting installed in compliance with the applicable electrical codes. All installations are to be

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

made by a State of Connecticut-licensed electrician and properly permitted by local building department (if required).

- B. Deactivate and/or isolate heating, ventilating, and air conditioning (HVAC) air systems or zones to prevent contamination and fiber dispersal to other areas of the structure. During the work, vents within the work area shall be covered with one layer of 6-mil poly sheeting sealed with duct tape and glue.
- C. The Contractor shall be responsible for removing furniture from the work areas. The Contractor shall pre-clean moveable objects within the proposed work areas using HEPA vacuum equipment and/or wet cleaning methods as appropriate and remove such objects from work areas to a temporary location. For example, cabinets to gain access to floor tile and associated mastic.
- D. Completely seal off all openings, including, but not limited to: windows, corridors, doorways, skylights, ducts, grills, diffusers, and any other penetration of the work areas, with poly sheeting a minimum of 6-mil thick, sealed with duct tape. This includes doorways and corridors that will not be used for passage during work areas and occupied areas.
- E. Pre-clean fixed objects within the work areas, using HEPA vacuum equipment and/or wet cleaning methods as appropriate, and enclose with a minimum 6-mil poly sheeting sealed with duct tape.
- F. Clean the proposed work areas using HEPA vacuum equipment or wet cleaning methods as appropriate. Do not use methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters.
- G. After HEPA vacuum cleaning, cover fixed walls with two layers of 4-mil poly sheeting to the floor level. Where fixed walls are not used, two layers of 6-mil poly sheeting will be applied to a rigid framework of wood, metal, or PVC. Where floor tile/mastic is not being abated, cover the floor with two layers of 6-mil poly sheeting. All overlaps shall be sealed with tape or spray adhesive.
- H. Maintain emergency and fire exits from the work areas, or establish alternate exits satisfactory to fire officials.
- I. Clean and remove ceiling-mounted objects, such as lights and other items not covered with poly sheeting that interfere with asbestos abatement. Use hand-held amended water spraying or HEPA vacuum equipment during fixture removal to reduce settled fiber dispersal.
- J. Create pressure differential between work areas and uncontaminated areas by the use of acceptable negative air pressure equipment sufficient to provide four air changes per hour and create negative pressure of -0.02 inches of the water column within enclosure with respect to outside area as measured on a water gauge.

### 3.3 DECONTAMINATION SYSTEM

- A. The Contractor shall establish contiguous to the work area, a decontamination system consisting of equipment room, shower room, and clean room in series. The only access between contaminated and uncontaminated areas shall be through this decontamination system.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Access between rooms in the decontamination system shall be through double flap curtain openings. The clean room, shower and equipment room within the decontamination system, shall be completely sealed ensuring that the sole source of airflow through this area originates from uncontaminated areas outside the work area.
- C. The Contractor shall establish an equipment decontamination system contiguous with the work area. This shall consist of two fully-enclosed chambers divided by double flap curtained opening. This system must be constructed so as to ensure that no personnel enter or exit through this unit.
- D. Construct the decontamination system with wood or metal framing, cover both sides with a double layer of 6-mil poly sheeting, sealed at the joints.
- E. The Contractor and the Consultant shall visually inspect barriers several times daily to assure effective seal and the Contractor shall repair defects immediately.

3.4 ASBESTOS REMOVAL PROCEDURE - GENERAL

- A. The Contractor shall have a designated “competent person” on Site at all times to ensure establishment of a proper enclosure system and proper work practices throughout project.
  - B. Abatement work will not commence until authorized by the Consultant.
  - C. Mist ACM with amended water using airless spray equipment or apply approved removal wetting agent to reduce the fiber release during the removal operation. The Consultant shall pre-approve the use of amended water as the wetting agent.
  - D. To maintain indoor asbestos concentrations to the minimum, the wet asbestos must be removed in manageable sections.
  - E. Remove ACM as appropriate by standard methods. Fill disposal containers as removal proceeds; seal filled containers and clean containers before removal to equipment decontamination system. Wet clean each container thoroughly, double bag and apply caution label. Ensure that workers do not exit the work area through the equipment decontamination system.
- A. After completion of removal work, all surfaces from which asbestos has been removed shall be wet brushed, using a nylon brush, wet wiped, and sponged or cleaned by an equivalent method to remove all visible material (wire brushes are prohibited). During this work, the surfaces being cleaned shall be kept adequately wet.
  - B. Remove and containerize all visible accumulations of ACM or asbestos-contaminated debris. During cleanup, utilize brooms, rubber dustpan, and rubber squeegees to minimize damage to subfloor.
  - C. Sealed disposal containers, and all equipment used in the work area, shall be included in the cleanup and shall be removed from work areas via the equipment decontamination system at an appropriate time in the cleaning sequence. All asbestos waste in 6-mil poly disposal bags shall be double bagged in the equipment room of the decontamination system before removal from the Site.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. At any time during asbestos removal, should the Consultant suspect contamination of areas outside the work area(s), the Contractor shall stop work and take the necessary steps to decontaminate these areas and eliminate the causes of such contamination. Unprotected individuals shall be prohibited from entering suspected contaminated areas until air sampling and visual inspections certify decontamination.
- E. After completion of the initial final cleaning procedure including removal of the inner layers of poly sheeting, but prior to encapsulation, a pre-sealant inspection shall be conducted by the Consultant. The pre-sealant inspection shall verify that ACM and residual dust has been removed from the work area.

**3.5 ASBESTOS REMOVAL PROCEDURES – BLACK FLOOR MASTIC**

- A. Prior to the removal of black floor mastic, the Contractor shall ensure that work area preparation has been conducted in accordance with Section 3.2 and 3.3 of this Specification.
- B. The Contractor shall remove binding strips, all vinyl wall base, or other restrictive molding from doorways, walls, etc., clean and dispose of as non-asbestos waste. Dispose any materials coated with floor mastic as asbestos-containing waste.
- C. The Contractor shall wet the floor with amended water or detergent solution, so that entire surface is wet. Do not allow to puddle or run off into other areas. If a detergent is used, use in strict accordance with manufacturer's instructions. Allow time for humidity and water or removal encapsulant to loosen tiles prior to removal.
- D. The Contractor shall keep floor continuously wet throughout removal operation.
- E. If chemical stripping agents are utilized, the Contractor must obtain the Owner's permission to use chemical stripping agents prior to use on-site.

**3.6 ASBESTOS REMOVAL PROCEDURE – EXTERIOR ROOFING**

- A. Following a federal court of appeals decision, the OSHA has issued a final rule on June 29, 1998 removing regulation of asbestos-containing asphalt roof cements, mastics and coatings from the OSHA standards for occupational exposure to asbestos in construction and shipyard work. However, friable materials (felts, papers, etc.) continue to be regulated by OSHA, federal (no visible emissions) and state entities.
- B. Exterior non-friable materials which are not RACM as defined by the EPA and CTDPH are not required to be removed by a CTDPH-licensed asbestos abatement contractor in the State of Connecticut. This is true as long as the proposed methods of removal will not render the Category I non-friable roofing materials RACM during proposed roof removal operations.
- C. Supervisors and workers are not required to be certified in the State of Connecticut unless the Category I non-friable roofing materials become RACM. Workers must be properly trained in compliance with OSHA regulations.
- D. The Contractor shall have a designated "competent person" on the job at all times to ensure proper work practices throughout the project.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

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- E. The Contractor shall regulate the work area as required for compliance with OSHA regulation 29 CFR 1926.1101 to prohibit non-trained workers from entering areas where ACM are to be removed.
- F. The Contractor shall establish a remote worker decontamination in close proximity to the work area.
- G. The Contractor shall spray asbestos materials with amended water using airless spray equipment or apply approved removal wetting agent to ensure no visible emissions during removal of Category I non-friable roofing materials.
- H. The wet asbestos must be removed in manageable sections. Material drop shall not exceed 8 feet. For heights up to 15 feet, provide inclined chutes or scaffolding to intercept drop. For heights exceeding 15 feet, the Contractor shall provide an enclosed dust-proof chute.
- I. After completion of stripping work, all surfaces from which asbestos has been removed shall be wet wiped or cleaned by an equivalent method to remove all visible material (wire brushes are not permitted). During this work, the surfaces being cleaned shall be kept wet.
- J. Remove and containerize all visible accumulations of asbestos-containing and/or asbestos-contaminated debris. Waste shall be containerized in labeled and signed 6 mil poly disposable bags. Tie wraps for bags shall be plastic, 5-inches long (minimum), pointed and looped to secure filled plastic bags.
- K. If an enclosed dumpster is used in conjunction with a "bladder bag liner", the Contractor shall continuously inspect the dumpster and chute to ensure the integrity of the system.
- L. At any time during asbestos removal, should the Consultant suspect contamination of areas outside the work area(s), he shall cause all removal work to stop until the Contractor takes steps to decontaminate these areas and eliminate the causes of such contamination. Unprotected individuals shall be prohibited from entering suspected contaminated areas until air sampling and visual inspections certify decontamination.
- M. The Consultant may conduct a final visual inspection of the work area. If residual debris is identified during the final inspection, the Contractor shall comply with the request of the Consultant to render the area clean of all residual ACM.

3.7 CONSULTANT

- A. The Owner shall retain a Consultant for the purpose of construction administration, project monitoring, final visual inspection, and final re-occupancy air clearance sampling during Asbestos Abatement.
- B. The Consultant will represent the Owner in the abovementioned tasks of the abatement project at the discretion of the Owner.

3.8 CONSULTANT'S RESPONSIBILITIES

- A. The Consultant's project monitor shall collect and analyze air samples during the following time period:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Abatement Period. If required, the Consultant's project monitor shall collect air samples on a daily basis during the work period. A sufficient number of area air samples shall be collected outside of the work area, at the exhaust of the negative pressure system, and outside of the building to evaluate the degree of cleanliness or contamination of the building during removal. Additional air samples may be collected inside the work area and decontamination system, at the discretion of the project monitor.
  2. Post Abatement Period. The Consultant's project monitor shall conduct air sampling following the final cleanup phase of the project, once the "no visible residue" criterion, as established by the project monitor, has been met. Five inside work area air samples shall be collected utilizing aggressive methods to comply with the CTDPH Standards for Asbestos Abatement, Sections 19a-332a-12 and 19a-332a-13. Analysis of the air samples shall be performed by total airborne fiber concentrations shall be conducted by Phase Contrast Microscopy (PCM) with a limit of 0.010 fibers/cc of air in accordance with NIOSH Method 7400 sampling protocols.
- B. The Consultant's project monitor shall provide continual evaluation of the air quality of the building during removal, using their best professional judgment in respect to the CTDPH guideline of 0.010 fibers/cc and the background air quality established during the pre-abatement period.
- C. If the project monitor determines that the building air quality has become contaminated from the project, they shall immediately inform the Contractor to cease all removal operations and implement a work stoppage clean up procedure. The Contractor shall conduct a thorough cleanup of the building areas designated by the Consultant. No further removal work may occur until the project monitor has assessed that the building air has been decontaminated.
- D. Abatement air samples shall be collected as required to obtain a volume of 1,200 liters of air. Air samples shall be analyzed by PCM NIOSH Method 7400 sampling protocol.

### 3.9 CONSULTANT'S INSPECTION RESPONSIBILITIES

- A. The Consultant's project monitor shall perform the following inspections during abatement activities:
1. Pre-commencement Inspection. Pre-commencement inspections may be performed at the time requested by the Contractor. The Consultant shall be informed a minimum of 12-hours prior to the time the inspection is required. If, during the course of the pre-commencement inspection, deficiencies are identified, the Contractor shall perform the necessary adjustments to obtain compliance.
  2. Work Area Inspections. Work area inspections may be conducted on a daily basis at the discretion of the Consultant. During the work inspections, the Consultant shall observe the Contractor's removal methods and procedures, verify barrier integrity, monitor negative air filtration devices, assess project progress, and inform the Contractor of specific remedial activities if deficiencies are noted.
  3. Pre-Sealant Inspection. Upon the request of the Contractor, the Consultant shall conduct a pre-sealant inspection. The Consultant shall be informed a minimum of 24-hours prior the time that the inspection is required. The pre-sealant inspection shall be conducted after completion of the initial cleaning procedures, but prior to encapsulation. The pre-sealant inspection shall verify that all ACM and residual debris have been visibly removed from the work area and encapsulation of

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

the work area. If during the pre-sealant inspection the Consultant identifies residual dust or debris, the Contractor shall comply with the request of the Consultant to render the area “dust free.”

4. Final Visual Inspection. The Consultant, upon request of the Contractor, shall conduct a final visual inspection. Following the removal of the inner layer of poly sheeting and prior to final re-occupancy air clearance, the Consultant shall conduct a final visual inspection inside the work area. If residual dust or debris is identified during the course of the final inspection, the Contractor shall comply with the request of the Consultant to render the area “dust free.”

3.10 RE-OCCUPANCY CLEARANCE AIR SAMPLING

- A. After the visual inspection is completed and all surfaces in the abatement area have dried, the Consultant shall perform final re-occupancy clearance air sampling. Aggressive air monitoring will be used. Selection of location and of samples shall be Consultant’s responsibility. Air monitoring volumes shall be sufficient to provide a minimum detection limit of 0.010 fibers/cc using PCM NIOSH Method 7400 sampling protocol.
- B. The Contractor shall continue to clean areas that do not comply with the Standard for Cleaning for Initial Clearance at the Contractor’s expense, until the specified Standard of Cleaning is achieved as evidenced by air sample results.

3.11 DISPOSAL OF ASBESTOS

- A. All ACM or asbestos-contaminated material disposal must be in compliance with requirements of and authorized by the CTDEEP Office of Solid Waste Management and the State of Connecticut.
- B. Obtain disposal approvals of approved disposal authorization to the Owner and the Consultant and any required federal, state, or local agencies.
- C. The Contractor shall retain copies of all Waste Shipment Records (WSRs) as part of the project file. The landfill operator on receipt will sign the receipts, and the quantity of asbestos debris leaving the Site and arriving at the landfill acknowledged. The Contractor shall provide signed WSRs to the Owner and the Consultant within 30 days of ACM waste leaving the Site.
- D. Transport all asbestos debris in covered, sealed vans, boxes, or dumpsters, which are physically isolated from the driver by an airtight barrier. All vehicles must be properly licensed to meet DOT requirements.
- E. Any vehicles used to store or transport ACM will either be removed from the property at night, or securely locked and posted to prevent disturbance.
- F. Any incident and/or accident that may result in spilling or exposure of asbestos waste outside the containment, on and off the property and all related issues are the sole responsibility of the Contractor.

END OF SECTION 028200

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 031000 - CONCRETE FORMWORK

PART I - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 DESCRIPTION OF WORK

- A. Provide all labor, materials, equipment and appliances to furnish and install all concrete formwork.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

Concrete Reinforcement: Section 032000  
Cast-In-Place Concrete: Section 033000

1.4 QUALITY ASSURANCE

- A. All materials and work shall conform to the requirements of all standards, codes, and recommended practices required in this section. In conflicts between standards, required standards, and this specification, the more stringent requirements shall govern.
- B. Applicable Standards:
1. ACI 347 - "Recommended Practice for Concrete Formwork"
  2. ACI 301 (Latest Edition) - "Specifications for Structural Concrete for Buildings"

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forms shall be constructed of the following materials as indicated for the use and purpose intended:
1. For unexposed surfaces and rough work, undressed lumber may be used. Lumber once used in forms shall have nails withdrawn, and surfaces to be in contact with concrete shall be thoroughly cleaned before being used again.
  2. For exposed exterior sides of foundations walls which show exposed above grade, and surfaces of walls, columns, and slabs to be left exposed in the finished building, forms lined with plastic coated plywood or masonite shall be used. All joints shall be filled with suitable joint filler in order to produce a reasonable straight, smooth surface, free from honeycombs, bulges, and depressions.
  3. Form ties and spreaders shall be of such type as to leave no metal closer than  $\frac{3}{4}$ " from exposed concrete surfaces and  $1\frac{1}{2}$ " from unexposed surfaces, below grade.
- B. Expansion joints - premolded expansion joint filler shall conform to one of the following:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1. ASTM D 1751 "Standard Specifications for Preformed Expansion Joint Fillers for Concrete paving and Structural Construction" (Nonextruding and resilient bituminous types).
2. ASTM D 1752 "Standard Specifications for Preformed Expansion Joint Fillers for Concrete Paving and Structural construction" (Nonextruding and resilient nonbituminous types).

**PART 3 - EXECUTION**

**3.1 ERECTION**

- A. Forms shall conform to the shapes, lines, grades and dimensions of the members as called for on the drawings. They shall be erected with sufficient strength, bracing and ties as to remain in correct position during and after depositing of concrete. They shall be substantially free from surface defects and sufficiently tight to prevent leakage of mortar. They shall produce a plumb, true, even concrete surface. Lumber in forms for exposed surfaces shall be dressed and free from loose knots or other defects. Undressed lumber may be used for rough work or unexposed surfaces. They shall permit thorough cleaning and inspection before depositing of concrete.
- B. Form ties and spreaders shall be of such type as to leave no metal closer than  $\frac{3}{4}$ " from exposed concrete surfaces. Tie rod holes shall be plugged solid with a mortar of same color and texture as the concrete.
- C. Forms, if oiled, shall be coated with a non-staining mineral oil or other approved material and allowed to dry before placing of reinforcing steel.
- D. Forms shall not be disturbed until the concrete has sufficiently hardened to prevent injury by this operation. All forms, except permanent metal forms, shall be removed when the concrete is thoroughly hardened. Forms for walls shall be left in place for a minimum of three days.
- E. Provide  $\frac{3}{4}$ " chamfers at all exposed concrete edges if shown by Architectural Drawings.
- F. Shoring, posts or uprights shall not be removed until the supported member has acquired sufficient strength to support safely its own weight and all loads upon it. Re-shoring will not be permitted. Members subjected to additional loads during construction shall be adequately shored or braced. Contractor shall assume responsibility for any damage to the structure due to premature removal of forms or inadequate bracing.
- G. Sleeves shall not be formed into any structural member unless shown on structural drawings.
- H. Construction Joints, when not shown on working drawings shall be made and located to least impair the strength of the structure.
  1. All reinforcement shall be continued across joints and keys shall be provided.
  2. Slabs on Fill: Joints shall be located so that slabs can be poured in or cut into panels, each panel not exceeding 900 square feet in area. The ratio of length to width shall not exceed 3.
  3. Foundation Walls: Vertical joints shall be placed at intervals not exceeding 75 feet. Horizontal joints shall not be permitted.
- I. Expansion Joints - premolded expansion joint filler shall be placed along edges of slab on grade where abutting foundation walls, and at all other locations as detailed.
- J. Control joints shall be as shown on the working drawings and as directed by the Architect.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

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1. Contraction joints may be formed, tooled or sawed approximately equal to  $\frac{1}{4}$  the thickness of the member.
- K. Erect formwork to produce concrete members conforming to the following dimensional tolerances:
1. Variations from plumb in the lines and surfaces of columns, piers, and walls shall not exceed  $\frac{1}{4}$ " in any 10 feet of height nor 1" for entire length.
  2. Variation of linear building lines from established position in plan shall not exceed 1".
  3. Variation in cross-sectional dimensions of columns and beams and in thickness of slabs and walls shall not exceed minus  $\frac{1}{4}$ ", nor plus  $\frac{1}{2}$ ".

END OF SECTION 031000



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 032000 – CONCRETE REINFORCEMENT

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 DESCRIPTION OF WORK

- A. Furnish and erect in place all reinforcing steel and welded wire fabric as indicated on Drawings. Include all splices, ties, supports, and other accessories required to properly place and secure all reinforcing during placing of concrete.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

Concrete Formwork: Section 031000  
Cast-In-Place Concrete: Section 033000

1.4 SUBMITTALS

- A. Shop Drawings: Contractor shall prepare detailed drawings showing dimensions, bar schedules, bending details and placing diagrams and details, for all reinforcement. Drawings shall be submitted for approval and no reinforcement shall be placed before drawings are approved.

1.5 QUALITY ASSURANCE

- A. All work shall conform to the requirements of the following:
1. ACI 318 (Latest Edition) “Building Code Requirements for Reinforced Concrete”
  2. ACI 315 “Manual of Standard Practice for Detailing Reinforced Concrete Structure”
  3. ACI 301 (Latest Edition) “Specifications for Structural Concrete for Buildings”

2.1 MATERIALS:

- A. Steel Reinforcement: Reinforcing bars shall be new domestic with a minimum  $f_y = 60,000$  psi; and shall conform to the requirements of “Standard Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement” (ASTM A615).
- B. Wire Fabric: Welded wire fabric for concrete reinforcement shall conform to the requirements of “Specifications for Welded Steel Wire Fabric for Concrete Reinforcement” (ASTM A185).
- C. Bar supports shall have CRSI “Rust Prevention Classification” as listed:
1. Unexposed: Concrete beams, slabs, etc. - Class “A”.
  2. Exposed: Concrete beams, slabs, and soffits, etc. - Class “C”.

PART 3 - EXECUTION

3.1 FABRICATION AND SITE STORAGE

- A. Reinforcing shall be accurately formed to dimensions on drawings details, and schedules within the following tolerances:

Sheared Length .....+ or - 1 inch  
Stirrups, Ties and Spirals.....+ or - ½ inch  
All other bends.....+ or - 1 inch

- B. Fabrication shall not commence until details and schedules have been approved by the Architect.
- C. Reinforcement shall be bent cold and shall not be straightened or rebent in a manner than will injure the materials. Bars with bends or kinks not shown on Drawings shall not be used. Bars shall be stored on site, off of the ground and separated by individual groups that shall be tagged for ease of identification. Bundles shall be securely wrapped to prevent separation prior to placement.

3.2 PLACING REINFORCEMENT

- A. Metal reinforcement shall be secured against displacement with suitable ties or clips and all accessories such as chairs, metal bar-supports, bolsters, etc., which come in contact with exposed concrete surface shall have Rust Prevention Classification “C” and shall have plastic coated bearing surfaces.
- B. Welded wire fabric shall be lapped 8” at ends and sides and the upper layer shall be placed within 1” of the top of the slab and to be held in place by high chairs at 4’-0” o/c maximum, this includes welded wire fabric in slabs-on-grade.
- C. Metal reinforcement, at the time concrete is placed, shall be free from mill scale, rust, or other coatings that will reduce bond.
- D. Metal reinforcement shall have a protection of concrete not less than the following:
1. Three inches (3”) at sides and on bottoms of footings.
  2. Two inches (2”) where concrete is exposed to weather or to the ground after removal of forms for bars larger than #5 and one and one-half inches (1 ½”) for #5 bars and smaller.
  3. One and one-half inches (1 ½”) in columns, beams and girders not exposed to the weather.
  4. Three fourths inch (¾”) in slabs, joists and walls not exposed to the weather.
- E. Metal reinforcement shall be accurately bent, spliced, and placed to dimensions shown on he Drawings and in accordance with the latest specifications of the American Concrete Institute. Bars shall be tied at all intersections.

END OF SECTION 032000

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 DESCRIPTION OF WORK

- A. This contract includes all labor, materials, equipment and appliances necessary to complete all cast-in-place concrete as indicated on the drawings or hereinafter specified.
- B. Anchor bolts, leveling plates, sleeves, inserts, hangers, etc. furnished under other divisions and required to be cast into the concrete shall be set by this Contractor where required.
- C. Provide all concrete bases, curbs, mats, pads, trenches, slots, openings, etc., as required by any or all of the drawings; Architectural, Site, Structural, Plumbing, Heating and Ventilating, and Electrical, and to accommodate equipment or work of all the divisions of these specifications.
- D. Provide thickened slabs on grade with flush top surfaces where required to accommodate conduit, piping, etc... Consult structural and mechanical drawings for conditions and maintain minimum 1 ½" thickness of concrete below conduit and full slab on grade thickness above conduit. Provide required thickness of gravel below such thickened slabs.
- E. Vapor retarder, seam tape, pipe boots, and detail strip for installation under concrete slabs.

1.3 RELATED WORK SPECIFIED IN OTHER SECTIONS

Concrete Formwork: Section 031000  
Concrete Reinforcement: Section 032000

1.4 QUALITY ASSURANCE

- A. Materials and work shall conform to the requirements of all standards, codes, and recommended practices required in this section. In conflicts between standards, required standards and this specification and the local building code, the more stringent requirements shall govern.
- B. Applicable Standards:
1. "Specifications for Structural Concrete for Buildings" ACI 301 (Latest Edition)
  2. "Building Code Requirement for Structural Concrete" ACI 318 (Latest Edition)
  3. "Standard Specification for Ready-Mixed Concrete" ASTM C 94 (Latest Edition)
  4. "Standard Specification for Plastic Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs" ASTM E 1745 (Latest Edition)
  5. "Standard Test Methods for Water Vapor Retarders Used in Contact with Earth" ASTM E 154 (Latest Edition).
  6. "Standard Test Methods for Water Vapor Transmission of Materials" ASTM E 96 (Latest Edition)

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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7. "Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs" ASTM E 1643 (Latest Edition)
8. "Chemical Admixtures for Concrete Type S" ASTM C 494 (Latest Edition)

C. Testing and Inspection:

1. Materials and operations shall be tested and inspected as work progresses. Failure to detect defective work shall not prevent rejection when defect is discovered, nor shall it obligate the Architect for final acceptance.
2. Testing agencies shall meet the requirements of "Recommended Practices for Inspection and Testing Agencies for Concrete and Steel in Construction" ASTM E 329 (Latest Edition).
3. The following testing services shall be performed by the designated agency, paid for by the Owner.
  - a. Secure composite samples in accordance with "Method of Sampling Fresh Concrete" ASTM C 172 (Latest Edition).
  - b. Mold and cure three specimens from each sample in accordance with "Method of Making and Curing Concrete Test Specimens in the Field" ASTM C 31 (Latest Edition).
  - c. Test Specimens in accordance with "Method of Test for Compressive Strength of Cylindrical Concrete Specimens" ASTM C 39 (Latest Edition). Two specimens shall be tested at 28 days for acceptance and one shall be tested at 7 days for information.
  - d. Make one strength test for each 50 cu. Yd. or fraction thereof, of each mix design of concrete placed in any one day.
  - e. Determine slump for each strength test and whenever consistency of concrete appears to vary, using "Method of Test for Slump of Portland Cement Concrete". ASTM C 143 (Latest Edition).
  - f. Determine total air content of normal-weight concrete sample for each strength test in accordance with "Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method". ASTM C 231 (Latest Edition).
  - g. Determine temperature of concrete sample for each strength test.
  - h. Unit weight, yield and air content (gravimetric) of concrete. ASTM C 138.
4. The contractor shall provide and pay for the necessary testing services of the following:
  - a. Qualification of proposed materials and the establishment of mix design in accordance with "Building Code requirements for Structural Concrete" ACI 318 (Latest Edition).
  - b. Other testing services needed or required by the Contractor.
5. To facilitate testing and inspection, the contractor shall:
  - a. Furnish necessary labor to assist testing agency in obtaining and handling samples at the job-site.
  - b. Advise the testing agency in advance of operations to allow for the assignment of testing personnel and testing.
  - c. Provide and maintain for the use of the testing agency adequate facilities for proper curing of concrete test specimens on the project site in accordance with "Method of Making and Curing Concrete Test Specimens in the Field" ASTM C 31 (Latest Edition).

D. Evaluation and Acceptance:

1. The strength level of the concrete will be considered satisfactory if 90% of the strength test results and the averages of all sets of three consecutive strength test results equal or exceed

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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specified strength and no individual test result is below specified strength by more than 500 psi.

1.5 SUBMITTALS

- A. Submit copies of two laboratory trial mix designs proposed in accordance with Method 1, ACI 301 (Latest Edition), or copies each of 30 consecutive test results and the mix design used from a record of past performance in accordance with ACI 301 (Latest Edition), Method 2.
- B. Submit copies of all concrete cylinder test results.
- C. Submit copies of fine and coarse aggregate sieve analysis showing conformance to this specification.
- D. Submit copies of specifications for each product proposed for use as listed in Part 2 of this section.

PART 2 - PRODUCTS

2.1 CONCRETE AND RELATED MATERIALS

- A. Portland Cement; Type I conforming to ASTM C 150 (Latest Edition). Cement used in the work shall correspond to that upon which the selection of concrete proportions was based. Use fly ash, pozzolan, ground granulated blast-furnace slag, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.
  - 1. Only one brand and manufacturer of approved cement shall be used for exposed concrete.
  - 2. Type III cement shall be used only with prior written approval from the Architect.
- B. Aggregates; conforming to ASTM C 33 (Latest Edition).
  - 1. Fine aggregate: clean, sharp, natural sand free from loam, clay, or other deleterious matter.
  - 2. Coarse aggregate, clean, uncoated, graded aggregate containing no clay, loam or foreign matter.
- C. Water; shall be fresh, and drinkable.
- D. Concrete admixtures; provide admixtures used in compliance with manufacturers recommendations.
  - 1. Air-entraining agent; conforming to ASTM C 260 (Latest Edition), MB-AE 10, or MB-VR, manufacturer by Master Builders, or approved equal as manufactured by Sonnoborne, Euclid, or W. R. Grace Companies.
  - 2. Water-reducing; set-controlling admixture; conforming to ASTM C 494 (Latest Edition), Type A (water-reducing), Type D (water-reducing and retarding) and Type E (water-reducing, acceleration), manufacturer by Master Builders, Sonnoborne, Euclid or W. R. Grace Companies.
- E. Metal Accessories; shall conform to the requirements of the Concrete Reinforcing Steel Institute (CRSI) "Manual Construction".
- F. Expansion Joint; conforming to ASTM D 1751 or ASTM D 1752.
- G. Curing Materials; exceeding the requirements of ASTM C 309 (Latest Edition) "Standard Specifications for Liquid Membrane-Forming Compounds for Curing Concrete". "MB-429" manufactured by Master Builders, or approved equal manufactured by Sonnoborne, Euclid or W. R. Grace Companies.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1. Material providing water retention not exceeding loss of .055 gm/cm<sup>2</sup> when used at a coverage of 450 sq. ft. per gallon and tested in accordance with ASTM C 156.
  2. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- H. Grout: Non-shrink, "SETGROUT" as manufactured by Master Builders.
- I. Curing paper shall be the approved equal of Sisalkraft Paper "Orange Label" that conforms with ASTM C171, Type I.
- J. Provide Dampproofing from top of footing to the finished grade for foundations that retain earth and enclose interior spaces and floor below grade where waterproofing is not required. Dampproofing shall be the approved equal Sonnoborne Building Products' Hydrocide 700B that complies to ASTM D-1227, Type I.

## 2.2 SELECTION OF CONCRETE PROPORTIONS

- A. Concrete shall be composed of Portland Cement, fine and Coarse aggregate, water, Pozzoloth admixture, and as specified, an air-entraining admixture. Proportions of ingredients shall produce concrete which will work readily into corners and angles of forms, bond to reinforcement, without segregation or excessive bleed water forming on the surface. Proportioning of materials shall be in accordance with ACI 211.1 (Latest Edition), "Recommended Practice for Selecting Proportions for Normal Weight Concrete" and ACI 211.2 (Latest Edition).
1. Proportions of ingredients shall be selected by past field experience or by laboratory trial mixes to produce placability, durability, strength and the additional properties specified.
- A. Required average strength above specified strength shall be determined in accordance with ACI 318-95 "Building Code Requirements for Structural Concrete" and evaluations of compressive strength results of field concrete shall be in accordance with ACI 214 (Latest Edition) "Recommended Practice for Evaluation of Strength Test Results of Concrete".
1. Past field Experience; proportions shall be established on the actual field experience of the ready-mix produced with the materials proposed to be employed. Standard deviation shall be determined by 30 consecutive tests (or two groups of tests totaling 30 or more).
    - a. Average strength used for selecting proportions shall exceed specified strength ( $f'c$ ) by at least:
      - 400 psi - standard deviation is less than 300
      - 550 psi - standard deviation is 300 to 400
      - 700 psi - standard deviation is 400 to 500
      - 900 psi - standard deviation is 500 to 600
      - 1200 psi - standard deviation is above 600 or unknown
  2. Trial Mixes; when the ready-mix producer does not have a record of past performance, the combination of materials and the proportions selected shall be selected from trial mixes having proportions and consistencies suitable for the work based on ACI 211.1 (Latest Edition),

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

using at least three different water-cement ratios which will produce a range of strengths encompassing those required.

- a. Average strength required shall be 1200 psi above specified strength.

2.4 CONCRETE QUALITIES REQUIRED

- A. Specified compressive strength at 28 days shall be 3,000 psi for footings, piers and foundations walls unless noted on the drawings.
- B. Concrete subject to exposure shall be air-entrained. Total air content required (air-entrained and entrapped air) shall be:

<u>Nominal Max. Size Coarse Aggregate</u>	<u>Total Air Content</u>
3/4"	6% + or - 1
1"	5% + or - 1
1 1/2"	4% + or - 1

- C. Concrete shall be proportioned and produced to have a slump, not to exceed 4 in. if consolidation is by vibration or 5 in. if consolidation is by other means.
- D. Slump for concrete flatwork shall be 1" less than specified above.
- E. Maximum size of coarse aggregate shall not exceed one-third the thickness of slabs, and one-fifth the narrower dimension between forms.
- F. Concrete shall be adjusted to produce the required rate of hardening for varied climatic and job-site conditions.
  - 1. Under 50°F ambient temperature - Accelerate (Approval in Writing Required from the Architect) (Type E Admixture - ASTM C 494)
  - 2. Between 50°F and 80°F - Normal rate of Hardening (Type A Admixture - ASTM C 494)
  - 3. Over 80°F ambient temperature - Retard (Type B Admixture - ASTM C 494)

PART 3 - EXECUTION

3.1 PREPARATION (Vapor Retarder)

- A. Ensure that subsoil is approved by Geotechnical Firm before placement of vapor retarder.
  - 1. Level, tamp or roll aggregate, sand or earth base.

3.2 PRODUCTION OF CONCRETE

- A. Concrete shall be ready-mixed batched, mixed, and transported in accordance with ASTM C 94 (Latest Edition) "Specifications for Ready-Mixed Concrete". Add concrete moisture vapor reduction admixture in accordance with manufacturer's recommendations to all ready mix concrete to be placed in interior slabs on grade (a representative or agent of concrete moisture vapor reduction admixture must be present at the jobsite during the placement of all treated concrete).

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3.3 PLACING

- A. Preparation - contractor shall provide access for delivery and provide sufficient equipment and manpower to rapidly place all concrete.
  - 1. All work shall be in accordance with ACI 304 Latest Edition) “Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete”.
  - 2. Formwork shall have been completed; snow, ice, water, & debris removed from within forms.
  - 3. Expansion joint material, anchors and all embedded items shall have been positioned.
  - 4. Concrete shall not be placed on frozen ground.
  - 5. Subgrades shall be sprinkled sufficiently to eliminate water loss from concrete.
  - 6. Test concrete mix with concrete moisture vapor reduction admixture per manufacturer’s requirements for project specific warranty. Provide admixture at rate recommended by manufacturer and mix per manufacturer requirements (confirm that shrinking reducing admixtures is not permitted).
- B. Conveying - concrete shall be handled from mixer to final placement rapidly by methods which will prevent segregation or loss of ingredients to maintain required quality of concrete.
- C. Depositing - concrete shall be deposited continuously; when continuous placement is not possible, construction joints shall be located as approved by the architect. Concrete shall be placed as nearly as possible to its final position; avoid rehandling or flowing.
  - 1. Concrete shall be consolidated by vibration, spading, rodding, or forking. Work concrete around reinforcement, embedded items, and into corners, eliminating all air and stone pockets, and other sources of honeycombing and planes of weakness.
  - 2. Internal vibration shall have a minimum frequency of 8000 v/min with amplitude to consolidate effectively.
    - a. Vibrators shall be operated by competent workmen.
    - b. Use of vibrators to transport concrete shall not be allowed.
    - c. Vibrators shall be inserted and withdrawn approximately every 18 in. for 5 o 15 sec.

3.4 WEATHER CONDITIONS:

- A. Cold Weather - temperature of concrete delivered at the job site shall conform to the following minimum:

<u>Air Temperature</u>	<u>Concrete Temperature</u>
30 to 45°F	55°F to 90°F
0 to 30°F	60°F to 90°F
Below 0°F	65°F to 90°F

- B. Water heated to above 100°F shall be combined with the aggregates before cement is added. Cement shall not be added to water or aggregated having a temperature greater than 100°F.
  - 1. All work shall be in accordance with ACI 306 “Recommended Practice for Cold Weather Concreting”. Contractor shall maintain a copy of this on the project site.
  - 2. When the outdoor temperature is less than 40°F temperature of the concrete shall be maintained at not less than 50°F for the required curing time.
    - a. Arrangements shall be made before placement to maintain required temperature without injury from excessive heat.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- b. Combustion heaters shall not be used during the first 48 hours without precautions to prevent exposure of concrete and workmen to exhaust gases containing carbon dioxide and carbon monoxide.
- C. Hot Weather - temperature of concrete delivered at the job-site shall not exceed 90°F. Cool materials before mixing as required.
  - 1. All work shall be in accordance with ACI 305 (Latest Edition) "Recommended Practice for Hot Weather Concreting". Contractor shall maintain a copy of this on the contract site.
  - 2. Provisions shall be made for windbreaks, shading, fog, spraying, sprinkling or wet cover when necessary.

3.5 CURING AND PROTECTION

- A. Immediately following placement, concrete shall be protected from premature drying, hot and cold temperatures, rain, flowing water and mechanical injury.
- B. Materials and method of curing shall be approved by the Architect. Final curing shall continue for not less than 7 days.
  - 1. Applications of Waterproof sheet material shall conform to ASTM C 171 (Latest Edition) "Specifications for Waterproof Sheet Materials for Curing Concrete".
  - 2. Application of liquid membrane-forming compound shall conform to ASTM C 309 (Latest Edition) "Specifications for Liquid Membrane-Forming Compounds for curing Concrete."
- C. Forms for walls shall be left in place for a minimum of 3 days.
- D. Grout cleaning of exposed walls: Exposed exterior concrete walls shall be patched as required and shall have a grout cleaned finish as indicated on drawings or as instructed by the Architect.
- E. No cleaning operations shall be undertaken until the walls of the building are entirely completed. Cleaning portions of the walls as the work progresses will not be permitted.
- F. Cure concrete slab on grade per minimum concrete moisture vapor reduction admixture recommendations.
- G. The Contractor shall use the following method for grout cleaning of exposed concrete:
  - 1. Mix 1 part Portland Cement and 1 ½ parts fine sand with enough water to produce a grout having the consistency of thick paint. White Portland cement shall be used for all or part of the cement in the grout, as directed by the Architect, to give the color desired. Wet the surface of the concrete and apply the grout with brushes or a spray gun uniformly, completely filling air bubbles and holes.
  - 2. Immediately after applying the grout, float the surface with a wood float, and scour the wall vigorously. The grout shall then be allowed to set partially for an hour or two depending on weather conditions. In hot, dry weather, the wall shall be kept damp during this period, using a fine fog spray. When grout has hardened so it can be scraped from the wall with the edge of a steel trowel without removing the grout from the small air holes cut off all that can be removed with a trowel. Next allow surface to dry thoroughly and rub it vigorously with a dry burlap to completely remove any dried grout. There shall be no visible film of grout remaining after this rubbing. The entire cleaning operation for any area must be completed the day it is started. No grout shall be left on the wall overnight and sufficient time shall be allowed for the grout to dry after it has been cut with the trowel so it can be wiped off clean with the burlap.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3. After the entire building has been grout cleaned, if any slightly dark spots or streaks remain, they shall be wiped off lightly with a fine abrasive hone. The rubbing with the hone shall not be enough to change the texture of the concrete. This final operation shall be included as a part of the grout cleaning.
  
- H. Any exposed concrete which is not formed as shown on plans, or for any reason is out of alignment or level beyond tolerance specified, or shows a defective surface, shall be considered as not conforming with the intent of these Specifications; and shall be removed from the job by the Contractor, at his expense, unless the Engineer grants permission to patch the defective area.

3.6 PROTECTION OF WORK:

- A. Concrete shall be protected from damage. Damaged concrete shall be replaced at the Contractor's expense.
  
- B. This Contractor shall be responsible for the protection of concrete slabs on grade through winter weather. If they should heave due to cold weather, they shall be removed and replaced. All fill below the slabs shall be removed and replaced.

END OF SECTION 033000

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Framing with dimension lumber.
  - 2. Wood blocking.
- B. Related Sections include the following:
  - 1. Division 06 Section "Sheathing" for plywood wall and roof sheathing, and subfloor.
  - 2. Division 06 Section "Wood Patio Decking" for exterior wood framing for elevated decks.
  - 3. Division 07 Section "Weather Barriers."

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NLGA: National Lumber Grades Authority.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
  - 1. Preservative-treated wood.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Power-driven fasteners.
3. Powder-actuated fasteners.
4. Expansion anchors.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  3. Provide dressed lumber, S4S, unless otherwise indicated.

2.2 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 15 percent.
- B. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade.
  1. Application: Interior partitions not indicated as load-bearing.
  2. Species:
    - a. Hem-fir (north); NLGA.
    - b. Douglas fir-larch (north); NLGA.
- C. Joists, Rafters, and Other Framing Not Listed Above: No. 2 grade.
  1. Species:
    - a. Hem-fir (north); NLGA.
    - b. Douglas fir-larch (north); NLGA.

2.3 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA C2.
  1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic, chromium or chromated copper arsenate (CCA).

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat miscellaneous carpentry, including the following:
  - 1. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
  - 2. Wood floor plates that are installed over masonry foundation walls.
  - 3. Wood deck framing.
- E. Manufacturers: Subject to compliance with requirements, provide products by one the following:
  - 1. Georgia Pacific.
  - 2. Hoover Treated Wood Products, Inc.
  - 3. Osmose, Inc.

#### 2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
  - 1. Blocking.
  - 2. Nailers.
- B. For items of dimension lumber size, provide Construction or No. 2 lumber with 15 percent maximum moisture content and the following species:
  - 1. Hem-fir (north); NLGA.
- C. For blocking not used for attachment of other construction Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. 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.

#### 2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. Where carpentry is exposed to weather, in ground contact, fire retardant treated, or in area of high relative humidity, provide fasteners of with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.6 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Do not splice structural members between supports, unless otherwise indicated.
- D. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- E. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- I. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

**3.2 WOOD BLOCKING AND NAILER INSTALLATION**

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.

**3.3 WALL AND PARTITION FRAMING INSTALLATION**

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction unless otherwise indicated.
  - 1. For interior partitions and walls, provide framing as noted on Structural Drawings unless otherwise indicated.
  - 2. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
  - 1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
  - 2. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated.

**3.4 FLOOR JOIST FRAMING INSTALLATION**

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:
  - 1. Where supported on wood members, by toe nailing or by using metal framing anchors.
  - 2. Where framed into wood supporting members, by using wood ledgers as indicated or, if not indicated, by using metal joist hangers.
- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.
- C. Do not notch in middle third of joists; limit notches to one-sixth depth of joist, one-third at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.
- E. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- F. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c., extending over and fastening to three joists. Embed anchors at least 4 inches into grouted masonry with ends bent at right angles and extending 4 inches beyond bend.
- G. Provide solid blocking between joists under jamb studs for openings.
- H. Under non-load-bearing partitions, provide double joists separated by solid blocking equal to depth of studs above.
  - 1. Provide triple joists separated as above, under partitions receiving ceramic tile and similar heavy finishes or fixtures.
- I. Provide bridging of type indicated below, at intervals of 96 inches o.c., between joists.
  - 1. Diagonal wood bridging formed from bevel-cut, 1-by-3-inch nominal size lumber, double-crossed and nailed at both ends to joists.
  - 2. Steel bridging installed to comply with bridging manufacturer's written instructions.

3.5 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061533 - WOOD PATIO DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 1 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

A. Section Includes:

1. Wood decking.
2. Stairs for elevated decks.
3. Railings for elevated decks.
4. Support framing for elevated decks.

B. Related Requirements:

1. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing used with patio decking.
2. Division 09 Section "Painting" for field finishing railings, posts and framing indicated.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.

B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

1. NeLMA: Northeastern Lumber Manufacturers' Association.
2. NLGA: National Lumber Grades Authority.
3. WCLIB: West Coast Lumber Inspection Bureau.
4. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

A. Product Data: For preservative-treated wood products and plastic decking.

1. For preservative-treated wood products. Include chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. For lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by ALSC's Board of Review.
  2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- B. Certificates of Inspection: Issued by lumber grading agency for exposed wood products not marked with grade stamp.
- C. Evaluation Reports: For the following, from ICC-ES:
1. Preservative-treated wood products.
  2. Expansion anchors.
  3. Metal framing anchors.
  4. Decking fasteners.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and protected from weather and contact with damp or wet surfaces. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.
- B. Handle and store plastic lumber to comply with manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Comply with DOC PS 20 and with grading rules of lumber grading agencies certified by ALSC's Board of Review as applicable. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by ALSC's Board of Review.
1. Factory mark each item with grade stamp of grading agency.
  2. For items that are exposed to view in the completed Work, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
  3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry wood products.
  4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD DECKING AND STAIR TREADS

- A. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

B. Dimension Lumber Decking and Stair Treads: No. 2 grade and the following species:

1. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.

2.3 DIMENSION LUMBER FRAMING

A. Hand select wood for freedom from characteristics, on exposed surfaces and edges, that would impair finish appearance, including decay, honeycomb, knot holes, shake, splits, torn grain, and wane.

B. Dimension Lumber Framing: No. 2 grade and the following species:

1. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.

C. Dimension Lumber Posts: No. 2 grade and the following species:

1. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.

2.4 WOOD RAILINGS

A. Dimension Lumber Railing Members: Select Structural or No. 1 grade and the following species:

1. Hem-fir or hem-fir (North); NLGA, WCLIB, or WWPA.

2.5 PRESERVATIVE TREATMENT

A. Pressure treat boards and dimension lumber with waterborne preservative according to AWPA U1; Use Category UC3b for exterior construction not in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic, chromium or chromated copper arsenate (CCA).

B. Use process that includes water-repellent treatment.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

E. Application: Treat all wood framing and railings.

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

1. Georgia Pacific.
2. Hoover Treated Wood Products, Inc.
3. Osmose, Inc.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated, acceptable to authorities having jurisdiction, and that comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches into wood substrate.
  - 1. Use stainless steel, unless otherwise indicated.
- B. Nails: ASTM F 1667.
- C. Power-Driven Fasteners: ICC-ES AC70.
- D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.

2.7 METAL FRAMING ANCHORS

- A. Basis-of-Design Products: Subject to compliance with requirements, provide products by **Simpson Strong-Tie Co., Inc.** or equal.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of products of manufacturers listed. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Hot-Dip, Heavy-Galvanized Steel Sheet: ASTM A 653/A 653M; structural steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G185 coating designation; and not less than 0.036 inch thick.
  - 1. Use for wood-preservative-treated lumber.
- D. Joist Hangers: U-shaped joist hangers with 2-inch long seat and 1-1/4-inch wide nailing flanges at least 85 percent of joist depth.
  - 1. Thickness: 0.050 inch.
- E. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3.3 INSTALLATION, GENERAL

- A. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit work to other construction; scribe and cope as needed for accurate fit.
- B. Framing Standard: Comply with AF&PA WCD1 unless otherwise indicated.
- C. Install plastic lumber to comply with manufacturer's written instructions.
- D. Secure decking to framing with deck clips.
- E. Install metal framing anchors to comply with manufacturer's written instructions.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- G. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of members or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Securely attach exterior rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. ICC-ES AC70 for power-driven fasteners.
  - 2. "Fastener Schedule for Structural Members" and "Alternate Attachments" in ICC's International Residential Code for One- and Two-Family Dwellings.
- I. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced and with adjacent rows staggered.

3.4 ELEVATED DECK JOIST FRAMING INSTALLATION

- A. General: Install joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists where framed into wood supporting members by using wood ledgers as indicated or, if not indicated, by using metal joist hangers. Do not notch joists.
- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.
- C. Lap members framing from opposite sides of beams or girders not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- D. Provide solid blocking of 2-inch nominal thickness by depth of joist at intervals of 96 inches o.c., between joists.

3.5 STAIR INSTALLATION

- A. Provide stair framing members of size, space, and configuration indicated or, if not indicated, to comply with the following requirements:
  - 1. Stringer Size: 2 by 12 inches nominal, minimum.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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2. Notching: Notch stringers to receive treads, risers, and supports; leave at least 3-1/2 inches of effective depth.
  3. Stringer Spacing: At least three stringers for each 36-inch clear width of stair.
- B. Provide stair framing with no more than 3/16-inch variation between adjacent treads and risers and no more than 3/8-inch variation between largest and smallest treads and risers within each flight.
- C. Treads and Risers: Secure by gluing and screwing to carriages with concealed fasteners. Extend treads over carriages.

3.6 RAILING INSTALLATION

- A. Balusters: Fit to railings, screw in place. Countersink fastener heads, fill flush, and sand filler.
- B. Newel Posts: Secure to stringers and risers with through bolts.
- C. Railings: Fasten freestanding railings to newel posts and to trim at walls with countersunk-head wood screws or rail bolts.

END OF SECTION 061533

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Roof sheathing.
  - 2. Wall sheathing.
  - 3. Subflooring.
- B. Related Sections include the following:
  - 1. Division 06 Section "Miscellaneous Rough Carpentry" for plywood backing panels and wood blocking.
  - 2. Division 07 Section "Asphalt Shingles" for felt underlayment and self-adhering sheet underlayment.
  - 3. Division 07 Section "Weather Barriers" for water-resistive barrier applied over wall sheathing.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. Product Certifications: From manufacturer, indicating that sheathing products comply with ICC-ES AC269 and ICC-ES AC310.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Outdoor Storage: Comply with manufacturer's recommendations.
  - 1. Set panel bundles on supports to keep off ground.
  - 2. Cover panels loosely with waterproof protective material.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3. Anchor covers on top of stack, but keep away from sides and bottom to assure adequate air circulation.
4. When high moisture conditions exist, cut banding on panel stack to prevent edge damage.

**PART 2 - PRODUCTS**

**2.1 WOOD PANEL PRODUCTS, GENERAL**

- A. Plywood: DOC PS 1.
1. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
  2. Factory mark panels to indicate compliance with applicable standard.

**2.2 ROOF SHEATHING**

- A. Plywood Roof Sheathing: Exposure I, Structural I sheathing.
1. Span Rating: Not less than 16/0.
  2. Nominal Thickness: Not less than 5/8 inch, or as required to match existing.

**2.3 WALL SHEATHING**

- A. Plywood Wall Sheathing: Exposure I, Structural I sheathing.
1. Span Rating: Not less than 16/0.
  2. Nominal Thickness: As required to match existing, but not less than 1/2 inch.

**2.4 SUBFLOORING**

- A. Plywood Subflooring: Exposure 1, Structural I single-floor panels, tongue and groove.
1. Span Rating: Not less than 16" o.c.
  2. Nominal Thickness: Not less than 3/4- inch.
  3. Basis of Design Product: Subject to compliance with requirements, provide the following:
    - a. **Huber Engineered Woods; AdvanTech.**

**2.5 FASTENERS**

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. For wall and roof sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.

- D. Wood Screws: ASME B18.6.1.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

#### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30S, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Wall and Roof Sheathing:
    - a. Nail to wood framing.
    - b. Space panels 1/8 inch apart at edges and ends.
  - 2. Subflooring:
    - a. Glue and screw to wood framing.
    - b. Space panels 1/8 inch apart at edges and ends.

END OF SECTION 061600



SECTION 062013 – EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes exterior standing and running trim including the following:
  - 1. Cellular PVC trim boards.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Samples for Verification: For each type, size and thickness indicated.
- C. Evaluation Reports: For the following, from ICC-ES:
  - 1. Cellular PVC trim.
- D. Warranties: Special warranties specified in this Section.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store trim materials and sheets on a flat and level surface on a full shipping pallet. Handle materials to prevent damage to product ends and corners. Provide for air circulation within and around stacks and under temporary coverings.

1.5 WARRANTY

- A. Manufacturer's Warranty for Cellular PVC Trim: Manufacturer agrees to repair or replace trim that fails due to defects in manufacturing within specified warranty period. Failures include, but are not limited to, deterioration, delamination, and excessive swelling from moisture.
  - 1. Warranty Period: 25 years from date of Substantial Completion.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 2 - PRODUCTS

2.1 STANDING AND RUNNING TRIM

- A. Cellular PVC Trim: Extruded, expanded PVC with a small-cell microstructure, made from UV- and heat-stabilized, rigid material.
1. Basis of Design Products: Subject to compliance with requirements, provide products by **Trim Solutions, Inc.** or comparable product by one of the following:
    - a. Advanced TrimWright, Inc.
    - b. Azek Building Products, Inc.
    - c. Fypon, Ltd.
    - d. Kleer.
    - e. Versatex.
  2. Performance and physical characteristic requirements:
    - a. Density: ASTM D 792, not less than 0.55 g/cu.cm.
    - b. Heat Deflection Temperature: Not less than 150 deg F, per ASTM D 648.
    - c. Coefficient of Linear Expansion: Not more than  $3.2 \times 10^{-5}$  inches/inch x deg F.
    - d. Water Absorption: Not more than 1 percent, per ASTM D 570.
    - e. Flame-Spread Index: 25 or less, per ASTM E 84.
  3. Trim Boards: 5/4-inch thickness, in widths indicated.
  4. Color: White.
  5. Texture: Smooth.

2.2 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide hot-dipped galvanized screws, blunt point and full round head in sufficient length to penetrate not less than 1-1/2 inches into wood substrate.
1. The use of staples, brads and wire nails is not permitted.
  2. Provide hidden fastening system complete with screws, plugs and setting tools for concealed fastening.
    - a. Product: Subject to compliance with requirements, provide the following, or equal for use with cellular PVC trim product selected:
      - 1) Cortex Hidden Fastening System.
- B. Adhesive for Cellular PVC Trim: Cellular PVC cement product recommended by trim manufacturer to bond trim joints.
- C. Flashing: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.
- D. Sealants: Urethane based sealants without silicone, complying with applicable requirements in Division 07 Section "Joint Sealants"; recommended by sealant manufacturer and manufacturer of substrates for intended application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of the work indicates acceptance of substrates.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
  - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
  - 1. Scribe and cut exterior finish carpentry to fit adjoining work.
  - 2. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining exterior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
  - 3. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install cellular PVC trim to comply with manufacturer's written instructions.
  - 1. Install trim boards with concealed fasteners and plugs.
- B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of trim available. Do not use pieces less than 24 inches long except where necessary.
  - 1. Use scarf joints for end-to-end joints.
  - 2. Stagger end joints in adjacent and related members.
- C. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. Install trim boards with two fasteners per every framing member. Trimboards 12-inches and wider, and sheets, require additional fasteners per manufacturer's recommendation. Install fasteners no more than 2-inches from the end of the board.
  - 1. Predrilling for fasteners may be required in low temperatures. Comply with manufacturer's recommendations.
  - 2. Allow for 1/8-inch per 18 foot of run for expansion and contraction.
- E. Glue all PVC to PVC joints with cellular PVC cement to prevent joint separation. Secure glue joint with fasteners on each side of the joint to allow adequate bonding time.

3.5 ADJUSTING

- A. Replace exterior finish carpentry that is damaged or does not comply with requirements. Exterior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing. Adjust joinery for uniform appearance.

3.6 CLEANING

- A. Clean exterior finish carpentry on exposed and semi-exposed surfaces. Touch up factory-applied finishes to restore damaged or soiled areas.

3.7 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.
- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 062013

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Interior standing and running trim.
  - 2. Interior wood frames and jambs.
  - 3. Closet shelving.
- B. Related Sections include the following:
  - 1. Division 08 Section "Flush Wood Doors."
  - 2. Division 09 Section "Painting" for field finishing interior wood trim.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. For installation adhesives, documentation including printed statement of VOC content.
- B. Product Certificates: For each type of product, signed by product manufacturer.
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
  - 1. Show details full size.
  - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products, or installer approved by fabricator.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- B. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species for Opaque Finish: Eastern white pine or poplar.

2.2 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Wood Glues: 30 g/L.
  - 2. Contact Adhesive: 250 g/L.

2.3 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

2.4 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH (FIELD FINISHED)

- A. Grade: Custom.
- A. Wood Species: Eastern white pine.
  - 1. Wood Base: Provide Woodgrain Millwork 623, Pine Base Molding (Home Depot), 3-1/4" high x 9/16" thick, or equal.
- B. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

2.5 INTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH (FIELD FINISHED)

- A. Grade: Custom.
- B. Wood Species: Pine or Poplar.
- C. For frames or jambs wider than available lumber, use veneered construction. Do not glue for width.

2.6 CLOSET SHELVING AND CLOTHES RODS

- A. Closet Shelving: Made from the following material, 3/4 inch thick.
  - 1. Melamine-faced particleboard with applied PVC front edge.
- B. Shelf Brackets with Rod Support: BHMA A156.16, B04051; prime-painted formed steel.
- C. Shelf Brackets without Rod Support: BHMA A156.16, B04041; prime-painted formed steel.
- D. Clothes Rods: 1-1/2-inch- diameter, clear, kiln-dried hardwood.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 96 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
  - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
  - 2. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.
- G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 SHELVING AND CLOTHES ROD INSTALLATION

- A. Install shelf brackets according to manufacturer's written instructions, spaced not more than 36 inches o.c. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
- B. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled. Install shelves, fully seated on cleats, brackets, and supports.
  - 1. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.
- C. Install rod flanges for rods as indicated. Fasten to shelf cleats, framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors. Install rods in rod flanges.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean woodwork on exposed and semiexposed surfaces.

END OF SECTION 064023



SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Concealed building insulation (thermal).
  - 2. Sound attenuation insulation.
  - 3. Spray-applied cellulosic insulation.
  - 4. Vapor retarders.

1.3 DEFINITIONS

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.
- D. Low-emitting product certification.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Surface-Burning Characteristics: ASTM E 84.
  - 2. Fire-Resistance Ratings: ASTM E 119.
  - 3. Combustion Characteristics: ASTM E 136.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Indoor Air Quality Requirements: The following practices shall be implemented in accordance with Division 01 Section "Indoor Air Quality Requirements."
  - 1. Insulations are to be stored per manufacturer's recommendations for allowable temperature and humidity range. Insulations shall not be allowed to become damp.
  - 2. Where feasible, fiberglass, mineral wool, and other fibrous insulations shall be stored separately from materials which have high short-term emissions. Materials with high short-term emissions include, but are not limited to: adhesives, sealants and glazing compounds (specifically those with petrochemical vehicles or carriers); paint, wood preservatives, and finishes; control and/or expansion joint fillers; hard finishes requiring adhesive installation; gypsum board (with associated finish processes and products); and composite or engineered wood products with formaldehyde binders.
  - 3. Where feasible, exposed fiberglass or mineral wool insulations shall not be stored in occupied spaces, near HVAC diffusers (supply or return), or near fresh air intakes.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION (THERMAL)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CertainTeed Corporation; CertaPro AcoustaTherm Batts.
  - 2. Johns Manville; Unfaced.
  - 3. Owens Corning; Ecotouch Thermal Batt Insulation.
- B. Thermal Insulation: Provide insulating materials as follows:
  - 1. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft vapor-retarder membrane on 1 face.
    - a. Provide thickness indicated or as required to fill depth of framing.

2.2 GLASS-FIBER BLANKET INSULATION (SOUND ATTENUATION)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. CertainTeed Corporation; CertaPro AcoustaTherm Batts.
  - 2. Johns Manville; Sound Control Batts.
  - 3. Owens Corning; Sound Attenuation Batt Insulation (SAB).
- B. Sound Attenuation Insulation: Provide insulating materials as follows:
  - 1. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

- a. Thickness: As indicated, not less than 3-1/2 inches.

### 2.3 SPRAY-APPLIED CELLULOSIC INSULATION

- A. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type III (materials containing an adhesive mixed with water during application; intended for application on attic floors), chemically treated for flame-resistance, processing, and handling characteristics.
  - 1. In accordance with ASTM E 84, provide products with a flame spread of 25 and smoke developed of 450.
  - 2. Properties:
    - a. R-Value: Thickness required for R-38 minimum in attic.
    - b. Density: ASTM C 739, minimum 1.6 lbs./cu.ft. for long term settling of dry applications.
  - 3. Product: Subject to compliance with requirements, provide one of the following, or equal:
    - a. GreenFiber; GreenFiber Stabilized Attic Insulation.
    - b. International Cellulose Corp.; Celbar Loosefill.
- B. Attic Measuring Rulers: Universal ruler with 1-inch increments made from cardboard stock 20 inches long, to provide working gauge for installation of spray foam insulation in attic.
  - 1. Product: Subject to compliance with requirements, provide the following:
    - a. J&R Products, Inc.; R-Sticks.

### 2.4 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13 perm.
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

### 3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice, rain, and snow.
- C. Extend insulation in thickness indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. For preformed insulating units, provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
- C. Install mineral-fiber insulation in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill cavity, provide lengths that will produce a snug fit between ends.
  - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures.
  - 4. Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
  - 5. For wood-framed construction, install mineral-fiber blankets according to ASTM C 1320 and as follows:
    - a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.
- D. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
  - 1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."
  - 2. Attic Measuring Rulers: Install rulers on wood framing to provide a solid backing, set with the bottom of the ruler against the gypsum board ceiling to measure thickness of spray foam insulation. Install rulers at a maximum distance of 6 feet in any direction for ease of inspection.

- a. Provide photographic documentation that includes proof of insulation thickness of installation in all attic spaces, and any assemblies hidden from view.

### 3.5 INSTALLATION OF VAPOR RETARDERS

- A. General: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches o.c.
- C. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
- D. Firmly attach vapor retarders to solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- E. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.
- F. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

### 3.6 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100



SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. Section Includes:
  - 1. Building wrap (weather barrier).
  - 2. Flexible flashing.
- B. Related Sections:
  - 1. Division 06 Section "Sheathing."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barriers and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
  - 1. Basis of Design Product: Subject to compliance with requirements, provide the following, or equal:
    - a. DuPont; Tyvek HomeWrap.
  - 2. Water-Vapor Permeance: Not less than 400 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg when tested according to ASTM E 2178.
4. Allowable UV Exposure Time: Not less than three months.

- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

## 2.2 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film to produce an overall thickness of not less than 25 mil.

1. Basis of Design Product: Subject to compliance with requirements, provide the following, or equal:

- a. **Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Plus Self-Adhered Flashing.**

- B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.

- C. Nails and Staples: ASTM F 1667.

## PART 3 - EXECUTION

### 3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.

- B. Cover sheathing with water-resistive barrier as follows:

1. Cut back barrier 1/2 inch on each side of the break in supporting members at expansion- or control-joint locations.
2. Apply barrier to cover vertical flashing with a minimum 4-inch overlap unless otherwise indicated.

- C. Building Wrap: Comply with manufacturer's written instructions.

1. Seal seams, edges, fasteners, and penetrations with tape.
2. Extend into jambs of openings and seal corners with tape.

### 3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over water-resistive barrier at bottom and sides of openings.
4. Lap water-resistive barrier over flashing at heads of openings.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 07 25 00



SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Asphalt shingles for sloped roofs.
  - 2. Underlayment and self-adhering sheet underlayment.
  - 3. All hoisting and scaffolding necessary for the completion of the roof work.
  - 4. Waste disposal.
- B. Related Sections include the following:
  - 1. Division 06 Section "Sheathing" for plywood roof sheathing.
  - 2. Division 07 Section "Sheet Metal Flashing and Trim" for step flashing, drip edges, and other sheet metal work.

1.3 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definitions of terms related to roofing work in this Section.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of asphalt shingle indicated.
- C. Samples for Verification: For the following products, of sizes indicated, to verify color selected.
  - 1. Asphalt Shingle: Full-size asphalt shingle strip.
  - 2. Underlayment: 12 inches square.
  - 3. Self-Adhering Underlayment: 12 inches square.
- D. Qualification Data: For Installer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.
- F. Research/Evaluation Reports: For asphalt shingles.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- G. Maintenance Data: For asphalt shingles to include in maintenance manuals.
- H. Warranties: Special warranties specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual that is approved, authorized, or licensed by asphalt shingle roofing system manufacturer to install roofing system indicated.
- B. Fire-Test-Response Characteristics: Provide asphalt shingle and related roofing materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
  - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.
- C. Wind-Resistance-Test Characteristics: Provide asphalt shingles and related products identical to those tested according to ASTM D 7158 Class H 150 mph wind resistance and passed. Identify each bundle of asphalt shingles with appropriate markings of applicable testing and inspecting agency.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store roofing materials in a dry, well-ventilated, weathertight location according to asphalt shingle manufacturer's written instructions. Store underlayment rolls on end on pallets or other raised surfaces. Do not double-stack rolls.
  - 1. Handle, store, and place roofing materials in a manner to avoid significant or permanent damage to roof deck or structural supporting members.
- B. Protect unused underlayment from weather, sunlight, and moisture when left overnight or when roofing work is not in progress.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit asphalt shingle roofing to be performed according to manufacturer's written instructions and warranty requirements.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

1.8 WARRANTY

- A. Standard Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Manufacturing defects.
    - b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
  2. Material Warranty Period: Lifetime, prorated, with first 10 years nonprorated.
  3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by wind speeds up to 130 mph for 15 years from date of Substantial Completion.
  4. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor 10 years from date of Substantial Completion.
  5. Workmanship Warranty Period: 10 years from date of Substantial Completion.
- B. Special Project Warranty: Roofing Installer's Warranty, signed by roofing Installer, covering the Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.
  1. Warranty Period: Two years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Asphalt Shingles: 100 sq. ft of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Laminate Strip Asphalt Shingles: ASTM D 3462, laminated multi ply overlay construction, glass fiber reinforced, mineral granule, surfaced and self-sealing, and rated to perform at 110 mph.
  1. Product: Subject to compliance with requirements, provide one of the following to match existing asphalt shingles:
    - a. CertainTeed; Landmark Premium.
    - b. GAF Materials Corporation; Timberline.
    - c. Owens Corning; Duration.
  2. Butt Edge: Straight cut.
  3. Strip Size: Manufacturer's standard.
  4. Weight/Square: 300 lbs.
  5. Algae Resistance: Granules treated to resist algae discoloration.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

6. Color: As selected by Architect / Owner to match existing.

## 2.2 UNDERLAYMENT MATERIALS

- A. Glass-Reinforced Felt: ASTM D 6757, glass-reinforced, asphalt-saturated organic felt.
  1. Obtain felt underlayment from same manufacturer of asphalt shingles, or equal product approved in writing by manufacturer, as required to maintain specified warranty of system.
  2. Products: Subject to compliance with requirements, provide the following, or equal:
    - a. CertainTeed; Roofers' Select High-Performance Underlayment.
    - b. GAF; Shingle-Mate.
- B. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40-mil- thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied.
  1. Obtain self-adhering sheet underlayment from same manufacturer of asphalt shingles, or equal product approved in writing by manufacturer, as required to maintain specified warranty of system.
  2. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed; WinterGuard HT.
    - b. Grace, W. R. & Co.; Grace Ice and Water Shield.
    - c. Johns Manville International, Inc.; Roof Defender.
    - d. Owens Corning; WeatherLock M.
    - e. Polyguard Products, Inc.; Polyguard Deck Guard.

## 2.3 ACCESSORIES

- A. Roofing Nails: ASTM F 1667; hot-dip galvanized steel wire shingle nails, minimum 0.120-inch-diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through plywood sheathing.
  1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
- B. Felt-Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.

## 2.4 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
  1. Step Flashings: Fabricate with a headlap of 2 inches and a minimum extension of 5 inches over the underlying asphalt shingle and up the vertical surface.
  2. Drip Edges: Fabricate in lengths not exceeding 10 feet with 2-inch roof deck flange and 1-1/2-inch fascia flange with 3/8-inch drip at lower edge.
- B. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof and extending at least 4 inches from pipe onto roof.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
  - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
  - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.
  - 3. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Lap sides a minimum of 2 inches over underlying course. Lap ends a minimum of 4 inches. Stagger end laps between succeeding courses at least 72 inches. Fasten with roofing nails.
  - 1. Install felt underlayment on roof deck not covered by self-adhering sheet underlayment. Lap sides of felt over self-adhering sheet underlayment not less than 3 inches in direction to shed water. Lap ends of felt not less than 6 inches over self-adhering sheet underlayment.
  - 2. Install fasteners at no more than 36 inch o.c.
- C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated on Drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days.

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7 Section "Sheet Metal Flashing and Trim."
- B. Step Flashings: Install with a headlap of 2 inches and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
- C. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
- D. Eave Drip Edges: Install eave drip edge flashings over underlayment and fasten to roof sheathing.
- E. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3.4 ASPHALT SHINGLE INSTALLATION

- A. Install asphalt shingles according to manufacturer's written instructions, recommendations in ARMA's "Residential Asphalt Roofing Manual," and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."
  - 1. Fasten asphalt shingles to roof sheathing with roofing nails.
  - 2. Fasten asphalt shingles with a minimum of six fasteners per shingle in accordance with the Connecticut State Building Code. STAPLING OF SHINGLES IS NOT ALLOWED.
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip at least 7 inches wide with self-sealing strip face up at roof edge.
  - 1. Extend asphalt shingles 1/2 inch over fascia at eaves and rakes.
  - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck with manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure.
- D. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.
  - 1. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
  - 2. When ambient temperature during installation is below 50 deg F, seal asphalt shingles with asphalt roofing cement spots.

3.5 WASTE DISPOSAL

- A. Disposal: At completion of roofing work, transport demolished materials and waste off Owner's property.

END OF SECTION 073113

SECTION 074600 - SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. Section Includes:
  - 1. Vinyl siding and soffit.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
  - 1. For vinyl siding, include VSI's official certification logo printed on product data.
- B. Samples for Initial Selection: For siding and soffit including related accessories.
- C. Samples for Verification: For each type, color, texture, and pattern required.
  - 1. 12-inch- long-by-actual-width Sample of siding.
  - 2. 12-inch- long-by-actual-width Sample of soffit.
  - 3. 12-inch- long-by-actual-width Sample of trim.
- D. Qualification Data: For qualified vinyl siding Installer.
- E. Product Certificates: For each type of siding and soffit, signed by product manufacturer.
- F. Research/Evaluation Reports: For each type of siding required, from ICC-ES.
- G. Maintenance Data: For each type of siding and related accessories to include in maintenance manuals.
- H. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Vinyl Siding Installer Qualifications: A qualified installer who employs a VSI-Certified Installer on Project.
- B. Vinyl Siding Certification Program: Provide vinyl siding products that are listed in VSI's list of certified products.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- C. Source Limitations: Obtain each type, color, texture, and pattern of siding, including related accessories, from single source from single manufacturer.
  
  - D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for fabrication and installation.
    - 1. Build mockup of typical wall area as directed by Architect.
    - 2. Build mockups for vinyl siding and soffit including accessories.
      - a. Size: 48 inches long by 60 inches high.
      - b. Include outside corner on one end of mockup.
    - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
    - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
  
  - E. Preinstallation Conference: Conduct conference at Project site.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Store materials in a dry, well-ventilated, weathertight place.
- 1.6 COORDINATION
- A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.
- 1.7 WARRANTY
- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding that fails in materials or workmanship within specified warranty period.
    - 1. Failures include, but are not limited to, the following:
      - a. Structural failures including cracking, deforming, and fading
      - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - 2. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 4 Hunter color-difference units as measured according to ASTM D 2244.
    - 3. Warranty Period: 50 years from date of Substantial Completion.
- 1.8 EXTRA MATERIALS
- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
    - 1. Furnish full lengths of siding including related accessories, in a quantity equal to 2 percent of amount installed.

PART 2 - PRODUCTS

2.1 VINYL SIDING

- A. General: Integrally colored vinyl siding complying with ASTM D 3679.
  - 1. Products: Subject to compliance with requirements, provide one of the following or equal, to match existing vinyl siding:
    - a. CertainTeed Corporation; Monogram 46.
    - b. Georgia Pacific; Compass.
    - c. Mastic Home Exteriors by PlyGem; Quest.
- B. Horizontal Pattern: 8-inch exposure in plain, double, 4-inch board style.
- C. Texture: Woodgrain.
- D. Nominal Thickness: 0.044 inch minimum.
- E. Minimum Profile Depth (Butt Thickness): 1/2 inch.
- F. Nailing Hem: Double thickness.
- G. Finish: Wood-grain print with clear protective coating containing not less than 70 percent PVDF.
  - 1. Colors: As selected by Architect / Owner to match existing.

2.2 VINYL SOFFIT

- A. Vinyl Soffit: Integrally colored product complying with ASTM D 4477.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. CertainTeed Corporation; Triple 3-1/3" Invisivent.
    - b. Georgia Pacific; Triple 3-1/3" Vinyl Soffit.
    - c. Mastic Home Exteriors by PlyGem; Ventura Triple 3-1/3" Hidden Vent Soffit.
- B. Pattern: 10-inch exposure in V-grooved, triple 3-1/3 inch board style.
- C. Thickness: 0.044 inch.
- D. Ventilation: Provide perforated soffit with net free air space of 10.0 sq. in. per foot.
- E. Minimum Profile Depth: 3/4 inch.
- F. Color: As selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

- A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Provide accessories made from same material as and matching color and texture of adjacent siding unless otherwise indicated.
- B. Vinyl Accessories: Integrally colored vinyl accessories complying with ASTM D 3679 except for wind-load resistance.
  1. Texture: Smooth.
- C. Decorative Accessories: Provide the following vinyl decorative accessories as required to match existing:
  1. Corner posts.
  2. 3-1/2-inch lineal molding for window trim.
- D. Colors for Accessories: As selected by Architect from manufacturer's full range.
- E. Flashing: Provide aluminum flashing complying with Division 7 Section "Sheet Metal Flashing and Trim" at window heads and where indicated.
- F. Fasteners:
  1. For fastening to wood, use siding nails of sufficient length to penetrate a minimum of 1 inch into substrate.
  2. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
  3. For fastening vinyl, use stainless-steel fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and related accessories.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

#### 3.3 INSTALLATION

- A. General: Comply with siding manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
  1. Do not install damaged components.
  2. Center nails in elongated nailing slots without binding siding to allow for thermal movement.
- B. Install vinyl siding and soffit and related accessories according to ASTM D 4756.
  1. Install fasteners for horizontal vinyl siding no more than 16 inches o.c.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Install joint sealants as specified in Division 07 Section "Joint Sealants" and to produce a weathertight installation.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 074600



SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. Section Includes:
1. Formed Products:
    - a. Formed roof drainage sheet metal fabrications.
    - b. Formed steep-slope roof sheet metal fabrications.
    - c. Roof penetration flashing.
  2. All hoisting and scaffolding necessary for the completion of the work.
  3. Waste disposal.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
1. Identification of material, thickness, weight, and finish for each item and location in Project.
  2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
  4. Details of termination points and assemblies, including fixed points.
  5. Details of edge conditions, including eaves, rakes, and counterflashings as applicable.
  6. Details of special conditions.
  7. Details of connections to adjoining work.
  8. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
  2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
  3. Accessories and Miscellaneous Materials: Full-size Sample.
- D. Qualification Data: For qualified fabricator.
- E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.
- F. Warranty: Sample of special warranty.

#### 1.5 QUALITY ASSURANCE

- A. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- C. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical roof eave, including gutter and fascia trim, approximately 10 feet long, including supporting construction cleats, seams, attachments, underlayment, and accessories.
  2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Meet with Owner, Architect, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials.
2. Review methods and procedures related to sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.7 COORDINATION

- A. Coordinate installation of manufactured roof specialties with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

1.8 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
  1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
  1. Surface: Smooth, flat.
  2. Exposed Coil-Coated Finish:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- a. 2-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

## 2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
  2. Fasteners for Aluminum Sheet: Series 300 stainless steel.
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

## 2.3 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
  1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
  2. Obtain field measurements for accurate fit before shop fabrication.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
  4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- D. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- G. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.
- I. Do not use graphite pencils to mark metal surfaces.

#### 2.4 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters.
1. Gutter Profile: Style A according to cited sheet metal standard, in size indicated on Drawings.
  2. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.
  3. Fabrication:
    - a. Fascia Splices: Fabricated from 0.032 inch thick aluminum in 6 inch lengths, formed to fit inside the snap-on fascia.
    - b. Provide factory mitered corners for fascia and liner.
    - c. Provide factory mitered, sculptured end caps for fascias.
    - d. Provide mill finished aluminum liner end caps at all fascia end caps and wall abutments.
  4. Fabricate from 0.032 inch thick aluminum.
    - a. Color: As selected by Architect from manufacturer's full range.
- B. Downspouts: Fabricate round and square downspouts with mitered elbows to dimensions indicated. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Provide aluminum outlets at all downspout locations to connect gutter liner to downspout.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Wall Brackets: Fabricated from 0.125 inch x 1 inch extruded aluminum bar, finished to match downspout. Furnish brackets at 60 inch maximum spacing, two brackets minimum per downspout.
  3. Fabricate from 0.024 inch thick aluminum.
    - a. Color: As selected by Architect from manufacturer's full range.
- C. Concrete Splash Blocks: Provide 24" long x 16" wide precast concrete splash blocks at the termination of each downspout.

2.5 STEEP-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Drip Edges: Fabricate from the following material:
1. Aluminum: 0.032 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
1. Verify compliance with requirements for installation tolerances of substrates.
  2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
  4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
  5. Install sealant tape where indicated.
  6. Torch cutting of sheet metal flashing and trim is not permitted.
  7. Do not use graphite pencils to mark metal surfaces.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
  - 1. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- E. Seal joints as shown and as required for watertight construction.
  - 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
  - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.
  - 1. Do not solder aluminum sheet.
  - 2. Pre-tinning is not required for zinc-tin alloy-coated copper.
  - 3. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

### 3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored straps spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
  - 1. Fasten gutter spacers to front and back of gutter.
  - 2. Loosely lock straps to front gutter bead and anchor to roof deck.
  - 3. Anchor and loosely lock back edge of gutter to continuous cleat.
  - 4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
  - 5. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.

- C. Downspouts: Join sections with 1-1/2-inch telescoping joints.
  - 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
  - 2. Provide elbows at base of downspout to direct water away from building.
  - 3. Connect downspouts to underground drainage system where indicated.
- D. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below gutter discharge.
- E. Splash Blocks: Install where downspouts discharge.

### 3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements[, sheet metal manufacturer's written installation instructions,] and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- C. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

### 3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

### 3.6 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.7 WASTE DISPOSAL

- A. Unless otherwise indicated, excess materials are Contractor's property. At completion of roofing work, remove from Project site.

END OF SECTION 076200



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. Section Includes:
  - 1. Urethane joint sealants.
  - 2. Latex joint sealants.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
  - 1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  - 2. Submit not fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
  - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
  - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing of current sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that establish and maintain watertight and airtight continuous joint seals without staining or deteriorating joint substrates.
- B. Provide joint sealants for interior applications that establish and maintain airtight and water-resistant continuous joint seals without staining or deteriorating joint substrates.

1.5 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- C. Samples for Verification: For each type and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
  - 1. Joint-sealant application, joint location, and designation.
  - 2. Joint-sealant manufacturer and product name.
  - 3. Joint-sealant formulation.
  - 4. Joint-sealant color.

1.6 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of joint sealant and accessory, signed by product manufacturer.
- B. Qualification Data: For Installer.
- C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- D. Product Test Reports: Based on comprehensive testing of product formulations performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Warranties: Special warranties specified in this Section.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized Installer who is approved or licensed for installation of elastomeric sealants required for this Project.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Test joint sealants using a qualified testing agency.
  - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
  - 2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- D. Mockups: Build mockups incorporating sealant joints, as follows, to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
  - 1. Joints in mockups of assemblies specified in other Sections that are indicated to receive elastomeric joint sealants, which are specified by reference to this Section.
  - 2. Each type of sealant and joint substrate indicated.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.8 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Special warranties specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:
  - 1. Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
  - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
  - 3. Mechanical damage caused by individuals, tools, or other outside agents.
  - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 50, for Use NT.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. BASF Corporation-Construction Systems; MasterSeal NP 2 (formerly Sonolastic NP2).
    - c. Pecora Corporation; Dynatrol II.
    - d. Tremco; Dymeric 240 FC.

2.3 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Pecora Corporation; AC-20+.
    - b. Tremco; Tremflex 834.

2.4 JOINT-SEALANT BACKING

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

## 2.5 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
    - a. Concrete.
    - b. Masonry.
  - 3. Remove laitance and form-release agents from concrete.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

- a. Metal.
- b. Glass.

B. **Joint Priming:** Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. **Masking Tape:** Use masking tape where required to prevent contact of sealant with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

A. **General:** Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. **Sealant Installation Standard:** Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. **Install sealant backings of type indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.**

- 1. Do not leave gaps between ends of sealant backings.
- 2. Do not stretch, twist, puncture, or tear sealant backings.
- 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. **Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.**

E. **Install sealants using proven techniques that comply with the following and at the same time backings are installed:**

- 1. Place sealants so they directly contact and fully wet joint substrates.
- 2. Completely fill recesses in each joint configuration.
- 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. **Tooling of Nonsag Sealants:** Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

- 1. Remove excess sealant from surfaces adjacent to joints.
- 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
- 3. Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
  - 1. Joint Locations:
    - a. Control and expansion joints in unit masonry.
    - b. Joints in cellular PVC trim.
    - c. Perimeter joints at frames of doors and windows.
    - d. Other joints as indicated.
  - 2. Urethane Joint Sealant: Multicomponent, nonsag, Class 50.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors, for each material.
- B. Joint-Sealant Application: Interior joints in all vertical surfaces.
  - 1. Joint Locations:
    - a. Perimeter joints between interior wall surfaces and frames/trim of doors and windows.
    - b. Other joints as indicated.
  - 2. Joint Sealant: Latex.
  - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200



SECTION 079201 – SPRAY FOAM SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes polyurethane spray foam sealant.
- B. Related Sections include the following:
  - 1. Division 07 Section "Joint Sealants" for sealants installed in interior and exterior surfaces.

1.3 PERFORMANCE REQUIREMENTS

- A. Provide spray foam sealant engineered to fill voids and seal gaps without deteriorating substrates.

1.4 SUBMITTALS

- A. Product Data: For spray foam sealant.
- B. Product Certificates: For spray foam sealant and accessories, signed by product manufacturer.
- C. Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming sealant substrates have been tested for compatibility and adhesion with spray from sealant.
- D. Certification from sealant manufacturer that products supplied comply with State of Connecticut regulations controlling the use of volatile organic compounds (VOC's).

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain spray foam sealant through one source from a single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials in original containers in cool, dry area at room temperature between 60 and 70 deg. F. Do not store materials above 90 deg. F.

1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of spray foam sealant under the following conditions:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1. When ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 45 deg. F.
2. When joint substrates are wet.
3. Contaminants capable of interfering with adhesion have not yet been removed from substrate.

## PART 2 - PRODUCTS

### 2.1 SPRAY FOAM SEALANTS

- A. Polyurethane Spray Foam Sealant: Single or two-component, polyurethane foam sealant packaged in self-contained pressurized containers, gun-grade, containing no urea formaldehyde, and UL Classified.
1. In accordance with ASTM E 84, provide products with a flame spread of 25 and smoke developed of 450.
  2. Properties:
    - a. Cure Time: 8-24 hours at 75 deg. F, 50% relative humidity.
    - b. Air permeability at 75 Pa per inch thickness: ASTM E 2178, less than 0.02 L/s/m<sup>2</sup>.
    - c. Water Vapor Transmission, per inch thickness: ASTM E 96, less than 4 perms.
    - d. R-Value: 4.5 per inch, minimum.
    - e. Closed Cell Content: ASTM D 2856, 70% or greater.
    - f. Core Density: Minimum 1.7 lbs./cu.ft.
  3. Products: Subject to compliance with requirements, provide one of the following:
    - a. Dow Building Solutions; Great Stuff Pro Window & Door.
    - b. Hilti; CF 812 Window and Door Low-Pressure Filler Foam.
    - c. Versi-Foam Systems; Versi-Tite Window & Door Sealant.
    - d. Zerodraft; Insulating Air Sealant.
- B. Cleaner: Manufacturer's standard for cleaning substrates and to clean up foam spills, overspray, tools and nozzles before foam cures.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine voids and substrates to receive spray foam sealant, with Installer present, for compliance with requirements and conditions affecting foam sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

### 3.2 PREPARATION

- A. Remove foreign material that could interfere with adhesion of spray foam sealant, including dust, oil, grease, water, repellants, water, and surface dirt.
1. Remove laitance and form-release agents from concrete.
  2. Clean nonporous surfaces with cleaner that does not stain, harm substrate, or leave residue capable of interfering with adhesion of spray foam sealants.

3.3      INSTALLATION

- A.      General: Comply with spray foam sealant manufacturer's written instructions for products and applications indicated.
- B.      Install foam sealant at exterior frames of windows and doors.
  - 1.      Fill cavities 30-40%, allowing foam to expand approximately three times its original dispensed volume.

3.4      CLEANING AND PROTECTING

- A.      Protect adjacent surfaces from overspray. If required, clean spills before product cures.
- B.      Protect spray foam from exposure to sunlight.
- C.      Proceed with installation of joint sealants by Division 07 Section "Joint Sealants."

END OF SECTION 079201



SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Sections:

1. Division 06 Section "Interior Architectural Woodwork" for wood frames and jambs for flush wood doors.
2. Division 08 Section "Door Hardware."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, and trim for openings. Include factory-finishing specifications.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Provide a schedule of wood doors using same reference numbers for details, openings, and door types as those indicated in the Door Schedule.
2. Indicate dimensions and locations of mortises and holes for hardware.
3. Indicate dimensions and locations of cutouts.
4. Indicate factory finish requirements.

- C. Samples for Initial Selection: For factory-finished doors.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish.
2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
  - a. Provide samples for each species of veneer and solid lumber required.
  - b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3. Frames for light openings, 6 inches long, for each material, type, and finish required.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.
- B. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags and wrap bundles of doors in plastic sheeting.
- C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
    - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
  2. Warranty shall include installation and finishing that may be required due to repair or replacement of defective doors, distribution, glass and glazing and removal of defective doors.
  3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Algoma Hardwoods, Inc.
  2. Eggers Industries.
  3. Graham Wood Doors; an Assa Abloy Group company.
  4. Marshfield Door Systems, Inc.
  5. Oshkosh Architectural Door Company.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

6. VT Industries Inc.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

## 2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards.

1. Provide AWI Quality Certification Labels indicating that doors comply with requirements of grades specified.
2. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. WDMA I.S.1-A Performance Grade:

1. Heavy Duty.

C. Particleboard-Core Doors:

1. Particleboard: ANSI A208.1, Grade LD-2.
2. Blocking: Provide all wood blocking in particleboard-core doors as needed to allow secure application of all hardware.

## 2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

1. Grade: Custom (Grade A faces).
2. Species: Red oak, or veneer as required to match existing wood doors.
3. Cut: Plain sliced.
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Running match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Core: Particleboard.
8. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
9. Stiles: 1-3/8- inch laminated strand lumber (LSL) with veneer band to match veneer face.
10. Crossbands: Engineered fiber.
11. Top and bottom rails: 1-1/8- inch LSL or hardwood.

B. Blocking: Provide blocking in all doors to allow for secure application of all hardware.

## 2.4 FABRICATION

A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.

B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Drill all pilot holes for butt hinges and lock fronts at the factory.

2.5 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Finish doors at factory.
- C. Transparent Finish:
1. Grade: Premium.
  2. Finish: AWI's "Architectural Woodwork Standards" System 11, catalyzed polyurethane.
  3. Staining: As selected by Architect from manufacturer's full range to match existing.
  4. Effect: Filled finish (oak).
  5. Effect: Open grain finish.
  6. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames before hanging doors.
1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, comply with requirements in Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch from bottom of door to top of threshold unless otherwise indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416



SECTION 081613 – FIBERGLASS DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. Section Includes:
  - 1. Fiberglass entry doors.
  - 2. Composite frames.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Provide door assemblies that have been designed and fabricated to comply with specified performance requirements, as demonstrated by testing manufacturer's corresponding standard systems.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, and finishes.
- B. Shop Drawings: Include the following:
  - 1. Elevations of each door design.
  - 2. Details of doors, including vertical and horizontal edge details.
  - 3. Locations of reinforcement and preparations for hardware.
- C. Other Action Submittals:
  - 1. Schedule: Provide a schedule of doors prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with Door Hardware Schedule.
- D. Samples for Initial Selection: For units with factory-applied finishes.
  - 1. Include similar Samples of seals, gaskets, and accessories involving color selection.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of fiberglass door.
- F. Maintenance Data: For fiberglass doors to include in maintenance manuals.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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G. Warranty: Special warranty included in this Section.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain fiberglass doors from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Store materials under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- high wood blocking. Do not store in a manner that traps excess humidity.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fiberglass doors that fail in materials or workmanship within specified warranty period.

1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
2. Warranty Period: Lifetime.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide products indicated by **Therma-Tru**, or comparable product by one of the following:

1. JELD-WEN Windows and Doors.
2. Milgard Windows and Doors.

2.2 FIBERGLASS DOORS

A. General: Provide doors of design indicated.

1. Entry Doors:

- a. Basis-of-Design Product: Subject to compliance with requirements, provide **Therma-Tru; Smooth-Star Entry Door**.

B. Construction: Compression-molded fiberglass with full glass panels.

1. Faces: 1/16-inch thick minimum thickness, fiberglass-reinforced thermoset composite.
  - a. Color: White.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Door Edges: Machinable kiln-dried pine, primed to match color of faces, lock edge reinforced with laminated veneer lumber core, lockset reinforced with solid blocking for hardware backup.
3. Door Bottom Edge: Moisture-proof and decay-proof composite.
4. Core: Foamed-in-place polyurethane, CFC-free, density 1.9 pcf minimum, K-factor of 0.15 for minimum thermal transmittance.

a. U-Value for Entry Doors: 0.26.

- C. Weatherstripping: Jacketed thermoset closed-cell foam, press fit in kerfs at jamb stops in frames. Extruded thermoplastic elastomer, finned and chambered design, press fit into bottom edge of doors.
- D. Frames: Milled from 5/4-inch thick kiln-dried white pine, profiled with 1/2-inch stop. Provide framed depth to match wall construction.
- E. Lockset: Manufacturer's standard tongue version for single doors.
  1. Handlesets: As selected by Architect from manufacturer's full range.
  2. Finish: As selected by Architect from manufacturer's full range.
- F. Hinges: Solid brass with screws plated and finished to match hardware.
- G. Threshold: Manufacturer's standard, aluminum threshold.

### 2.3 FABRICATION

- A. Fabricate doors to be rigid and free of defects, warp, or buckle.
- B. Hardware Preparation: Factory prepare doors to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
  1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8 and ANSI/NAAMM-HMMA 861.
  2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3.2 PREPARATION

- A. Drill and tap doors to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install fiberglass doors plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Fiberglass Doors: Fit doors accurately in frames, within clearances specified below. Shim as necessary.
  - 1. Non-Fire-Rated Standard Doors:
    - a. Jamb and Head: 1/8 inch plus or minus 1/16 inch.
    - b. Between Edges of Pairs of Doors: 1/8 inch plus or minus 1/16 inch.
    - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch.
    - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work.
- B. Clean doors promptly after installation in accordance with manufacturer's instructions. Do not use harsh cleaning materials or methods that could damage finish.

END OF SECTION 081613

SECTION 085313 - VINYL WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes operable vinyl-framed windows.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review, discuss, and coordinate the interrelationship of vinyl windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealants, and protecting finishes.
  - 3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
  - 4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of vinyl window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
  - 1. Mullion details, including reinforcement and stiffeners.
  - 2. Joinery details.
  - 3. Expansion provisions.
  - 4. Flashing and drainage details.
  - 5. Weather-stripping details.
  - 6. Glazing details.
  - 7. Window cleaning provisions.
  - 8. For installed products indicated to comply with design loads, include structural analysis data prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of vinyl windows, and used to determine structural test pressures and design pressures from basic wind speeds indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Samples for Initial Selection: For units with factory-applied color finishes.
  - 1. Include similar Samples of hardware and accessories involving color selection.
- D. Samples for Verification: For vinyl windows and components required, prepared on Samples of size indicated below.
  - 1. Operable Window: Full-size unit with factory-applied finish.
- E. Product Schedule: For vinyl windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer, professional engineer, and testing agency.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency for each type, class, grade, and size of vinyl window. Test results based on use of downsized test units will not be accepted.
- C. Maintenance Data: For operable window sash, operating hardware, weather stripping, and finishes to include in maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to vinyl window manufacturer for installation of units required for this Project.
  - 1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
  - 2. Engineering Responsibility: Preparation of data for vinyl windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- C. Source Limitations: Obtain vinyl windows through one source from a single manufacturer.
- D. Product Options: Drawings indicate size, profiles, and dimensional requirements of vinyl windows and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements." Do not modify size and dimensional requirements.
  - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- E. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockup for windows indicated, in location as directed by Architect.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify vinyl window openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to meet performance requirements.
    - b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
    - c. Faulty operation of movable sash and hardware.
    - d. Deterioration of vinyl, other materials, and finishes beyond normal weathering.
    - e. Failure of insulating glass.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Provide vinyl windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of test size indicated below:
  - 1. Size required by AAMA/WDMA 101/I.S.2/NAFS for gateway performance.
- B. Structural Performance: Provide vinyl windows capable of withstanding the effects of the following loads, based on testing units representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:
  - 1. Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.
    - a. Basic Wind Speed: 100 mph.
    - b. Exposure Category: B.
- C. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Provide vinyl window units with performance requirements indicated, and the following:
  - a. Thermal Transmittance: Provide vinyl windows with a whole-window, U-factor maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to NFRC 100.
    - 1) U-Factor: Less than or equal to 0.30 Btu/sq. ft. x h x deg F or less.

2.2 MATERIALS

- A. Vinyl Extrusions: Rigid (unplasticized) hollow PVC extrusions, formulated and extruded for exterior applications, complying with AAMA/WDMA 101/I.S.2/NAFS and the following:
  1. PVC Formulation: High impact, low heat buildup, lead free, nonchalking, and color and UV stabilized.
  2. Extrusion Wall Thickness: Not less than 0.070 inch.
- B. Vinyl Trim and Glazing Stops: Material and finish to match frame members.
- C. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with vinyl window members, cladding, trim, hardware, anchors, and other components.
  1. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Reinforcing Members: Aluminum, or nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- F. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and for complete concealment when vinyl window is closed.
- G. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
  1. Weather Seals: Provide weather stripping with integral barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
- H. Replaceable Weather Seals: Comply with AAMA 701/702.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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2.3 VINYL WINDOWS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide **Harvey Building Products; Classic Double Hung Windows** or a comparable product by one of the following:
  - 1. Jeld-Wen Windows and Doors.
  - 2. Milgard Manufacturing, Inc.
- B. Window Types: In sizes and configurations indicated.
  - 1. Double hung.
- C. AAMA/WDMA Performance Requirements: Provide vinyl windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS.
  - 1. Performance Class and Grade: AP-LC75.
- D. Thermal Transmittance: Provide vinyl windows with a whole-window, U-factor maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to NFRC 100.
  - 1. U-Factor: **0.30** Btu/sq. ft. x h x deg F or less. (Energy Star).
- E. Solar Heat-Gain Coefficient (SHGC): Provide vinyl windows with a whole-window SHGC maximum of 0.30, determined according to NFRC 200 procedures.
- F. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.
  - 1. Maximum Rate: 0.19 cfm/sq. ft. of area at an inward test pressure of 1.57 lbf/sq. ft.
- G. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to ASTM E 547.
  - 1. Test Pressure: 5.25 lbf/sq. ft.
- H. Forced-Entry Resistance: Comply with Performance Grade 10 requirements when tested according to ASTM F 588.
- I. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.

2.4 GLAZING

- A. Glass: Clear annealed glass, ASTM C 1036, Type 1, Class 1, q3.
- B. Insulating-Glass Units: ASTM E 2190, certified through IGCC as complying with requirements of IGCC.
  - 1. Glass: ASTM C 1036, Type 1, Class 1, q3.
  - 2. Lites: Two.
  - 3. Thickness: 7/8-inch.
  - 4. Filling: Fill space between glass lites with argon.
  - 5. Low-E Coating: Pyrolytic on second surface.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

## 2.5 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with vinyl; designed to smoothly operate, tightly close, and securely lock vinyl windows, and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals.
- B. Sill Cap/Track: Rigid PVC or other weather-resistant plastic track with manufacturer's standard integral color, of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
- C. Hung Window Hardware:
  - 1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
  - 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
  - 3. Tilt Hardware: Releasing tilt latch allows sash to pivot about horizontal axis to facilitate cleaning exterior surfaces from the interior.

## 2.6 INSECT SCREENS

- A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on outside of window and provide for each operable exterior sash or ventilator.
  - 1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Residential R-20 class.
- B. Aluminum Insect Screen Frames: Manufacturer's standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
  - 1. Aluminum Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
  - 2. Finish: Manufacturer's standard.
- C. Aluminum Wire Fabric: 18-by-16 mesh of 0.011-inch- diameter, coated aluminum wire.
  - 1. Wire-Fabric Finish: Charcoal gray.

## 2.7 ACCESSORIES

- A. Jamb Extension: Furnish factory installed jamb extension for wall thickness indicated or required.
  - 1. Finish: Match interior frame finish.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2.8 FABRICATION

- A. Fabricate vinyl windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
  - 1. Welded Frame and Operable Sash: Miter-cut and fusion welded corners, nominal 0.070 inch frame thickness.
- B. Fabricate vinyl windows that are reglazable without dismantling sash or ventilator framing.
- C. Weather Stripping: Provide full-perimeter weather stripping for each operable sash and ventilator, unless otherwise indicated.
- D. Factory-Glazed Fabrication: Glaze vinyl windows in the factory.
- E. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant steel reinforcement complying with requirements for reinforcing members, or do both.
- F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

2.9 VINYL FINISHES

- A. Organic Pigmented Finish: Manufacturer's standard finish, interior and exterior, complying with AAMA 613 and paint manufacturer's written specifications for cleaning and painting.
  - 1. Color: White.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction.
- C. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 085313

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:
1. Commercial door hardware for the following:
    - a. Swinging doors.
    - b. Folding doors.
- B. Related Sections include the following:
1. Division 08 Section "Flush Wood Doors."
  2. Division 08 Section "Fiberglass Doors" for door hardware furnished and installed with fiberglass doors.

1.3 SUBMITTALS

- A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Verification: For exposed door hardware of each type, in specified finish, full size. Tag with full description for coordination with the door hardware sets. Submit Samples before, or concurrent with, submission of the final door hardware sets.
1. Samples will be returned to Contractor. Units that are acceptable and remain undamaged through submittal, review, and field comparison process may, after final check of operation, be incorporated into the Work, within limitations of keying requirements.
- C. Qualification Data: For Architectural Hardware Consultant.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for locks, latches, delayed-egress locks, and closers.
- E. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include the following:
1. Final hardware schedule, as-built.
  2. Keying schedule.
  3. Product cut sheets for each item installed.
  4. Parts list and numbers for each item installed.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

5. Maintenance information for each item installed.
6. Name, address and phone number of local representative of each item installed.

F. Warranty: Special warranty specified in this Section.

G. Other Action Submittals:

1. Door Hardware Sets: Prepared by or under the supervision of the Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
  - b. Content: Include the following information:
    - 1) Identification number, location, hand, fire rating, and material of each door and frame.
    - 2) Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
    - 3) Complete designations of every item required for each door or opening including name and manufacturer.
    - 4) Fastenings and other pertinent information.
    - 5) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    - 6) Explanation of abbreviations, symbols, and codes contained in schedule.
    - 7) Mounting locations for door hardware.
    - 8) Door and frame sizes and materials.
    - 9) List of related door devices specified in other Sections for each door and frame.
    - 10) Name, address and phone number of local representative of each item installed.
  - c. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the door hardware sets.

#### 1.4 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.

1. Installer's responsibilities include supplying and installing door hardware, and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
2. Installer shall have warehousing facilities in Project's vicinity.
3. Scheduling Responsibility: Preparation of door hardware and keying schedules.

B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

C. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.
  - 1. Each item to be individually packaged in manufacturer's original container.
- C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.6 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including excessive deflection, cracking, or breakage.
    - b. Faulty operation of operators and door hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  - 2. Warranty Period: One year from date of Substantial Completion, except as follows:
    - a. Hinges: Lifetime.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section, door hardware sets indicated in door and frame schedule, and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.
  - 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by descriptive titles corresponding to requirements specified in Part 2.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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2.2 HINGES

A. Hinges: BHMA A156.1.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Hager Companies.
  - b. McKinney Products Company; an ASSA ABLOY Group company.
  - c. Stanley Commercial Hardware; Div. of The Stanley Works.
2. Mounting: Full mortise (butts).
3. Bearing Material: Ball bearing.
4. Grade: Grade 1 (heavy weight).
5. Base and Pin Metal:
  - a. Interior Hinges: Steel with steel pin.
6. Pins: Non-rising loose.
7. Tips: Flat button.
8. Corners: Square.
9. Finish: US26D.

B. Quantity: Provide the following, unless otherwise indicated:

1. Three Hinges: For doors with heights 61 to 90 inches.

C. Fasteners: Comply with the following:

1. Wood Screws: For wood doors and frames.
2. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.

2.3 MECHANICAL LOCKS AND LATCHES

A. Lock Function:

1. Passage: Closets.
2. Privacy: Bedroom.

B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:

1. Bored Locks: Minimum 1/2-inch latchbolt throw.

C. Lock Backset: 2-3/4 inches.

D. Lock Trim:

1. Knobs and Levers: Solid brass, bronze or stainless steel; cast or forged and through-bolted with a 2-piece spindle.
2. Escutcheons (Roses): Wrought.
3. Dummy Trim: Match lever lock trim and escutcheons.
4. Lockset Designs:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- a. Levers: Accent, satin chrome finish.
  - E. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:
    - 1. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
  - F. Bored Locks: BHMA A156.2; Grade 1; Series 4000.
    - 1. Basis-of-Design Product: Subject to compliance with requirements, provide **Schlage; F Series** or comparable product by one of the following:
      - a. Best Access Systems, Div. of the Stanley Works.
      - b. Corbin Russwin Architectural Hardware, an ASSA ABLOY Group company.
      - c. SARGENT Manufacturing Company, an ASSA ABLOY Group company.
- 2.4 MECHANICAL STOPS AND HOLDERS
- A. Plunger-Type Door Holders: Grade 1; minimum 1-1/8-inch plunger throw; with replaceable rubber tip; for surface-screw application.
- 2.5 FOLDING DOOR HARDWARE
- A. General: BHMA A156.14; complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.
    - 1. Basis of Design Product: Subject to compliance with requirements, provide products by **Stanley Commercial Hardware; Div. of The Stanley Works, BF50.**
  - B. Bifolding Door Hardware: Rated for door panels weighing up to 50 lb Grade 1; with rails and door hardware that allow horizontal and vertical adjustment.
    - 1. Rail Material: Extruded aluminum.
    - 2. Rail Configuration: V-grooved double leg with fascia.
    - 3. Mounting: Surface mounted overhead.
    - 4. Wheel Assembly: Two wheel or four wheel, with roller bearings.
- 2.6 METAL PROTECTIVE TRIM UNITS
- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
    - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - a. Burns Manufacturing Incorporated.
      - b. Hager Companies.
      - c. IVES Hardware; an Ingersoll-Rand Company.
      - d. Rockwood Manufacturing Company.
      - e. Trimco.
  - B. Kick Plates: 8 inches high by door width, with allowance for frame stops.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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2.7 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
  - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
  - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
  - 2. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.8 FINISHES

- A. Standard: BHMA A156.18, as indicated in door hardware sets.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3.2 PREPARATION

- A. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated on Drawings, and in accordance with the Connecticut State Building Code.
  - 1. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

3.4 FIELD QUALITY CONTROL

- A. Independent Architectural Hardware Consultant: Owner will engage a qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
  - 1. Independent Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- B. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

END OF SECTION 087100

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. Section Includes:
  - 1. Interior gypsum board.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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2.2 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Georgia-Pacific Gypsum LLC.
  - 2. Lafarge / Continental.
  - 3. National Gypsum Company.
  - 4. Temple-Inland.
  - 5. USG Corporation.
  
- B. Gypsum Wallboard: ASTM C 1396/C 1396M.
  - 1. Thickness: 1/2 inch.
  - 2. Long Edges: Tapered.
  
- C. Moisture- and Mold-Resistant Gypsum Board, ASTM C 1396/C 1396M. With moisture- and mold-resistant core and coated surfaces.
  - 1. Thickness: 1/2 inch.
  - 2. Long Edges: Tapered.
  - 3. Mold Resistance: ASTM D 3273, score of 10.
  - 4. Products: Subject to compliance with requirements, provide one of the following:
    - a. G-P Gypsum; ToughRock Moisture-Guard Gypsum Board.
    - b. Lafarge / Continental; Mold Defense.
    - c. National Gypsum Company; Gold Bond XP Gypsum Board.
    - d. USG Corporation; Mold Tough Panels.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
  - 2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
  
- B. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
  
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  - 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
  - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- a. Use setting-type compound for installing paper-faced metal trim accessories.
- 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
- 4. Finish Coat: For third coat, use drying-type, all-purpose compound.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Gypsum Wallboard: Typical.
  - 2. Mold and Moisture Resistant Panels: Utility Room and Laundry Room.
- B. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
  - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

### 3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Interior Trim: Install in the following locations:
  - 1. Cornerbead: Use at outside corners.
  - 2. LC-Bead: Use at exposed panel edges.

### 3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 4: At panel surfaces that will be exposed to view.
    - a. Primer and its application to surfaces are specified in Division 09 Section "Painting."

3.6 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 093000 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes the following:

- 1. Porcelain paver tile.
- 2. Floor underlayment.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.
- D. Facial Dimension: Nominal tile size as defined in ANSI A137.1.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 PERFORMANCE REQUIREMENTS

- A. Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per the DCOF AcuTest in accordance with ANSI A137.1 – 2012 standard.
  - 1. Level Surfaces: Minimum 0.42 wet.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- D. Samples for Verification:
  - 1. Full-size units of each type and composition of tile and for each color and finish required.

1.7 INFORMATIONAL SUBMITTALS

- A. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- B. Product Certificates: For each type of product, signed by product manufacturer.
- C. Qualification Data: For Installer.
- D. Material Test Reports: For each tile-setting and -grouting product.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Store liquid latexes and emulsion adhesives in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Tile: Obtain all tile of same type and color or finish from one source or producer.
  - 1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
  - 1. Fiber cement backer units.

2.2 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.
  - 1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
  - 2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:
  - 1. As indicated by manufacturer's designations.
- D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.3 TILE PRODUCTS

- A. Porcelain Tile (**PTF-1**): Flat tile as follows:
  - 1. Product: Subject to compliance with requirements, provide **American Olean, Division of Dal-Tile International Corp.; Amber Valley** or comparable product by one of one of the following, or equal:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- a. Crossville, Inc.
  - b. Dal-Tile, Division of Dal-Tile International Corp.
2. Composition: Porcelain.
  3. Module Size: 6-1/2 by 6-1/2.
  4. Nominal Thickness: 5/16 inch.
  5. Finish: Unpolished.
  6. Color: Millstone Beige AM85.
  7. Grout Color: Laticrete #17 Marble Beige.

2.1 FLOOR UNDERLAYMENT

- A. Fiber-Cement Underlayment: ASTM C 1288, in maximum lengths available to minimize end-to-end butt joints.
  1. Products: Subject to compliance with requirements, provide one of the following, or equal:
    - a. CertainTeed Corp.; FiberCement Underlayment.
    - b. James Hardie; Hardiebacker.
  2. Thickness: 1/4 inch.

2.2 SETTING AND GROUTING MATERIALS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Custom Building Products.
  2. LATICRETE International Inc.
  3. MAPEI Corporation.
- B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, consisting of the following:
  1. Prepackaged dry-mortar mix containing dry, redispersible, ethylene vinyl acetate additive to which only water must be added at Project site.
    - a. Product: Subject to compliance with requirements, provide the following, or equal:
      - 1) MAPEI Corporation; Ultraflex 2.
- C. Epoxy Based Tile Grout: ANSI A118.3, color as selected by Architect from manufacturer's full range.
  1. Basis of Design Product: Subject to compliance with requirements, provide **LATICRETE International Inc.; Laticrete SpectraLOCK** or the following:
    - a. MAPEI Corporation; MAPEI Opticolor.

2.3 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
  - 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
  - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

#### 2.4 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
  - 1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
  - 2. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.
- B. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

- C. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

### 3.3 INSTALLATION, GENERAL

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
  - 1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:
    - a. Tile floors consisting of tiles 8 by 8 inches or larger.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.
- E. Grout tile to comply with requirements of the following tile installation standards:
  - 1. For ceramic tile grouts (sand-portland cement; dry-set, commercial portland cement; and latex-portland cement grouts), comply with ANSI A108.10.

### 3.4 UNDERLAYMENT INSTALLATION

- A. Install fiber-cement underlayment and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

### 3.5 FLOOR TILE INSTALLATION

- A. Joint Widths: Install tile on floors with the following joint widths:
  - 1. Paver Tile: 3/16- inch.

### 3.6 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
  2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions, but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
  3. Remove temporary protective coating by method recommended by coating manufacturer that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent it from clogging drains.
- B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

3.7 FLOOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Wood Subfloor:
1. Tile Installation: TCNA F144; thinset mortar on fiber cement backer board.
    - a. Tile Type: Porcelain paver tile.
    - b. Thin-Set Mortar: Latex-portland cement mortar.
    - c. Grout: Epoxy based grout.

END OF SECTION 093000



SECTION 096400 - WOOD FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. Section Includes:
  - 1. Field-finished wood flooring.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, approximately 12 inches long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.
- C. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors and finishes available for wood flooring.
  - 1. Include Samples of accessories involving color and finish selection.
- D. Samples for Verification: For each type of wood flooring and accessory, with stain color and finish required, approximately 12 inches and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Wood Flooring: Equal to 1 percent of amount installed for each type, color, and finish of wood flooring indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver wood flooring materials in unopened cartons or bundles.
- B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.

- C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

#### 1.6 FIELD CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
  - 1. Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
  - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
    - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
    - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Maple Flooring: Comply with applicable MFMA grading rules for species, grade, and cut.
  - 1. Certification: Provide flooring that carries MFMA mark on each bundle or piece.

#### 2.2 FIELD-FINISHED WOOD FLOORING

- A. Solid-Wood Flooring: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; with backs channeled.
  - 1. Grade and Species: MFMA-RL First Grade hard maple.
  - 2. Cut: Plain sawn.
  - 3. Thickness: 3/4 inch.
  - 4. Face Width: 2-1/4 inches.
  - 5. Lengths: Random-length strips complying with applicable grading rules.
- B. Urethane Finish System: Complete water-based system of compatible components that is recommended by finish manufacturer for application indicated.
  - 1. VOC Content:
    - a. Finish Coats and Floor Sealers: Not more than 350 g/L.
    - b. Stains: Not more than 250 g/L.
  - 2. Stain: Penetrating and nonfading type.
    - a. Color: Custom, to match existing.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- 3. Floor Sealer: Pliable, penetrating type.
  - 4. Finish Coats: Formulated for multicoat application on wood flooring.
- C. Wood Filler: Compatible with finish system components and recommended by filler and finish manufacturers for use indicated. If required to match approved Samples, provide pigmented filler.

2.3 ACCESSORY MATERIALS

- A. Wood Subfloor: As specified in Division 06 Section "Sheathing."
- B. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines."
- B. Provide expansion space at walls and other obstructions and terminations of flooring of not less than 3/4 inch.
- C. Solid-Wood Flooring: Blind nail or staple flooring to substrate.

3.4 FIELD FINISHING

- A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that are noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish.
  - 1. Comply with applicable recommendations in NWFA's "Installation Guidelines."
- B. Fill and repair wood flooring defects.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and three finish coats.
  - 1. Apply stains to achieve an even color distribution matching approved Samples.
  - 2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.
- D. Cover wood flooring before finishing.
- E. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.5 PROTECTION

- A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.
  - 1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 099100 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following substrates:
1. Gypsum board.
  2. Wood trim.
- B. Section also includes, but is not limited to the following, as indicated:
1. Clean, patching, repair and repainting of existing wall and ceiling surfaces.
- C. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Architect will select from standard colors and finishes available.
- D. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
1. Prefinished items include the following factory-finished components:
    - a. Finished mechanical and electrical equipment.
    - b. Light fixtures and wiring devices.
    - c. Switchgear.
  2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    - a. Furred areas.
    - b. Ceiling plenums.
    - c. Pipe spaces.
  3. Finished metal surfaces include the following:
    - a. Anodized or coated aluminum.
    - b. Stainless steel.
    - c. Chromium plate.
    - d. Copper and copper alloys.
    - e. Bronze and brass.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

4. Operating parts include moving parts of operating equipment and the following:
  - a. Valve and damper operators.
  - b. Linkages.
  - c. Sensing devices.
  - d. Motor and fan shafts.
5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

E. Related Sections include the following:

1. Division 09 Section "Gypsum Board" for surface preparation of gypsum board.
2. Division 09 Section "Cementitious Coatings" for coating applied to CMU foundations.

### 1.3 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
3. Semigloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
4. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

### 1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
3. Certification by the manufacturer that products supplied comply with State of Connecticut Ozone Transportation Commission (OTC) regulations controlling use of volatile organic compounds (VOCs).

B. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.
5. Submit 2 Samples on the following substrates for Architect's review of color and texture only:
  - a. Stained Wood: 4-by-8-inch. Samples of natural- or stained-wood finish on representative wood surfaces.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Qualification Data: For firms and persons specified in the “Quality Assurance” Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- D. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. VOC content.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mockups: Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Wall Surfaces: Provide samples of at least 100 sq. ft.
  - 2. Apply benchmark samples after permanent lighting and other environmental services have been activated.
  - 3. Final approval of color selections will be based on benchmark samples.
    - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

1.7 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
  - 1. Quantity: Furnish an additional 1 gallon of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Benjamin Moore & Co., including affiliate the following affiliate brands:
    - a. Lenmar Wood Finishes.
  - 2. Glidden Professional.
  - 3. PPG Architectural Finishes, Inc.; Pittsburgh Paints.
  - 4. Sherwin-Williams Co.

2.2 PAINT, GENERAL

- A. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content for Interior Paints and Coatings:
  - 1. All products shall comply with the VOC content regulations of the Ozone Transportation Commission (OTC) effective in the State of Connecticut. For interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
    - a. Flat Coatings: 100 g/L.
    - b. Nonflat Coatings: 150 g/L.
    - c. Nonflat-High Gloss Coatings: 250 g/L.
    - d. Primers, sealers and undercoaters: 200 g/L.
- C. Colors: As selected by Architect from manufacturer's full range.

2.3 INTERIOR PRIMERS

- A. General: Provide tinted primers as required for dark colors.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application (**100 g/L**).
  - 1. Benjamin Moore, Ultra Spec 500 Interior Latex Primer N534: Applied at a dry film thickness of not less than 1.8 mils.
  - 2. Glidden Professional; PVA Interior Primer Sealer 1030-1200N: Applied at a dry film thickness of not less than 1.2 mils.
  - 3. Pittsburgh Paints; 6-2 Speedhide Interior Latex Sealer Quick-Drying: Applied at a dry film thickness of not less than 1.0 mil.
  - 4. Sherwin-Williams; ProMar 200 Zero VOC Primer B28W2600: Applied at a dry film thickness of not less than 1.5 mils.
  
- C. Interior Wood Primer for Acrylic-Enamel Finishes: Factory-formulated acrylic-latex-based interior wood primer (**150 g/L**).
  - 1. Benjamin Moore; Fresh Start Multi-Purpose Latex Primer N023: Applied at a dry film thickness of not less than 1.2 mils.
  - 2. Glidden Professional; Gripper Interior/Exterior Primer Sealer 3210: Applied at a dry film thickness of not less than 1.8 mils.
  - 3. Pittsburgh Paints; 6-855 Interior Latex Enamel Undercoater: Applied at a dry film thickness of not less than 1.2 mils.
  - 4. Sherwin-Williams; Premium Wall and Wood Primer B28W08111 Series: Applied at a dry film thickness of not less than 1.8 mils.

#### 2.4 INTERIOR PAINTS

- A. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application ceilings (**50 g/L**).
  - 1. Benjamin Moore, Ultra Spec 500 Interior Flat N536: Applied at a dry film thickness of not less than 1.8 mils.
  - 2. Glidden Professional; Ultra-Hide 150 Interior Flat Paint 1210V: Applied at a dry film thickness of not less than 1.3 mils.
  - 3. Pittsburgh Paints; 6-70 Series Speedhide Interior Latex Flat: Applied at a dry film thickness of not less than 1.3 mils.
  - 4. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Flat Wall Paint B30-2600 Series: Applied at a dry film thickness of not less than 1.6 mils.
  
- B. Interior Low-Luster Acrylic Enamel: Factory-formulated eggshell acrylic-latex interior enamel for walls (**150 g/L**).
  - 1. Benjamin Moore, Ultra Spec 500 Interior Eggshell N538: Applied at a dry film thickness of not less than 1.8 mils.
  - 2. Glidden Professional; Ultra-Hide 150 Interior Eggshell Paint 1412V: Applied at a dry film thickness of not less than 1.3 mils.
  - 3. Pittsburgh Paints; 6-411 Series Speedhide Interior Enamel Latex Eggshell: Applied at a dry film thickness of not less than 1.5 mils.
  - 4. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Egg-Shell Enamel B20-2600 Series: Applied at a dry film thickness of not less than 1.6 mils.
  
- C. Interior Acrylic Enamel for Wood Surfaces: Factory-formulated semi-gloss acrylic latex enamel (**150 g/L**).
  - 1. Benjamin Moore; Regal Select Semi-Gloss Finish 551: Applied at a dry film thickness of not less than 1.5 mils. (primer not required).

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Glidden Professional; Ultra-Hide 150 Interior Semi-Gloss Paint 1416V: Applied at a dry film thickness of not less than 1.3 mils.
3. Pittsburgh Paints; 6-500 Series SpeedHide Interior Semi-Gloss Acrylic Latex: Applied at a dry film thickness of not less than 1.4 mils.
4. Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Semi-Gloss B31-2600 Series: Applied at a dry film thickness of not less than 1.7 mils.

2.5 INTERIOR WOOD STAINS AND VARNISHES

- A. Interior Wood Stain: Factory-formulated water-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer (**250 g/L**).
  1. Lenmar; Waterborne Interior Wood Stain 1WB1300.
  2. Glidden Professional Wood Pride; Water-Based Wood Finishing Semi-Transparent Stain 1700V.
  3. Pittsburgh Paints; Olympic Premium Interior Oil Based Wood Stain, Tint Base 44500.
  4. Sherwin-Williams; Minwax Wood Finish 250 VOC Stains.
- B. Clear Sanding Sealer: Factory-formulated fast-drying acrylic polyurethane clear wood sealer applied at spreading rate recommended by manufacturer. (**350 g/L OTC**).
  1. Benjamin Moore; Benwood Stays Clear Acrylic Polyurethane Gloss N422.
  2. Glidden Professional Wood Pride; Water-Based Quick Dry Semi-Gloss Sanding Sealer 1916-0000V.
  3. Pittsburgh Paints; Olympic Premium Interior Water Based Sanding Sealer 41061.
  4. Sherwin-Williams; Wood Classics Waterborne Polyurethane A68 Series.
- C. Interior Polyurethane-Based Clear Varnish: Factory-formulated polyurethane-based clear varnish (**350 g/L OTC**).
  1. Benjamin Moore; Benwood Stays Clear Acrylic Polyurethane Low Lustre N423.
  2. Glidden Professional Wood Pride; Water-Based Satin Varnish 1802-0000.
  3. Pittsburgh Paints; Olympic Premium Interior Water Based Polyurethane Clear Satin 42786.
  4. Sherwin-Williams; Wood Classics Waterborne Polyurethane A68 Series.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  1. Wood: 15 percent.
  2. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1. Notify Architect about anticipated problems when using the materials specified over substrates primed by others.
- E. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
  2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
  1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Wood Substrates:
  1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  2. Sand surfaces that will be exposed to view, and dust off.
  3. Prime edges, ends, faces, undersides, and backsides of wood.
  4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- E. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

### 3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
  1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

- A. Gypsum Board: Provide the following finish systems over new interior gypsum board surfaces:
  - 1. Flat Acrylic Finish (ceilings): Two finish coats over a primer.
    - a. Primer: Interior gypsum board primer.
    - b. Finish Coats: Interior flat acrylic paint.
  - 2. Low-Luster Acrylic-Enamel Finish (Walls): Two finish coats over a primer.
    - a. Primer: Interior gypsum board primer.
    - b. Finish Coats: Interior low-luster acrylic enamel.
- B. Wood: Provide the following paint finish systems over new interior wood surfaces:
  - 1. Gloss Acrylic-Enamel Finish: Two finish coats over a wood primer.
    - a. Primer: Interior wood primer for acrylic-enamel finishes.
    - b. Finish Coats: Interior acrylic enamel for wood surfaces.

3.6 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

- A. Stained Woodwork: Provide the following stained finishes over new interior woodwork as indicated:
  - 1. Stain Satin-Varnish Finish: Two finish coats of clear satin varnish over a sealer coat and interior wood stain.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- a. Stain Coat: Interior wood stain.
- b. Sealer Coat: Clear sanding sealer.
- c. Finish Coats: Interior polyurethane-based clear satin varnish.

END OF SECTION 099100



SECTION 099726 - CEMENTITIOUS COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section "Summary", Paragraph 1.1A, entitled "Related Documents."

1.2 SUMMARY

- A. Section includes surface preparation and application of cementitious coating systems on the following substrates:
  - 1. Concrete.
- B. Related Sections:
  - 1. Division 07 Section "Joint Sealants."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: In each color and gloss of finish coat indicated.
  - 1. Submit Samples on rigid backing, not less than 4 by 8 inches.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each cementitious coating, from manufacturer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency or by a qualified testing agency, for each product formulation.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that are from same production run (batch mix) as materials applied and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Quantity: Furnish an additional 5 percent of each color applied.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain cementitious coating materials from single source from single manufacturer.
- B. Mockups: Apply benchmark samples of coating system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one actual substrate of each type to represent surfaces and conditions for application of coating.
    - a. Wall Surfaces: Prepare samples of at least 50 sq. ft.
  - 2. Final approval of color selections will be based on benchmark samples.
    - a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, new, unopened packages and containers bearing manufacturer's name and label, and the following information:
  - 1. Product name or title of material.
  - 2. Manufacturer's stock number and date of manufacture.
  - 3. Contents by volume, for pigment and vehicle constituents.
  - 4. Application instructions.
  - 5. Color name and number.
  - 6. Handling instructions and precautions.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage of coatings in a clean condition, free of foreign materials and residue.
  - 1. Protect cementitious coating materials from freezing. Keep materials dry and storage area neat and orderly. Remove waste daily. Take necessary measures to ensure that workers and work areas are protected from health hazards resulting from handling, mixing, and applying the coating.

1.8 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)  
94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 2 - PRODUCTS

2.1 CEMENTITIOUS COATINGS

A. Polymer-Modified Cementitious Coating: Two-component, waterproof coating containing Portland cement, polymer, and hydrated lime or aggregates.

1. Basis of Design Product: Subject to compliance with requirements, provide **Sika Corporation, Construction Product Division; SikaTop Seal 107**, or one of the following:

- a. Silpro; Concrete Finish.
- b. Thoro, a BASF company; ThoroSeal with Acryl 60.

B. Performance Requirements: Comply with the following:

1. Tensile Strength (ASTM C-307) 28 days

- a. Type White 870 psi (6.0 Mpa)
- b. Type Gray 990 psi (6.8 Mpa)

2. Bond Strength (ACI 503R-30 Modified): Pull-off test

- a. 28 days 180 psi (1.25N/mm<sup>2</sup>)

3. Moisture Vapor permeability (ASTM E96)

- a. 28 days 18 perms

4. Compressive Strength (ASTM D-695) at 28 days

- a. Type White 3000 psi (20.7 Mpa)
- b. Type Gray 3400 psi (23.4 Mpa)

5. Flexibility (ASTM D522 Modified)

- a. Approximately 25%

6. Carbon Dioxide Diffusion

- a. Coefficient (uCO<sub>2</sub>) Approx. 35,000 equivalent to 6 inches of concrete

7. Watertightness under Hydrostatic Pressure (DIN 1048 Mod.)

Water Pressure		Penetrated Water		Water Absorption	
Feet	(bar)	grains	(grams)	<u>grains</u>	<u>(grams)</u>
				Ft. <sup>2</sup> * hours	m <sup>2</sup> * hours
16	(0.5)	0	(0)	0	(0)
33	(1)	15	(1)	3	(2)
99	(3)	31	(3)	10	(7)

- a. Rendering mortars absorbing less than 91 grains/ft.<sup>2</sup> \* h (64 grams/m<sup>2</sup> \*h) are considered watertight.

8. The material shall not produce a vapor barrier.

9. The material meets the chemical requirements in accordance with ANSI/NSF Standard 61- potable water approval.

10. The material shall be thermally compatible with Portland cement mortar and concrete.

11. Color: Gray.

C. Other Materials: Provide crack fillers, block fillers, and related materials that are compatible with cementitious finish-coat materials and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Verify suitability of substrates, including surface conditions and compatibility.
- C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
  - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for mixing and preparing materials and as applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
  - 1. After completing coating operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of coatings, including dirt, oil, grease, incompatible coatings, and loose substrate materials.
- D. Cementitious and Masonry Surfaces: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Crack Repair: Fill cracks according to manufacturer's written instructions before coating surfaces.
  - 1. Cracks Larger Than 1/32 Inch: Cut out static cracks, voids, or honeycombing larger than 1/32 inch and patch with materials recommended in writing by coating manufacturer. Identify dynamic cracks and treat according to manufacturer's written instructions before beginning application.

3.3 APPLICATION

- A. Apply coatings according to manufacturer's written instructions. Use applicators and techniques suited for coating and substrate indicated.
  - 1. Dampen substrate of surfaces to receive cementitious coatings one hour before beginning application to prevent surface drag. Immediately before applying coatings, redampen substrate. Substrates shall be saturated surface dry at time of application.
  - 2. Spray Equipment: Use spray equipment recommended in writing by manufacturer for material and texture required.
- B. Apply material at not less than manufacturer's recommended spreading rate. Provide total cured material thickness indicated or as recommended in writing by manufacturer.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Spray Application: Apply each coat according to manufacturer's written instructions to provide the equivalent hiding of brush-applied coats. Follow spray application with a general light brooming of coated surface to impart a slight texture.

#### 3.4 FIELD QUALITY CONTROL

- A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when coating operations are being conducted:
  - 1. Engage the services of a qualified testing agency to sample coating materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
  - 2. Testing agency will perform tests for compliance with the following product requirements.
    - a. Quantitative material analysis.
    - b. Compressive strength.
    - c. Tensile strength.
    - d. Flexural strength.
    - e. Permeance.
    - f. Accelerated weathering.
  - 3. Owner may direct Contractor to stop coating application if test results show materials being used do not comply with requirements. Contractor shall remove noncomplying materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

#### 3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from coating application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

#### 3.6 COATING SCHEDULE

- A. General: Apply additional coats when undercoats or other conditions show through final coat until cured film is of uniform coating finish, color, and appearance.
- B. Above-Grade Concrete: Two finish coats, 40 mils per coat (wet film).

END OF SECTION 099726



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 119000 – MISCELLANEOUS EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods or services referenced in or related to this Section shall also be bound by the Documents identified in Division 01 Section “Summary”, Paragraph 1.1A, entitled “Related Documents.”

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Flood vents.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Operation and Maintenance Data: For each product indicated.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for performance characteristics. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store equipment on site protected from weather, direct sunlight, and temperature extremes.

1.6 PROJECT CONDITIONS

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

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

PART 2 - PRODUCTS

2.1 GENERAL

- A. Provide equipment in quantities and locations indicated.

2.2 FLOOD VENTS

- A. Flood Vent: Insulated flood vent, fabricated from stainless steel, complete with stainless steel frame.
1. Fabrication: Constructed of stainless steel formed and smooth-welded construction, including frame. It shall have a pivoting door assembly that is fitted with two patented sealed floats that immediately and automatically release the door upon contact with rising water to relieve unbalanced lateral forces on foundation walls. The door shall swing open to provide two horizontal slot openings with a total combined unobstructed area of 76 square inches. The lower slot provides a 3-inch clear opening. One Single unit shall be used to relieve 200 square feet of enclosed area.
  2. Size: 16"W x 8"H.
  3. Finish: Stainless steel.
  4. Basis of Design Product: Subject to compliance with requirements, provide the following for installation in masonry walls:
    - a. Smart VENT, Inc.; Dual Function Smart Vent Model #1540-510.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install miscellaneous equipment in accordance with approved shop drawings and manufacturer's written installation instructions.

3.2 PROTECTING AND CLEANING

- A. Provide temporary covering of miscellaneous equipment until time of Substantial Completion. Use type of covering approved by manufacturer that will effectively protect equipment from abrasion, breakage, or other damage.
- B. Clean miscellaneous equipment immediately before date scheduled for inspection intended to establish date of Substantial Completion. Use methods and cleaning materials recommended by manufacturer, taking care not to scratch or damage coatings.

END OF SECTION 119000

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

SECTION 220719 - PLUMBING PIPING INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Pipe and fitting insulation for domestic water piping.
- B. Pipe and fitting insulation for sanitary, waste and vent piping in unheated basement.

1.3 RELATED REQUIREMENTS

- A. Section 221005 - Plumbing Piping: Placement of hangers and hanger inserts.

1.4 REFERENCE STANDARDS

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- B. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2012.
- C. ASTM C585 - Standard Practice for Inner and Outer Diameters of Rigid Thermal Insulation for Nominal Sizes of Pipe and Tubing (NPS System); 2010.
- D. ASTM D1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2007.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2013a.
- F. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2013.
- G. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.5 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.2 GLASS FIBER

- A. Manufacturers:
  - 1. Knauf Insulation: [www.knaufusa.com](http://www.knaufusa.com).
  - 2. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  - 3. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
  - 4. CertainTeed Corporation: [www.certainteed.com](http://www.certainteed.com).
- B. Insulation: ASTM C547 ; rigid molded, noncombustible.
  - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum service temperature: 850 degrees F.
  - 3. Maximum moisture absorption: 0.2 percent by volume.
- C. Vapor Barrier Jacket: White Kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- D. Vapor Barrier Lap Adhesive:
  - 1. Compatible with insulation.

2.3 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

- A. Manufacturer:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Armacell LLC: [www.armacell.us](http://www.armacell.us).
  
- B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C 534 Grade 3; use molded tubular material wherever possible.
  1. Minimum Service Temperature: -40 degrees F.
  2. Maximum Service Temperature: 220 degrees F.
  3. Connection: Waterproof vapor barrier adhesive.
  
- C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

#### 2.4 FITTING INSULATION

- A. Fitting Insulation
  1. Insulation:
    - a. Pre-molded fiberglass insert.
  2. Jacket: One piece molded type PVC fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 10 mil.
    - e. Connections: Brush on welding adhesive.
    - f. Equal to Johns Manville Zeston 2000.
  3. Covering Adhesive Mastic:
    - a. Compatible with insulation.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
  
- B. Verify that surfaces are clean and dry, with foreign material removed.

#### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
  
- B. Install in accordance with NAIMA National Insulation Standards.
  
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
  
- D. Glass fiber insulated pipes conveying fluids below ambient temperature:
  1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- E. Glass fiber insulated pipes conveying fluids above ambient temperature:
1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
  2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
- F. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions.
- G. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer.

### 3.3 SCHEDULES

- A. Plumbing Systems:
1. Domestic Cold Water in unheated basement (above 500 year flood elevation):
    - a. All Sizes - Glass Fiber Insulation; 1" Thickness
  2. Domestic Cold Water in unheated basement (at or below 500 year flood elevation):
    - a. All Sizes - Flexible Cellular Insulation; 1" Thickness
  3. Sanitary, Waste and Vent Piping in unheated basement (above 500 year flood elevation)
    - a. All Sizes - Glass Fiber Insulation; 1" Thickness

END OF SECTION

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 221005 - PLUMBING PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for piping systems.
  - 1. Sanitary sewer.
  - 2. Sanitary, waste and vent.
  - 3. Domestic water.
- B. Heat Trace Cable

1.3 RELATED REQUIREMENTS

- A. Section 220719 - Plumbing Piping Insulation.

1.4 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2013.
- C. ASTM B32 - Standard Specification for Solder Metal; 2008.
- D. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2010.
- E. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.
- F. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2013.
- G. ASTM D2239 - Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR) Based on Controlled Inside Diameter; 2012.
- H. ASTM D2447 - Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter; 2003.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- I. ASTM D2609 - Standard Specification for Plastic Insert Fittings for Polyethylene (PE) Plastic Pipe; 2002 (Reapproved 2009).
- J. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2012.
- K. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2011.
- L. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).
- M. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2008.
- N. MSS SP-69 - Pipe Hangers and Supports - Selection and Application; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2003.
- O. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2010.

1.5 SUBMITTALS

- A. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.
- B. Delegated Design: The heat trace vendor shall provide a detailed design utilizing standard heat-tracing design software, such as Pentair Thermal Management TraceCalc Pro design software or equal. At minimum, the design must provide the following:
  - 1. Circuit identification number
  - 2. Maintain temperature
  - 3. Line size and insulation
  - 4. Heat loss for pipe, valves, and supports
  - 5. Amount and type of heating cable required
  - 6. Spiral requirements
  - 7. Heating cable service voltage
  - 8. Heating cable power output at the maintain temperature
  - 9. Minimum and maximum maintain temperature vs. minimum and maximum ambient temperatures.
  - 10. Circuit breaker and transformer sizing

1.6 QUALITY ASSURANCE

- A. Valves: Manufacturer's name and pressure rating marked on valve body.
- B. Identify pipe with marking including size, ASTM material classification, ASTM specification, potable water certification, water pressure rating.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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**PART 2 PRODUCTS**

**2.1 SANITARY SEWER AND VENT PIPING, BURIED, WITHIN OR TO 5 FEET OF BUILDING**

- A. PVC Pipe (solid core): ASTM D2665 or ASTM D3034.
  - 1. Fittings: PVC.
  - 2. Joints: Solvent welded, with ASTM D2564 solvent cement.

**2.2 WATER PIPING, BURIED, WITHIN OR TO 5 FEET OF BUILDING**

- A. Copper Pipe: ASTM B 42, hard drawn Type K.
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
  - 2. Joints: ASTM B 32, alloy Sn95 solder.
- B. PE Pipe: ASTM D2239, or ASTM D2447 Schedule 40.
  - 1. Fittings: ASTM D2609, PE.
  - 2. Joints: Mechanical with stainless steel clamp.

**2.3 WATER PIPING, ABOVE GRADE**

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
  - 2. Joints: ASTM B32, alloy Sn95 lead-free solder.
  - 3. Mechanical Joints: Copper press fittings as manufactured by Viega or Rigid Tool Co.
    - a. Press fittings: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.

**2.4 FLANGES, UNIONS, AND COUPLINGS**

- A. Unions for Pipe Sizes 3 Inches and Under:
  - 1. Copper tube and pipe: Class 150 bronze unions with soldered joints.
- B. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

**2.5 PIPE HANGERS AND SUPPORTS**

- A. Provide hangers and supports that comply with MSS SP-58.
  - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
- B. Manufacturers
  - 1. Anvil International Inc.
  - 2. Tolco Inc.
  - 3. Beeline Products

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Plumbing Piping:
1. Conform to ASME B31.9.
  2. Hangers for Pipe Sizes 1/2 Inch to 1-1/2 Inches: Anvil, fig. 104, Malleable iron, adjustable swivel, split ring.
  3. Hangers for Pipe Sizes 2 Inches and Over: Anvil, fig. 260, Carbon steel, adjustable, clevis.
  4. Multiple or Trapeze Hangers: Anvil, fig. 46, Steel channels with welded spacers and hanger rods.
  5. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
  6. Threaded rod: Carbon steel, threaded complete length, size to load.

2.6 BALL VALVES

- A. Manufacturers:
1. Conbraco Industries: [www.apollovalves.com](http://www.apollovalves.com).
  2. Nibco, Inc: [www.nibco.com](http://www.nibco.com).
  3. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
  4. Watts Regulator Co.
  5. Apollo Valve
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, lead-free bronze, two piece body, chrome plated brass ball, regular port, teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, solder ends with union.

2.7 HEAT TRACE CABLE

- A. The heating cable shall consist of two 16 AWG or larger nickel-plated copper bus wires, embedded in a self-regulating polymeric core that controls power output so that the cable can be used directly on plastic or metallic pipes. Cables shall have a temperature identification number (T-rating) of T6 (185°F or 85°C) without use of thermostats.
- B. A ground-fault protection device set at 30 mA, with a nominal 100-ms response time, shall be used to protect each circuit.
- C. The heating cable shall have a tinned copper braid with a resistance less than the heating cable bus wire resistance as determined in type test (ASTM, B193, Sec.5). The braid shall be protected from chemical attack and mechanical abuse by a modified polyolefin or fluoropolymer outer jacket.
- D. In order to provide rapid heat-up, to conserve energy, and to prevent overheating of fluids and plastic pipe, the heating cable shall have the following minimum self-regulating indices (0.038 W/°F at 3 W/ft, 0.060 W/°F at 5 W/ft, 0.074 W/°F at 8 W/ft, 0.100 W/°F at 10 W/ft). The self-regulating index is the rate of change of power output in watts per degree Fahrenheit, as measured between the temperatures of 50°F and 100°F and confirmed by the type test and published data sheets.
- E. In order to ensure that the self-regulating heating cable does not increase power output when accidentally exposed to high temperatures, resulting in thermal run-away and self-ignition, the cable shall produce less than 0.5 watts per foot when energized and heated to 350°F for 30 minutes. After this test, if the cable is reenergized, it must not have an increasing power output leading to thermal runaway.

- F. The self-regulating heating cable shall retain at least 90 percent of its original power output after having been cycled 300 times between 50°F and 210°F, allowing at least six minutes of dwell time at each temperature.
- G. The heating cable shall be Raychem BTV-CT or BTV-CR self-regulating heater, with continuous exposure (maintain) capability up to 150°F (65°C) and intermittent exposure capability up to 185°F (85°C), as manufactured by Pentair Thermal Management.

## 2.8 HEAT TRACE TERMINATIONS

- A. All connection kits used to terminate heating cables, including power connectors, splices, tees, and connectors shall be approved for the respective area classification and approved as a system with the particular type of heating cable in use. Under no circumstances shall terminations be used which are manufactured by a vendor other than the cable manufacturer.
- B. In order to keep connections dry and corrosion resistant, connection kits shall be constructed of nonmetallic, electrostatic, charge-resistant, glass-filled, engineered polymer enclosed rated NEMA 4X. The connection kit stand shall allow for up to four inches of thermal insulation.
- C. Terminals shall be spring clamp wire connection type to provide reliable connection, maintenance-free operation, and ease of reentry.
- D. Heating cable terminations shall use cold-applied materials and shall not require the use of a heat gun, torch, or hot work permit for installation.
- E. Components shall be rated to a minimum installation temperature of -40°F, minimum usage temperature of -75°F and maximum pipe temperature of 500°F.
- F. The connection kit system shall be Raychem JBM-100-L-A connection kit complete with integral LED power indicating light to serve as complete power, splice, or tee connection for up to three Raychem BTVparallel heating cables as manufactured by Pentair Thermal Management.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that excavations are to required grade, dry, and not over-excavated.

### 3.2 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
- I. Install valves with stems upright or horizontal, not inverted.
- J. Ball valve handles shall allow for full range of operation.
- K. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- L. Sleeve pipes passing through partitions, walls and floors. Maintain assembly rating.
- M. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9.
  - 2. Support horizontal piping as scheduled.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 7. Provide copper plated hangers and supports for copper piping.
- N. Press Connections:
  - 1. Copper press fittings shall be made in accordance with the manufacturers installation instructions.
  - 2. The tubing shall be fully inserted into the fitting and the tubing marked at the shoulder of the fitting.
  - 3. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting.
  - 4. The joints shall be pressed using the tool approved by the manufacturer.

3.4 APPLICATION

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

3.5 TOLERANCES

- A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.
- B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.
- C. Vent Piping: Slope vent piping to drain back to drainage system

3.6 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

- A. Prior to starting work, verify system is complete, flushed and clean.
- B. Ensure Ph of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).
- C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.
- D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.
- E. Maintain disinfectant in system for 24 hours.
- F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.
- G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.
- H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze through an independent laboratory in accordance with AWWA C651 and the local Department of Public Health requirements. Provide written lab reports for each outlet tested. If samples do not pass bacteriological testing, flush and repeat disinfection, and retest.
- I. All repeat retesting shall be done at no cost to the Owner.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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3.7 SERVICE CONNECTIONS

- A. Provide new or extend existing sanitary sewer services as shown on the plans. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

3.8 TESTING

- A. Before any water, waste, sanitary, vent or storm piping is covered up, it shall be approved by the authority having jurisdiction and shall pass all testing described herein.
- B. Air pressure testing will not be allowed.
- C. Sanitary, Waste Piping
  1. Piping shall be hydrostatically tested to 10 ft of head for a minimum of 4 hours with no discernible loss of water.
  2. Testing shall be done either in sections or as a whole.
  3. If there is reasonable doubt of watertightness, a smoke test shall be performed.
- D. Water Piping
  1. Piping shall be hydrostatically tested with potable water to 125 psi or 1-1/2 times the operating pressure of the system, whichever is greater.
  2. Piping may be tested in sections or as a system in whole
  3. A pressure gauge shall be provided in the piping. The gauge shall be a minimum 4" dial face in 2 Psi increments.
  4. Minimum test time shall be 4 hours with a maximum loss of 2 psi.
  5. Do not test piping using valves or through valves that have been installed. Cap branch piping for testing.
- E. Test Results
  1. Results of the testing shall be submitted in writing and signed by the contractor doing the work, and submitted to the Engineer of record.
  2. If any section or joint of the piping fails the test, the contractor shall repair the leak and any associated damaged areas caused directly by the leak at no cost to the Owner.

3.9 HEAT TRACE TESTING

- A. Factory inspections and tests for self-regulating, power limiting, series constant wattage and constant wattage (MI) heater cables shall include but are not limited to the following:
  1. Testing shall be done per the latest IEEE Std. 515 test section and applicable manufacturer's standards.
  2. In the field, all heater cables shall be tested for insulation resistance. The following separate field megohmmeter readings shall be taken on each self-regulating and each M.I. heater cable:
    - a. When received at jobsite before installation
    - b. After installation, but before insulation is applied
    - c. After insulation has been installed

- B. All three of the above field megohmmeter readings shall be greater than 20 megohms. Otherwise, the heater cable is not acceptable and shall be replaced.
- C. Field megohmmeter tests shall be recorded for each heater cable, and certified reports shall be submitted to the user.

3.10 SCHEDULES

- A. Pipe Hanger Spacing:
  - 1. Metal Piping:
    - a. Pipe size: 1/2 inches to 1-1/4 inches:
      - 1) Maximum hanger spacing: 6.5 ft.
      - 2) Hanger rod diameter: 3/8 inches.
  - 2. Plastic Piping:
    - a. All Sizes:
      - 1) Maximum hanger spacing: 6 ft.
      - 2) Hanger rod diameter: 3/8 inch.

END OF SECTION



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 221250 - NATURAL GAS PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Pipe, pipe fittings, valves, and connections for gas piping systems.
  - 1. Natural Gas.

1.3 REFERENCES

- A. Connecticut Fuel Gas Code
- B. NFPA 54
- C. ANSI Z223.1
- D. CSA / AGA Standards
- E. FM P7825 - Approval Guide; Factory Mutual Research Corporation; current edition.
- F. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; The American Society of Mechanical Engineers; 2011.
- G. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
- H. ANSI/ASME B1.20.1 - Pipe Threads, General Purpose, Inch

1.4 SYSTEM DESCRIPTION

- A. The building system gas pressure shall operate at a nominal 5"W.C. throughout the distribution system.
  - 1. The contractor shall ensure that this pressure is noted and the information is available to all other trades.
- B. Provide gas piping, including fittings and valves to form a complete system.
  - 1. Piping includes connections to equipment shown on the plans or provided by others.

1.5 SUBMITTALS

- A. Piping and fittings
  - 1. Product Data: Provide Manufacturers literature.
- B. Test Reports: Indicate final testing, inspection and approval reports by the AHJ and/or the service utility.
- C. Certificates: Certify that products of this section meet or exceed specified requirements.

1.6 QUALITY ASSURANCE

- A. Perform in accordance with Connecticut Fuel Gas Code standard, State of Connecticut Building Code.
  - 1. Maintain one copy of codes and standards on project site.
  - 2. The Fuel Gas Code contains NFPA 54 in entirety and is subject to compliance with all requirements.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Exposed Piping - Inside and Outside Building (not buried)
  - 1. Steel Pipe: ASTM A53/A53M Schedule 40 black.
    - a. Fittings: ASME B16.3, malleable iron.
    - b. Joints: threaded.

2.2 MANUFACTURED ITEMS

- A. ACCESSORIES
  - 1. Shutoff Valves
    - a. Plug type - Heavy duty, iron body construction, flat head type with brass plug and washer, CSA / UL tested and approved
    - b. Ball type - Bronze body, chrome plated ball, brass stem, PTFE seat, stem packing and bearing CSA/UL tested and approved.
  - 2. Strainer - Bronze body, CSA/UL tested and approved

PART 3 EXECUTION

3.1 PIPING - GENERAL

- A. The service entrance of the gas pipe to the building shall be provided with a line size, CSA/UL tested and approved shut-off plug valve. The valve shall be lockable open or shut with a standard padlock.
- B. Ream ends of pipe free from burrs. Keep free of scale, dirt and oil. Piping shall be blown out with compressed air.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Pipe threads shall be tapered in compliance with ANSI/ASME B1.20.1. Apply pipe joint compound to male threads only.
  - 1. Threaded pipe shall be used for piping of 2" or less.
- D. Provide couplings for pipe size transitions and for joining lengths of pipe. Bushings shall not be used.

### 3.2 PIPING INSIDE BUILDINGS

- A. Do not cut, notch or drill through beams or joists to install piping.
- B. Slope piping upwards towards risers or equipment at not less than 1/4" in 15 feet.
- C. Piping shall not be installed in concealed locations except with the use of elbows, tees and couplings.
  - 1. Where fittings are inserted in the piping, the pipe shall be reconnected by welding, flanges or a ground joint union.
  - 2. Valves and regulators shall not be installed in concealed locations or above ceilings.
- D. Changes in direction shall be made by the use of fittings, factory or field bends.
  - 1. Bends shall be made only with bending equipment and shall be free from buckling, cracks or other damage.
- E. Provide drips at all risers or low points in the system. Drips are to be readily accessible for cleaning or emptying and are not to be used for supporting the piping.
- F. Provide plug type gas cocks or ball valves in pipe branch lines and connections to equipment and cap until ready for connection to equipment.
  - 1. Ball type shutoffs will be acceptable in branch lines off mains
- G. All exposed gas piping inside and outside the building shall be painted yellow and pipe markers provided.
  - 1. Pipe markers to read "Gas"
  - 2. Space pipe markers at maximum 5'-0" intervals
- H. Branch piping is to be connected from top or side of horizontal piping.
- I. Maximum hanger spacing:
  - 1. 1/2" pipe -6 feet
  - 2. 3/4" to 1" pipe -8 feet
  - 3. 1 1/4" and larger pipe -10 feet

### 3.3 TESTING

- A. All piping, new and existing, shall be tested and shall be in compliance with NFPA-54 with records of inspection and tests performed.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. Test medium shall be compressed air or other inert gas.
- C. Test pressure shall be 1-1/2 times the maximum working pressure but not less than 3 PSIG. Duration shall be ½ hour for each 500 cubic feet of pipe or fraction thereof.
  - 1. Piping shall be tested without valves installed.
  - 2. Valves are not to be used as a bulkhead between gas in one section of pipe and test medium in another.
- D. Provide gauges or a manometer of increments not greater than 1/10 pound. Soap solution shall be used at joints or fittings.
  - 1. Pressure gauges shall be permanently installed downstream from each line pressure regulator.
- E. After turning on the gas the piping shall be purged of all test medium and the system shall again be checked for leakage.
- F. The gas utility shall be the governing authority and shall be presented with copies of tests results and records. All rules and regulations must be complied with and coordinated to insure a safe installation.
- G. If any part of the gas system is defective or not in compliance with this specification the contractor shall repair or replace the items at no cost to the Owner.

#### 3.4 EQUIPMENT CONNECTORS

- A. Connectors shall have a plug type shut-off gas cock or ball valve installed in rigid tubing in an accessible location upstream of the connector.
  - 1. CSST Flexible connectors of semi-rigid stainless steel with polyethylene jacket may be used for connecting appliances to the shut-off valve.
  - 2. All connectors shall be provided with a drip leg, full line size.
- B. Connectors shall be made from the top or side of horizontal lines.
- C. Provide unions for connectors at gas-cocks and equipment.
- D. Connectors to kitchen equipment are to be the "quick disconnect" type.

END OF SECTION

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 230500 - MECHANICAL GENERAL CONDITIONS

PART 1 GENERAL

1.1 DESCRIPTION

- A. The General Conditions and Supplementary General Conditions are a part of this Division and are to be considered a part of this Contract.
- B. Where items of the General Conditions and Supplementary General Conditions are repeated in other Sections of the Specifications, it is merely intended to qualify or to call particular attention to them. It is not intended that any other parts of the General Conditions and Supplementary General Conditions shall be assumed to be omitted if not repeated therein.
- C. This Section applies equally and specifically to all Contractors supplying labor and/or equipment and/or materials as required under each Section of this Division.
- D. The following information contains specifications of Work in connection with, and in addition to, this Division:
  - 1. All drawings associated with the project.
  - 2. All specifications associated with the project.
- E. Division of work responsibilities shall be as defined and directed by the Bidding Agent and/or the Bidding General Contractor.

1.2 INTENT

- A. It is the intent of the Specifications and Drawings to call for finished work, tested and ready for operation.
- B. Furnish, deliver and install any apparatus, appliance, material or Work not shown on Drawings but mentioned in the Specifications, or vice versa, or any incidental accessories necessary to make the Work complete and perfect in all respects and ready for operation, even if not particularly specified, under their respective Section without additional expense to the Owner.
- C. Include in the work minor details not usually shown or specified but necessary for proper installation and operation, as though they were hereinafter shown or specified.
- D. Provide Engineer written notice of any materials or apparatus believed inadequate or unsuitable; in violation of laws, ordinances, rules or regulations of authorities having jurisdiction; and any necessary items of Work omitted. In the absence of such written notice, it is mutually agreed that Work under each Section has included the cost of all required items for the accepted, satisfactory functioning of the entire system without extra compensation.
- E. The Work indicated is diagrammatic. The Architect and/or Engineer may require as part of this Contract, the relocation of devices to reasonable distances from the general locations shown.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- F. Verbal clarifications of the Drawings or Specifications during the bid period are not to be relied upon. Refer any questions or clarifications to the Engineer at least five Working days prior to bidding to allow for issuance of an addendum. After the five-day deadline, Bidder must make a decision and qualify the Bid, if the Bidder feels it necessary.

### 1.3 DRAWINGS

- A. Drawings are diagrammatic and indicate the general arrangement of systems and work included in the Contract. (Do not scale the Drawings.) Consult the Architectural Drawings and Details for exact location of fixtures and equipment; where same are not definitely located, obtain this information from the Architect.
- B. Closely follow Drawings in layout of Work; check Drawings of other Divisions to verify spaces in which work will be installed. Maintain maximum headroom. Where space conditions appear inadequate, Engineer shall be notified before proceeding with installations.
- C. Engineer may, without extra charge, make reasonable modifications in the layout as needed to prevent conflict with work of other trades and/or for proper execution of the work.
- D. Where variances occur between the Drawings and Specifications or within either of the Documents, include the item or arrangement of better quality, greater quantity or higher cost in the Contract price. The Engineer shall decide on the item and the manner in which the work shall be installed.

### 1.4 SURVEYS AND MEASUREMENTS

- A. Before submitting a Bid, the Contractor shall visit the site and shall become thoroughly familiar with all conditions under which the work will be installed. Contractor will be held responsible for any assumptions, omissions or errors made as a result of failure to become familiar with the site and the Contract Documents.
- B. Base all measurements, both horizontal and vertical, from established bench marks. All Work shall agree with these established lines and levels. Verify all measurements at the site and check the correctness of same as related to the Work.
- C. Should the Contractor discover any discrepancies between actual measurements and those indicated which prevent following good practice or the intent of the Drawings and Specifications, notify the Engineer do not proceed with that Work until instructions have been received from the Engineer.

### 1.5 CODES AND STANDARDS

- A. The Codes and Standards listed below apply to all Work. Where Codes or Standards are mentioned in these Specifications, follow the latest edition or revision.
- B. The current adopted editions of the following State or local Codes apply:
  1. 2009, 2011 and 2013 Amendments to 2005 Connecticut Supplement.
  2. 2009 International Residential Code
  3. 2011 National Electrical Code (NFPA 70)

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.
- D. Include in the Work, without extra cost to the Owner, any labor, materials, testing, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on Drawings and/or specified.

1.6 PERMITS AND FEES

- A. Give all necessary notices, obtain all permits; pay all Government and State sales taxes and fees where applicable, and other costs, including utility connections or extensions in connection with the Work. File all necessary Drawings, prepare all Documents and obtain all necessary approvals of all Governmental and State departments having jurisdiction, obtain all required certificates of inspections for Work and deliver a copy to the Engineer before request for acceptance and final payment for the Work.

1.7 COORDINATION

- A. Carry out all work in conjunction with other trades and give full cooperation in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the General Contractor or Construction Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, access doors, etc. required by other trades, and to allow for serviceable access to equipment.
- B. Contractors are required to examine all of the Project Drawings and mutually arrange Work so as to avoid interference.
- C. Where the Work of the Contractor will be installed in close proximity to or will interfere with Work of other trades, assist in working out space conditions to make a satisfactory adjustment.
- D. If Work is installed before coordinating with other Divisions or so as to cause interference with Work of other Sections, the Contractor causing the interference will make necessary changes to correct the condition without extra charge to the Owner.

1.8 ACCEPTANCES

- A. The equipment, materials, Workmanship, design and arrangement of all Work installed are subject to the review of the Engineer.
- B. Within 30 days after the awarding of a Contract, submit to the Engineer for review a list of manufacturers of equipment proposed for the Work. The intent to use the exact makes specified does not relieve the Contractor of the responsibility of submitting such a list.
- C. If extensive or unacceptable delivery time is expected on a particular item of equipment specified, notify the Engineer, in writing, within 30 days of the awarding of the Contract. In such instances, deviations may be made pending acceptance by the Engineer or the Owner's representative.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. Where any specific material, process or method of construction or manufactured article is specified by reference to the catalog or model number of a manufacturer, the Specifications are to be used as a guide and are not intended to take precedence over the basic duty and performance specified or noted on the Drawings. In all cases, verify the duty specified with the specific characteristics of the equipment offered for review. Equipment characteristics are to be used as mandatory requirements where the Contractor proposes to use an acceptable equivalent.
- E. If material or equipment is installed before shop drawing review, liability for its removal and replacement is assumed by the Contractor, at no extra charge to the Owner, if, in the opinion of the Engineer, the material or equipment does not meet the intent of the Drawings and Specifications.
- F. Failure on the part of the Engineer to reject shop drawings or to reject Work in progress shall not be interpreted as acceptance of Work not in conformance with the Drawings and/or Specifications. Correct Work not in conformance with the Drawings and/or Specifications whenever non-conformance is discovered.

1.9 EQUIPMENT DEVIATIONS

- A. Where the Contractor proposes to deviate (substitute or provide an equivalent) from the equipment or materials as hereinafter specified, he shall do so by making a request in writing. The Contractor shall state in his request whether it is a substitution or an equivalent to that specified, and the amount of credit involved. A copy of said request shall be included in the Base Bid with manufacturer's equipment cuts. The Base Bid shall be based on using the materials and equipment as specified and scheduled with no exceptions. Equipment Manufacturers Scheduled on Drawings are considered Base Bid and any other acceptable manufacturers listed in the specifications is considered a substitution and equipment deviation and subject to the requirements for equipment substitution and deviation. When any alternate manufacturer does not qualify acceptable, as determined by the Engineer, provide the Base Bid manufacturer at no additional cost to Owner.
- B. In these Specifications and on the accompanying Drawings, one or more makes of materials, apparatus or appliances may have been specified for use in this installation. This has been done for convenience in fixing the standard of workmanship, finish and design required for installation. In the event that only one (1) manufacturer of a product is specified and it is found that the manufacturer has discontinued the product, the Contractor shall use an acceptable equivalent product that meets the requirements of an equivalent product, as noted below, and has all the features of the originally specified product. The details of workmanship, finish and design, and the guaranteed performance of any material, apparatus or appliance which the Contractor desires to deviate for those mentioned herein shall also conform to these standards.
- C. Where no specific make of material, apparatus or appliance is mentioned, any first-class product made by a reputable manufacturer may be submitted for the Engineer's review.
- D. Where two or more names are given as equivalents, the Contractor must use the specified item or one of the named equivalents. Where one name only is used and is followed by the words "or acceptable equivalent", the Contractor must use the item named or he may apply for an equipment deviation through the prescribed manner in accordance with this Specification.
- E. Equipment, material or devices submitted for review as an "accepted equivalent" shall meet the following requirements:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. The equivalent shall have the same construction features such as, but not limited to:
2. Material thickness, gauge, weight, density, etc.
3. Welded, riveted, bolted, etc., construction
4. Finish, undercoatings, corrosion protection
5. The equivalent shall perform with the same or better operating efficiency.
6. The equivalent shall have equal or greater reserve capacity.
7. The equivalent shall be locally represented by the manufacturer for service, parts and technical information.
8. The equivalent shall bear the same labels of performance certification as is applicable to the specified item, such as AMCA or ARI labels.

- F. Where the Contractor proposes to use an item of equipment other than specified or detailed on the Drawings which requires any redesign of the structure, partitions, foundations, piping, wiring or any other part of the mechanical, electrical or architectural layout, all such redesign and all new drawings and detailing required therefore shall be prepared by the Designers of Record at the expense of the Contractor and at no additional cost to the Owner.
- G. Where such accepted deviation or substitution requires a different quantity and arrangement of piping, ductwork, valves, pumps, insulation, wiring, conduit and equipment from that specified or indicated on the Drawings, the Contractor shall, with the acceptance by the Engineer, furnish and install any such additional equipment required by the system at no additional cost to the Owner, including any costs added to other trades due to the substitution.
- H. The Engineer shall determine if an "accepted equivalent" to a manufacturer listed in the Specifications is considered acceptable.

1.10 SHOP DRAWINGS

- A. Refer to individual specification sections for additional submittal information.
- B. The Contractor shall submit for review detailed shop drawings of all equipment and material specified in each section. No material or equipment may be delivered to the job site or installed until the Contractor has received shop drawings for the particular material or equipment which have been properly reviewed.
- C. Shop drawings shall be submitted within 60 days after award of Contract before any material or equipment is purchased. The Contractor shall submit for review copies of all shop drawings to be incorporated in the Contract. Refer to the General Conditions and Supplementary General Conditions for the quantity of copies required for submission. Where quantities are not specified, provide seven (9) copies for review.
- D. Provide shop drawings for all devices specified under equipment specifications for all systems, materials, equipment and/or devices. Shop drawings shall include manufacturers' names, catalog numbers, cuts, diagrams and other such descriptive data as may be required to identify and accept the equipment. A complete list in each category (example: all fixtures) of all shop drawings, catalog cuts, material lists, etc., shall be submitted to the Engineer at one time. No consideration will be given to a partial shop drawing submittal. Partial submissions shall be rejected.
- E. Equipment shop drawings shall contain full range performance curves, graphs, tables or other pertinent data which clearly indicates operational range of a given unit size. Computer generated/plotted curves, based solely on design performance, will not be accepted.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- F. All specific options and/or alternatives shall be clearly indicated. Failure to do so shall be grounds for rejection.
- G. Submittals shall be marked with the trade involved, i.e., HVAC, plumbing, fire protection, etc. and the specific associated specification section.
- H. Where multiple quantities or types of equipment are being submitted, provide a cover sheet (with a list of contents) on the submittal identifying the equipment or material being submitted.
- I. Failure to submit shop drawings in ample time for review shall not entitle the Contractor to an extension of Contract time. Contractor must allow for a one week review at the Engineer's office plus normal delivery time to the G.C., Architect, Engineer, and return to the Architect, and G.C. No claim for extension by reason of such default will be allowed, nor shall the Contractor be entitled to purchase, furnish and/or install equipment which has not been reviewed by the Engineer. The Contractor shall incur all costs associated with delay of construction due to equipment and/or materials arriving late due to late or improper shop drawing submittal.
- J. The Contractor shall furnish all necessary templates, patterns, etc., for installation work and for the purpose of making adjoining work conform; furnish setting plans and shop details to other trades as required.
- K. Acceptance rendered on shop drawings shall not be considered as a guarantee of measurements or building conditions. Where drawings are reviewed, review does not indicate that drawings have been checked in detail; said approval does not in any way relieve the Contractor from his responsibility or necessity of furnishing material or performing work as required by the Contract Drawings and Specifications. Verify available space prior to submitting shop drawings.
- L. Acceptance of shop drawings shall not apply to quantity nor relieve Contractor of his responsibility to comply with intent of Drawings and Specifications.
- M. Acceptance of shop drawings is final and no further changes will be allowed without the written consent of the Engineer.
- N. Shop drawing submittal sheets which may show items that are not being furnished shall have those items crossed off to clearly indicate which items will be furnished.
- O. Bidders shall not rely on any verbal clarification of the Drawings and/or Specifications. Any questions shall be referred to the Engineer at least five (5) working days prior to Bidding to allow for issuance of an Addendum. After the five (5) day deadline, Bidder shall make a decision and qualify the Bid, if the Bidder deems if necessary.
- P. Contractor shall make any corrections required by Engineer and shall resubmit required number of corrected copies of shop drawings or new samples until accepted. Contractor shall direct specific attention in writing or on resubmitted shop drawings to revisions other than corrections requested by Engineer on previous submissions. Engineer shall review no more than one resubmittal of any shop drawing or sample at Owner's expense. The fees for review of additional resubmittals shall be paid by the Contractor at the Engineer's standard rates.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.11 CHANGES IN WORK

- A. A Change Order is a written order to the Contractor signed by the Owner and the Architect, issued after Contracts have been awarded, authorizing a change in the work or an adjustment in the Contract sum or the Contract time. A Change Order signed by the Contractor indicates his agreement therewith, including the adjustment in the Contract sum or the Contract time.
- B. All changes in the work shall follow the recommendations of the AIA "General Conditions of the Contract for Construction", Article 12.

1.12 MANUFACTURER'S IDENTIFICATION

- A. All component parts of each item of equipment or device shall bear the manufacturer's nameplate giving name of manufacturer, description, size, type, serial and model number, electrical characteristics, etc., in order to facilitate maintenance or replacement. Nameplate data shall not be obstructed. The nameplate of a Contractor or distributor will not be acceptable.
- B. All material and equipment for the electrical portion of the mechanical systems shall bear the label of or be listed by UL, or other accredited authoritative agencies or testing organizations approved by the authority having jurisdiction.

1.13 RECORD DRAWINGS

- A. Maintain at the job site a record set of Mechanical Drawings on which any changes in location or routing of all equipment, materials and access panels shall be recorded.
- B. At the end of construction, the Contractor shall provide the Owner with a complete set of As-Built Drawings, including all updated coordination drawings, ductwork and piping plans. As-Built drawings shall be drawn on the latest version of Autocad or compatible software, approved in writing, prior to submittal. The Owner shall be provided with a "CD Rom" disk and one set of reproducible mylar sepia.

1.14 MATERIALS AND WORKMANSHIP

- A. All materials and apparatus required for the work, except as otherwise specifically indicated, shall be new, of first-class quality, and shall be furnished, delivered, erected, connected and finished in every detail and be so selected and arranged as to fit properly into the building spaces. Where no specific type or quality of material is given, a first-class standard article as accepted by industry standards shall be furnished.
- B. The Contractor shall furnish the services of an experienced superintendent who shall be constantly in charge of the installation of the work together with all skilled workmen, fitters, metal workers, welders, helpers and laborers required to unload, transfer, erect, connect, adjust, start, operate and test each system.
- C. Unless otherwise specifically indicated on the Drawings or Specifications, all equipment and materials shall be installed with the acceptance of the Engineer and in accordance with the recommendations of the manufacturer. This includes the performance of such tests as the manufacturer recommends.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- D. All labor for installation of mechanical systems shall be performed by experienced, skilled tradesmen under the supervision of a licensed journeyman foreman. All work shall be of a quality consistent with good trade practice and shall be installed in a neat, workmanlike manner. The Engineer reserves the right to reject any work which, in his opinion, has been installed in a substandard, dangerous or unserviceable manner. The Contractor shall replace said work in a satisfactory manner at no extra cost to the Owner.

1.15 PROTECTION OF MATERIALS AND EQUIPMENT

- A. Work under each Section shall include protecting the work and material of all other Sections from damage by work or workmen and shall include making good all damage thus caused.
- B. The Contractor shall be responsible for work and equipment until the facility has been accepted by the Owner. Protect work against theft, injury or damage and carefully store material and equipment received on site which is not immediately installed. Close open ends of work with temporary covers or plugs during construction to prevent entry of foreign material.
- C. Work under each Section includes receiving, unloading, uncrating, storing, protecting, setting in place and completely connecting equipment supplied under each Section. Work under each Section shall also include exercising special care in handling and protecting equipment and fixtures, and shall include the cost of replacing any of the equipment and fixtures which are missing or damaged.
- D. Equipment and material stored on the job site shall be protected from the weather, vehicles, dirt and/or damage by workmen or machinery. Insure that all electrical or absorbent equipment or material is protected from moisture during storage.

1.16 BASES AND SUPPORTS

- A. Unless otherwise specifically noted, the Contractor shall furnish all necessary supports, rails, framing, bases and piers required for all equipment furnished under this Division.
- B. Unless otherwise shown, all equipment shall be securely attached to the building structure in an acceptable manner. Attachments shall be of a strong and durable nature; any attachments that are insufficient, in the opinion of the Engineer, shall be replaced as directed without extra cost to the Owner.
- C. All equipment supports shall be designed and constructed such that the equipment will be capable of resisting both vertical and horizontal movement. The equipment shall be positively anchored to the bases or supports to resist vertical movement. The equipment and its supports shall be provided with suitable restraints to resist horizontal movement from any direction as dictated by applicable seismic Codes.

1.17 SLEEVES, INSERTS AND ANCHOR BOLTS

- A. The Contractor shall provide, set in place and be held responsible for the location of all sleeves, inserts and anchor bolts required for the work. In the event that failure to do so requires cutting and patching of finished work, it shall be done at the Contractor's expense.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- B. It is the responsibility of the Contractor to furnish cast-in-place steel sleeves, inserts and anchors in sufficient time to be installed during initial concrete pours. Where job schedules make this impossible, coordinate and obtain acceptance from the Structural Engineer for alternate installation methods.

1.18 CUTTING AND PATCHING

- A. All cutting and patching shall be done per Division 1 requirements. The Contractor shall furnish sketches showing the location and sizes of all openings, chases, etc., required for the installation of work.
- B. Work under this Division shall include furnishing, locating and setting inserts and/or sleeves required before the floors and walls are built or be responsible for cutting, drilling or chopping where sleeves and inserts were not installed or correctly located. The Contractor shall do all drilling required for the installation of hangers.
- C. Exercise extreme caution when core drilling or punching openings in concrete floor slabs in order to avoid cutting or damaging structural members. No structural members or structural slabs/floors shall be cut without the written acceptance of the Structural Engineer and all such cutting shall be done in a manner directed by him.

1.19 SCAFFOLDING, RIGGING, HOISTING

- A. The Contractor shall furnish all scaffolding, rigging, hoisting and services necessary for erection and delivery into the premises any equipment and apparatus furnished under this Division. Remove same from premises when no longer required.

1.20 WATERPROOFING

- A. Where any work pierces waterproofing, including waterproof concrete and floors in wet areas, the method of installation shall be reviewed by the Engineer before work is done. The Contractor shall furnish all necessary sleeves, caulking and flashing required to make openings absolutely watertight.

1.21 ACCESSIBILITY AND ACCESS PANELS

- A. Locate all equipment which must be serviced, operated or maintained in fully accessible positions. Equipment shall include, but not be limited to: motors, controllers, coil, valves, switchgear, drain points, etc. Access doors shall be furnished if required for better accessibility. Minor deviations from the Drawings may be made to allow better accessibility, but changes of magnitude or which involve extra cost shall not be made without the acceptance of the Engineer.
- B. Access doors in walls, ceilings, floors, etc., shall be field coordinated. It is the responsibility of the Contractor to coordinate and provide information regarding the sizes and quantities of access doors required for his work. The Contractor shall arrange his work in such a manner as to minimize the quantity of access doors required, such as grouping shutoff valves in the same area. Where possible, locate valves in already accessible areas, such as lay-in ceilings, etc.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1.22 TEMPORARY OPENINGS

- A. The Contractor shall ascertain from an examination of the Drawings whether any special temporary openings in the building will be required for the admission of apparatus provided under this Division and shall coordinate the requirements accordingly. In the event of failure of the Contractor to give sufficient notice in time to arrange for these openings during construction, the Contractor shall assume all costs of providing such openings thereafter.

1.23 ESCUTCHEONS

- A. The Contractor shall provide escutcheons on pipes wherever they pass through floors, ceilings, walls or partitions in finished visible locations.

1.24 PAINTING

- A. All finish painting in completed areas shall be performed per Division 9 of the Specifications.
- B. All materials shipped to the job site under this Division, such as grilles, registers and/or radiation covers, shall have standard manufacturer's finish, unless otherwise specified by Architect.

1.25 PIPE EXPANSION

- A. All pipe connections shall be installed to allow for freedom of movement of the piping during expansion and contraction without springing.

1.26 ELECTRICAL CONNECTIONS

- A. Unless otherwise specified, all wiring shall be furnished and installed per Division 16 Specifications.
- B. All motor controllers not factory mounted on mechanical equipment shall be furnished, mounted, and installed by the Division 26 contractor, and shall be coordinated with this contractor. Provide properly sized overload heaters and all required accessories with all motor controllers. See Division 26 Motor Controllers for motor controller requirements.
- C. All power wiring shall be furnished and installed per Division 26 complete from power source to motor or equipment junction box including power wiring through the motor controller and proper means of disconnect per NEC and Division 26. The Division 26 Contractor shall provide all disconnects, unless noted otherwise.

1.27 QUIET OPERATION

- A. Equipment and material used in the various systems described herein shall not produce a sound level greater than 55 decibels in the area served. If noise level is deemed objectionable by the Owner/Engineer, the Contractor shall test and record sound levels in the presence of the Owner/Engineer. The sound level shall be observed on the "A" weighting network of a sound level or sound survey meter. The ASHRAE "Guide and Data Book" provides a means to determine sound level

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

of mechanical equipment when the total of background plus equipment sound levels exceeds the minimum acceptable equipment sound level.

- B. If objectionable noises or vibrations of any magnitude are produced and transmitted to occupied portions of the building by apparatus, piping, ducts or other parts of the mechanical work, the Contractor shall make such changes or additions as necessary without extra cost to the Owner.

1.28 MAINTENANCE

- A. The Contractor shall provide the necessary skilled labor to assure the proper operation and to provide all required current and preventative maintenance for all equipment and controls provided under this Division until final acceptance of the building by the Owner. The Contractor shall not assume acceptance of the building by the Owner until he receives written notification.
- B. The Contractor shall receive calls for any and all problems experienced in the operation of the equipment provided under this Division and he shall take steps to immediately correct any deficiencies that may exist.
- C. The Contractor shall certify on this check list that he has examined each piece of equipment and that, in his opinion, it is operating as intended by the manufacturer, it has been properly lubricated, and that all necessary current and preventative maintenance has been performed as recommended by the manufacturer and by good and accepted practice.
- D. The Contractor shall check all controls in the building to ascertain that they are functioning as designed. This shall apply to all thermostats, aquastats, humidistats, freezestats and firestats, etc. This portion of the work shall be performed by the Contractor who installed the controls.
- E. During construction, the Contractor shall ensure that all filters are in place on all equipment. If the equipment is operated during construction (see restrictions section of this specification), strict attention shall be paid to maintaining clean and effective filters and cleaning ductwork and equipment. Filters shall be new and/or clean when the system testing and balancing takes place. The Contractor shall bear the cost of all filters and media during construction until final acceptance by the Owner. This requirement shall apply equally to fluid filters and strainers.
- F. Where normal preventative maintenance for any piece of equipment requires special tools, the Contractor shall furnish the appropriate tools for that piece of equipment (i.e., special filter removal hooks, valve wrenches, etc.).

1.29 DEMOLITION

- A. All required demolition work shall be performed by the Contractor. All demolition work shall be performed in a neat and orderly fashion.
- B. Demolition work, if indicated on the drawings, is intended for general information only and is not intended to describe the full extent of demolition work required under this Contract. All existing mechanical work and systems, including but not limited to piping, equipment, ductwork, wiring, controls, hangers, and supports, made obsolete by this project, shall be removed in their entirety under this Contract, unless noted otherwise.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. After piping, ductwork, equipment, etc., has been removed, neatly cap remaining ductwork and piping, and insulate caps to match the existing adjacent ductwork and piping. In finished areas, all ductwork and piping shall be cut back to a concealed location, i.e., within walls, above ceilings, etc., before capping.
- D. Before submitting his Bid, the Contractor shall visit the site with the Contract Documents in hand, and shall inspect all existing systems to determine the extent of demolition work involved. Particular attention is drawn to the removal of existing walls or portions of existing walls. In those areas, all exposed and concealed piping, ductwork, equipment, etc., running across or through affected areas shall be removed as required. Piping and ductwork shall then be either capped, or, if required for the proper continuing operation of an existing system to remain, piping and ductwork shall be rerouted around the affected areas and reconnected as required.
- E. In general, it shall be the responsibility of the Contractor to remove demolished equipment, piping, ductwork, etc., from the site and properly dispose of it. If the Owner shall so request, however, the Contractor shall turn over demolished equipment, etc., to the Owner for the Owner's use. Unless otherwise noted, demolished work shall not be abandoned in place. Contractor shall make safe all utilities pertaining to this section.

1.30 CLEANING

- A. The Contractor shall be responsible for keeping the jobsite clean, safe and neat throughout the duration of construction. The Contractor shall clean up his own debris daily and shall coordinate removal of rubbish and debris with the General Contractor/Construction Manager.
- B. No debris, construction materials, cigarette butts, coffee cups, etc., shall be left above suspended ceilings.
- C. Terminal equipment and plumbing fixtures shall be cleaned at substantial completion.
- D. If any part of a system should be stopped or damaged by any foreign matter after being placed in operation, the system shall be disconnected, cleaned and reconnected wherever necessary to locate and/or remove obstructions. Any work damaged in the course of removing obstructions shall be repaired or replaced when the system is reconnected at no additional cost to the Owner.
- E. During the course of construction, all ducts and pipes shall be capped in an acceptable manner to insure adequate protection against the entrance of foreign matter.
- F. Upon completion of all work under the Contract, the Contractor shall remove from the premises all rubbish, debris and excess materials left over from his work. Any oil or grease stains on floor areas caused by the Contractor shall be removed and floor areas left clean.

1.31 OPERATING INSTRUCTIONS

- A. Upon completion of all work and tests, the Contractor shall furnish the necessary skilled labor and helpers for operating his system and equipment for a period specified under each applicable Section of this Division. During this period, he shall fully instruct the Owner or the Owner's representative in the

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

operation, adjustment and maintenance of all equipment furnished. The Contractor shall give at least 72 hours notice to the Owner and the Engineer in advance of this period.

- B. The Contractor shall formally submit for delivery to the Engineer three (3) complete bound sets of typewritten or blueprinted instructions for operating and maintaining all systems and equipment included in this Division. All instructions shall be submitted in draft for review prior to final issue. Manufacturer's advertising literature or catalogs will not be acceptable for operating and maintenance instruction.
- C. The Contractor, in the above-mentioned instructions, shall include the maintenance schedule for the principal items of equipment furnished under this Division.
- D. The appropriate Contractor shall physically demonstrate procedures for all routine maintenance of all equipment furnished under each respective Section to assure accessibility to all devices.
- E. Refer to individual trade Sections for any other particular requirements related to operating instructions.

1.32 ADJUSTING AND TESTING

- A. After all the equipment and accessories to be furnished are in place, they shall be put in final adjustment and subjected to such operating tests so as to assure the Engineer that they are in proper adjustment, the control operate as described in the sequence of operation and all systems are in satisfactory, permanent operating condition.

1.33 GUARANTEES

- A. The Contractor shall guarantee all equipment, material and workmanship under these Specifications and the Contract for a period of one (1) year from the date of final acceptance by Owner, unless otherwise noted.
- B. During this guarantee period, all defects developing through faulty equipment, materials or workmanship shall be corrected or replaced immediately by the Contractor without expense to the Owner. Such repairs or replacements shall be made to the Engineer's satisfaction.

PART 2 PRODUCTS - NOT USED.

PART 3 EXECUTION - NOT USED.

END OF SECTION



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 230719 - HVAC PIPING INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Piping insulation.
- B. Jackets and accessories.

1.3 RELATED REQUIREMENTS

- A. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.

1.4 REFERENCE STANDARDS

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded Hot Plate Apparatus; 2010.
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement; 2007.
- C. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement; 2007.
- D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.
- E. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation; 2012.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2012.
- G. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2010.
- H. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.
- I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Underwriters Laboratories Inc.; Current Edition, Including All Revisions.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1.5 SUBMITTALS

- A. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.
- B. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than five years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum five years of experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.8 FIELD CONDITIONS

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REQUIREMENTS FOR ALL PRODUCTS OF THIS SECTION

- A. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84, NFPA 255, or UL 723.

2.2 GLASS FIBER

- A. Manufacturers:
  - 1. Knauf Insulation: [www.knaufusa.com](http://www.knaufusa.com).
  - 2. Johns Manville Corporation: [www.jm.com](http://www.jm.com).
  - 3. Owens Corning Corp: [www.owenscorning.com](http://www.owenscorning.com).
  - 4. CertainTeed Corporation; : [www.certainteed.com](http://www.certainteed.com).
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
  - 1. 'K' value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum service temperature: 850 degrees F.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- 3. Maximum moisture absorption: 0.2 percent by volume.
  
  - C. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
  
  - D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
  
  - E. Vapor Barrier Lap Adhesive:
    - 1. Compatible with insulation.
  
  - F. Insulating Cement/Mastic:
    - 1. ASTM C195; hydraulic setting on mineral wool.
- 2.3 JACKETS
- A. PVC Plastic.
    - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
      - a. Minimum Service Temperature: 0 degrees F.
      - b. Maximum Service Temperature: 150 degrees F.
      - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      - d. Thickness: 10 mil.
      - e. Connections: Brush on welding adhesive.
    - 2. Covering Adhesive Mastic:
      - a. Compatible with insulation.

**PART 3 EXECUTION**

3.1 EXAMINATION

- A. Verify that piping has been tested before applying insulation materials.
  
- B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
  
- B. Install in accordance with NAIMA National Insulation Standards.
  
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
  
- D. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
  
- E. Glass fiber insulated pipes conveying fluids above ambient temperature:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples.
  2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with PVC fitting covers.
- F. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 078400.

3.3 SCHEDULE

- A. Heating Systems:
1. Heating Water Supply and Return:
    - a. 1-1/2" pipe size or less, 1-1/2" thickness, per 2009 IECC

END OF SECTION

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 232113 - HYDRONIC PIPING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Heating water piping, above grade.
- B. Condensate piping, above grade.
- C. Pipe hangers and supports.
- D. Unions, flanges, mechanical couplings, and dielectric connections.
- E. Valves:
  - 1. Ball valves.

1.3 REFERENCE STANDARDS

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder Joint Pressure Fittings; 2001 (R2010).
- C. ASME B31.9 - Building Services Piping; 2011 (ANSI/ASME B31.9).
- D. ASTM B32 - Standard Specification for Solder Metal; 2008.
- E. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2009.
- F. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2012.
- G. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2006.
- H. ASTM D2855 - Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings; 1996 (Reapproved 2010).

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- I. MSS SP-58 - Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation; Manufacturers Standardization Society of the Valve and Fittings Industry, Inc.; 2009.

1.4 SUBMITTALS

- A. Product Data: Include data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalogue information. Indicate valve data and ratings.
- B. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.
- C. Project Record Documents: Record actual locations of valves.
- D. Maintenance Data: Include installation instructions, spare parts lists, exploded assembly views.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with minimum five years of experience.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

PART 2 PRODUCTS

2.1 HEATING WATER PIPING, ABOVE GRADE

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), drawn, using one of the following joint types:
  - 1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
    - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
  - 2. Mechanical Joints: Copper press fittings as manufactured by Viega or Rigid Tool Co.
    - a. Press fittings: Copper press fittings shall conform to the material and sizing requirements of ASME B16.18 or ASME B16.22. O-rings for copper press fittings shall be EPDM.

2.2 EQUIPMENT CONDENSATE DRAINS

- A. PVC Pipe: ASTM D1785, Schedule 40.
  - 1. Fittings: ASTM D2466, PVC.
  - 2. Joints: Solvent welded in accordance with ASTM D2855.

2.3 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
- B. Conform to ASME B31.9.
- C. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch: Carbon steel, adjustable swivel, split ring.
- D. Vertical Support: Steel riser clamp.
- E. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
- F. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.

2.4 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS

- A. Unions for Pipe 2 Inches and Under:
  - 1. Copper Pipe: Bronze, soldered joints.
- B. Dielectric Connections: Union or waterway fitting with water impervious isolation barrier and one galvanized or plated steel end and one copper tube end, end types to match pipe joint types used.

2.5 BALL VALVES

- A. Manufacturers:
  - 1. Conbraco Industries: [www.conbraco.com](http://www.conbraco.com).
  - 2. Nibco, Inc: [www.nibco.com](http://www.nibco.com).
  - 3. Milwaukee Valve Company: [www.milwaukeevalve.com](http://www.milwaukeevalve.com).
- B. Up To and Including 2 Inches:
  - 1. Bronze one piece body, full port chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.

PART 3 EXECUTION

3.1 PREPARATION

- A. Ream pipe and tube ends. Remove burrs.

- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment using jointing system specified.
- D. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- E. After completion, fill, clean, and treat systems. Refer to Section 232500 for additional requirements.

### 3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install heating water piping to ASME B31.9 requirements.
- C. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- D. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- E. Install piping to conserve building space and to avoid interfere with use of space.
- F. Group piping whenever practical at common elevations.
- G. Sleeve pipe passing through partitions, walls and floors.
- H. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- I. Slope piping and arrange to drain at low points.
- J. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- K. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9.
  - 2. Support horizontal piping as scheduled.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 8. Provide copper plated hangers and supports for copper piping.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- L. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. Refer to Section 220719.
- M. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 08311.
- N. Use eccentric reducers to maintain top of pipe level.
- O. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welds.
- P. All piping supports shall be secured to the building structure.
- Q. Install valves with stems upright or horizontal, not inverted. Ball valve operators shall allow for full range of operation.
- R. Press Connections:
  - 1. Copper press fittings shall be made in accordance with the manufacturers installation instructions.
  - 2. The tubing shall be fully inserted into the fitting and the tube marked at the shoulder of the fitting.
  - 3. The fitting alignment shall be checked against the mark on the tubing to assure the tubing is fully engaged (inserted) in the fitting.
  - 4. The joints shall be pressed using the tool approved by the manufacturer.

### 3.3 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
  - 1. 1/2 inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  - 2. 1 inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
- B. Hanger Spacing for Plastic Piping.
  - 1. 1/2 inch: Maximum span, 42 inches; minimum rod size, 1/4 inch.
  - 2. 3/4 inch: Maximum span, 45 inches; minimum rod size, 1/4 inch.
  - 3. 1 inch: Maximum span, 51 inches; minimum rod size, 1/4 inch.

END OF SECTION



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 260502.01 - ELECTRICAL GENERAL CONDITIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DRAWINGS AND COORDINATION

- A. It is not the intention of the drawings to show every item, piece of equipment and detail. Provide complete, operating systems.
- B. Install work as closely as possible to layouts shown on drawings. Modify work as necessary to meet job conditions and to clear other equipment. Consult Engineer before making changes which affect the function or appearance of systems.
- C. Dimensions, elevations and locations are shown approximately. Verify actual conditions in the field.
- D. Owner, Architect, and Engineer reserve the right to order changes in layout of such items as switches, receptacles, and fixtures if such changes do not substantially affect costs and if affected items have not been fabricated or installed.
- E. In some cases, drawings are based upon products of one or several manufactures as listed on the Contract Documents. This contractor shall be responsible for modifications made necessary by substitution of products of different manufacturers.
- F. Do not install part of a system until all critical components of the system and related systems have been approved. Coordinate parts of systems to ensure proper operation of the entire system.
- G. Install products in accordance with manufacturer's written instructions. Notify Engineer if Contract Documents conflict with manufacturer's instructions. Comply with Engineers interpretations.
- H. Provide brackets, supports, anchors and frames required for installation of work specified herein.

1.3 REFERENCES

- A. NEMA ICS 6 - National Electrical Manufacturers Association; 1993 Enclosures for Industrial Control and Systems
- B. NFPA 70 - National Electrical Code; National Fire Protection Association; 2011.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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1.4 DEFINITIONS

- A. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, shall be as defined in IEEE 100.
- B. The technical sections referred to herein are those specification sections that describe products, installation procedures, and equipment operations and that refer to this section for detailed description of submittal types.
- C. The technical paragraphs referred to herein are those paragraphs in PART 2 - PRODUCTS and PART 3 - EXECUTION of the technical sections that describe products, systems, installation procedures, equipment, and test methods.

1.5 CODES AND STANDARDS

- A. The Codes and Standards listed below apply to all Work. Where Codes or Standards are mentioned in these Specifications, follow the latest edition or revision.
- B. The current adopted editions of the following State or local Codes apply:
  - 1. 2009, 2011 and 2013 Amendments to the 2005 Connecticut Supplement
  - 2. 2009 International Residential Code
  - 3. 2011 National Electrical Code (NFPA 70)
- C. All materials furnished and all work installed shall comply with the rules and recommendations of the NFPA, the requirements of the local utility companies, the recommendations of the fire insurance rating organization having jurisdiction and the requirements of all Governmental departments having jurisdiction.
- D. Include in the Work, without extra cost to the Owner, any labor, materials, testing, services, apparatus and Drawings in order to comply with all applicable laws, ordinances, rules and regulations, whether or not shown on Drawings and/or specified.

1.6 SUBMITTALS

- A. Provide manufacturer's ORIGINAL printed product data, catalog cuts and description of any special installation procedures. Photocopied and/or illegible product data sheets shall not be acceptable. All product datasheets shall be highlighted or stamped with arrows to indicate the specific components being submitted for approval.
- B. Submittals shall include the manufacturer's name, trade name, place of manufacture, catalog model or number, nameplate data, size, layout dimensions, capacity, project specification and technical paragraph reference. Submittals shall also include applicable federal, military, industry, and technical society publication references, and years of satisfactory service, and other information necessary to establish contract compliance of each item to be provided. Photographs of existing installations are unacceptable and will be returned without approval.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- C. Submittals for each manufactured item shall be current manufacturer's descriptive literature of cataloged products, equipment drawings, diagrams, performance and characteristic curves, and catalog cuts. Handwritten and typed modifications and other notations not part of the manufacturer's preprinted data will result in the rejection of the submittal. Should manufacturer's data require supplemental information for clarification, the supplemental information shall be submitted as specified for certificates of compliance.
- D. Submit drawings a minimum of 14 inches by 20 inches in size using a minimum scale of 1/8 inch per foot except as specified otherwise. Include wiring diagrams and installation details of equipment indicating proposed location, layout and arrangement, control panels, accessories, piping, ductwork, and other items that must be shown to ensure a coordinated installation. Wiring diagrams shall identify circuit terminals and indicate the internal wiring for each item of equipment and the interconnection between each item of equipment. Drawings shall indicate adequate clearance for operation, maintenance, and replacement of operating equipment devices.
- E. Where installation procedures or part of the installation procedures are required to be in accordance with manufacturer's instructions, submit printed copies of those instructions prior to installation. Installation of the item shall not proceed until manufacturer's instructions are received. Failure to submit manufacturer's instructions shall be cause for rejection of the equipment or material.
- F. Submit manufacturer's certifications as required for products, materials, finishes, and equipment as specified in the technical sections. Certificates from material suppliers are not acceptable. Preprinted certifications and copies of previously submitted documents will not be acceptable. The manufacturer's certifications shall name the appropriate products, equipment, or materials and the publication specified as controlling the quality of that item. Certification shall not contain statements to imply that the item does not meet requirements specified, such as "as good as"; "achieve the same end use and results as materials formulated in accordance with the referenced publications"; or "equal or exceed the service and performance of the specified material." Certifications shall simply state that the item conforms to the requirements specified. Certificates shall be printed on the manufacturer's letterhead and shall be signed by the manufacturer's official authorized to sign certificates of compliance.
- G. Where equipment or materials are specified to conform to industry and technical society reference standards of the organizations such as American National Standards Institute (ANSI), American Society for Testing and Materials (ASTM), National Electrical Manufacturers Association (NEMA), Underwriters Laboratories Inc. (UL), and Association of Edison Illuminating Companies (AEIC), submit proof of such compliance. The label or listing by the specified organization will be acceptable evidence of compliance.
- H. In lieu of the label or listing, submit a certificate from an independent testing organization, competent to perform testing, and approved by the Contracting Officer. The certificate shall state that the item has been tested in accordance with the specified organization's test methods and that the item complies with the specified organization's reference standard.

1.7 QUALITY ASSURANCE

- A. Material and Equipment Qualifications
  - 1. Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

period shall include applications of equipment and materials under similar circumstances and of similar size. The product shall have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the 2-year period. Where two or more items of the same class of equipment are required, these items shall be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in the technical section.

- B. Regulatory Requirements
    - 1. Equipment, materials, installation, and workmanship shall be in accordance with the mandatory and advisory provisions of NFPA 70.
  
  - C. Alternative Qualifications
    - 1. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.
  
  - D. Service Support
    - 1. The equipment items shall be supported by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.
  
  - E. Manufacturer's Nameplate
    - 1. Each item of equipment shall have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.
  
  - F. Modification of References
    - 1. In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "shall" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Building Official or Inspector and/or Fire Marshal.
  
  - G. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.
  
  - H. Installer Qualifications: Company specializing in performing the work of this section with minimum 5 years of experience.
  
  - I. Design Seismic bracing and restraints under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in Connecticut.
  
  - J. Products Requiring Electrical Connection: Listed and classified by UL as suitable for the purpose specified and indicated.
- 1.8 COORDINATION WITH OTHER DIVISIONS
- A. Carry out all work in conjunction with other trades and give full cooperation in order that all work may proceed with a minimum of delay and interference. Particular emphasis is placed on timely installation of major apparatus and furnishing other Contractors, especially the General Contractor or Construction

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

Manager, with information as to openings, chases, sleeves, bases, inserts, equipment locations, panels, access doors, etc. required by other trades, and to allow for serviceable access to equipment.

- B. Contractors are required to examine all of the Project Drawings and mutually arrange work so as to avoid interference. In general, ductwork, heating piping, sprinkler piping and drainage lines take precedence over water, gas and electrical conduits. The Engineer regarding the arrangement of work, which cannot be agreed upon by the Contractors, will make final decisions. Service of equipment will take precedence.
  - C. Where the work of the Contractor will be installed in close proximity to or will interfere with work of other trades, assist in working out space conditions to make a satisfactory adjustment.
  - D. If work is installed before coordinating with other Divisions or so as to cause interference with work of other Sections, the Contractor causing the interference will make necessary changes to correct the condition without extra charge to the Owner.
  - E. Initial contact and coordination has been conducted with utility entities for the purpose of the preparation of Bid Documents. The Contractor shall coordinate all final specific utility requirements.
- 1.9 PRE-INSTALLATION MEETING
- A. Convene one week before starting work of this section.
- 1.10 PROJECT CONDITIONS
- A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.
  - B. Sequence installation to conform with the project phasing indicated on the Architectural drawings.
- 1.11 WARRANTY
- A. Correct defective Work within a one year period after Date of Substantial Completion.
- 1.12 OPERATING INSTRUCTIONS
- A. Submit text of posted operating instructions for each system and principal item of equipment as specified in the technical sections. The operating instructions shall include the following:
    - 1. Wiring diagrams, control diagrams, and control sequence for each principal system and item of equipment.
    - 2. Start up, proper adjustment, operating, lubrication, and shutdown procedures.
    - 3. Safety precautions.
    - 4. The procedure in the event of equipment failure.
    - 5. Other items of instruction as recommended by the manufacturer of each system or item of equipment.
  - B. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions where directed. For operating instructions exposed to the weather, provide weather-resistant

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

materials or weatherproof enclosures. Operating instructions shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

1.13 ELECTRICAL REQUIREMENTS

- A. Electrical installations shall conform to ANSI C2, NFPA 70, and requirements specified herein.
  
- B. Motors and Equipment
  - 1. Provide electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, and other devices functioning to control mechanical equipment, including control wiring and conduit to conform with the requirements of the section covering the mechanical equipment. Extended voltage range motors shall not be permitted. The interconnecting power wiring and conduit, control wiring and conduit, the motor control equipment and the electrical power circuits shall be provided under Division 16.
  
- C. Wiring and Conduit
  - 1. Provide internal wiring for components of packaged equipment as an integral part of the equipment. Provide power wiring and conduit for field-installed equipment, and motor control equipment, the conduit and wiring connecting such assemblies, or other power sources to equipment. Power and Control wiring and conduit shall be provided under Division 16 and shall conform to the requirements of the section specifying the associated equipment.
  - 2. All wiring in finished areas shall be run concealed in ceilings, walls or floors unless otherwise indicated.
  
- D. New Work
  - 1. Provide electrical components of mechanical equipment, such as motors, motor starters, control or push-button stations, float or pressure switches, solenoid valves, integral disconnects, and other devices functioning to control mechanical equipment, as well as control wiring and conduit to conform with the requirements of the section covering the mechanical equipment. Extended voltage range motors shall not be permitted. The interconnecting power wiring and conduit, control wiring and conduit, the motor control equipment and the electrical power circuits shall be provided under Division 16, except internal wiring for components of packaged equipment shall be provided as an integral part of the equipment. When motors and equipment furnished are larger than sizes indicated, provide any required changes to the electrical service as may be necessary and related work as a part of the work for the section specifying that motor or equipment.
  
- E. Lockout Requirements
  - 1. Provide disconnecting means capable of being locked out for machines and other equipment to prevent unexpected startup or release of stored energy in accordance with 29 CFR 1910.147. Mechanical isolation of machines and other equipment shall be in accordance with requirements of Division 15, "Mechanical."

PART 2 PRODUCTS

2.1 NOT USED

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.2 CLEANING

A. Clean the entire installation at substantial completion .

B. Protect installed equipment from subsequent construction operations.

END OF SECTION



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 260519 - LOW-VOLTAGE POWER CONDUCTORS & CABLES (600 V & LESS)

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Single conductor building wire.
- B. Nonmetallic-sheathed cable.
- C. Service entrance cable.
- D. Armored cable.
- E. Wire and cable for 600 volts and less.
- F. Wiring connectors.
- G. Electrical tape.
- H. Wire pulling lubricant.

1.3 REFERENCE STANDARDS

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.
- B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011.
- C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010.
- D. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2010.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- F. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); National Electrical Contractors Association; 2006.
  - G. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); National Electrical Contractors Association; 2007.
  - H. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; National Electrical Manufacturers Association; 2009 (ANSI/NEMA WC 70/ICEA S-95-658).
  - I. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; International Electrical Testing Association; 2013 (ANSI/NETA ATS).
  - J. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
  - K. UL 4 - Armored Cable; Current Edition, Including All Revisions.
  - L. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.
  - M. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.
  - N. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.
  - O. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.
  - P. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.
  - Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.
  - R. UL 719 - Nonmetallic-Sheathed Cables; Current Edition, Including All Revisions.
  - S. UL 854 - Service-Entrance Cables; Current Edition, Including All Revisions.
- 1.4 SUBMITTALS
- A. Product Data: Provide for each cable assembly type.

## PART 2 PRODUCTS

### 2.1 CONDUCTOR AND CABLE APPLICATIONS

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
- C. Nonmetallic-sheathed cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. For branch circuit wiring in dry locations within one- and two-family dwellings and their attached or detached garages, and their storage buildings.
  - 2. In addition to other applicable restrictions, may not be used:
    - a. Where exposed to damage.
    - b. For damp, wet, or corrosive locations.
- D. Service entrance cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. For overhead service drop, installed in raceway to service head.
  - 2. In addition to other applicable restrictions, may not be used:
    - a. Where exposed to damage.
- E. Armored cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. Where concealed above accessible ceilings for final connections from junction boxes to luminaires.
      - 1) Maximum Length: 6 feet.
    - b. Where concealed in hollow stud walls and above accessible ceilings for branch circuits up to 20 A.
  - 2. In addition to other applicable restrictions, may not be used:
    - a. Where exposed to damage.
    - b. For damp, wet, or corrosive locations.
- F. Conductor sizes are based on copper. Aluminum conductors will not be accepted.

### 2.2 CONDUCTOR AND CABLE MANUFACTURERS

- A. Cerro Wire LLC: [www.cerrowire.com](http://www.cerrowire.com).
- B. Industrial Wire & Cable, Inc: [www.iewc.com](http://www.iewc.com).
- C. Southwire Company: [www.southwire.com](http://www.southwire.com).

2.3 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose indicated.
- C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
- D. Comply with NEMA WC 70.
- E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
- F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
- G. Conductors for Grounding and Bonding: Also comply with Section 260526.
- H. Conductor Material:
  - 1. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B 787M unless otherwise indicated.
  - 2. Tinned Copper Conductors: Comply with ASTM B33.
- I. Minimum Conductor Size:
  - 1. Branch Circuits: 12 AWG.
    - a. Exceptions:
      - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
      - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
  - 2. Control Circuits: 14 AWG.
- J. Conductor Color Coding:
  - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
  - 2. Color Coding Method: Integrally colored insulation.
  - 3. Color Code:
    - a. 120/240 V, 1 Phase, 3 Wire System:
      - 1) Phase A: Black.
      - 2) Phase B: Red.
      - 3) Neutral/Grounded: White.
    - b. Equipment Ground, All Systems: Green.
    - c. For control circuits, comply with manufacturer's recommended color code.

2.4 SINGLE CONDUCTOR BUILDING WIRE

- A. Manufacturers:
  - 1. Copper Building Wire:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- a. Cerro Wire LLC: [www.cerrowire.com](http://www.cerrowire.com).
- b. Encore Wire Corporation: [www.encorewire.com](http://www.encorewire.com).
- c. Southwire Company: [www.southwire.com](http://www.southwire.com).

- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
  - 1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Solid.
    - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
  - 1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2.
- F. Conductor: Copper.
- G. Insulation Voltage Rating: 600 volts.
- H. Insulation: NFPA 70, Type THHN/THWN.

#### 2.5 NONMETALLIC-SHEATHED CABLE

- A. Manufacturers:
  - 1. Cerro Wire LLC: [www.cerrowire.com](http://www.cerrowire.com).
  - 2. Encore Wire Corporation: [www.encorewire.com](http://www.encorewire.com).
  - 3. Southwire Company: [www.southwire.com](http://www.southwire.com).
- B. Description: NFPA 70, Type NM multiple-conductor cable listed and labeled as complying with UL 719, Type NM-B.
- C. Conductor Stranding:
  - 1. Size 10 AWG and Smaller: Solid.
  - 2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.

#### 2.6 SERVICE ENTRANCE CABLE

- A. Service Entrance Cable for Above-Ground Use: NFPA 70, Type SE multiple-conductor cable listed and labeled as complying with UL 854, Style R.
- B. Conductor Stranding: Stranded.
- C. Insulation Voltage Rating: 600 V.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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2.7 ARMORED CABLE

- A. Manufacturers:
  - 1. AFC Cable Systems Inc: [www.afcweb.com](http://www.afcweb.com).
  - 2. Encore Wire Corporation: [www.encorewire.com](http://www.encorewire.com).
  - 3. Southwire Company: [www.southwire.com](http://www.southwire.com).
  
- B. Description: NFPA 70, Type AC cable listed and labeled as complying with UL 4, and listed for use in classified firestop systems to be used.
  
- C. Conductor Stranding:
  - 1. Size 10 AWG and Smaller: Solid.
  - 2. Size 8 AWG and Larger: Stranded.
  
- D. Insulation Voltage Rating: 600 V.
  
- E. Insulation: Type THHN.
  
- F. Grounding: Combination of interlocking armor and integral bonding wire.
  
- G. Armor: Steel, interlocked tape.

2.8 WIRING CONNECTORS

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
  
- B. Wiring Connectors for Splices and Taps:
  - 1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
  - 2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
  
- C. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
  
- D. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
  
- E. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
  - 1. Manufacturers:
    - a. 3M: [www.3m.com](http://www.3m.com).
    - b. Ideal Industries, Inc: [www.idealindustries.com](http://www.idealindustries.com).
    - c. NSI Industries LLC: [www.nsiindustries.com](http://www.nsiindustries.com).

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- F. Mechanical Connectors: Provide bolted type or set-screw type.
  - 1. Manufacturers:
    - a. Burndy: [www.burndy.com](http://www.burndy.com).
    - b. Ilco: [www.ilco.com](http://www.ilco.com).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  
- G. Compression Connectors: Provide circumferential type or hex type crimp configuration.
  - 1. Manufacturers:
    - a. Burndy: [www.burndy.com](http://www.burndy.com).
    - b. Ilco: [www.ilco.com](http://www.ilco.com).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
  
- H. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
  - 1. Manufacturers:
    - a. Burndy: [www.burndy.com](http://www.burndy.com).
    - b. Ilco: [www.ilco.com](http://www.ilco.com).
    - c. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).

## 2.9 WIRING ACCESSORIES

- A. Electrical Tape:
  - 1. Manufacturers:
    - a. 3M: [www.3m.com](http://www.3m.com).
    - b. Plymouth Rubber Europa: [www.plymouthrubber.com](http://www.plymouthrubber.com).
  - 2. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
  
- B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
  
- C. Spring Wire Connectors:
  
- D. Compression Connectors:

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that interior of building has been protected from weather.
  
- B. Verify that work likely to damage wire and cable has been completed.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
  - D. Verify that raceway installation is complete and supported.
  - E. Verify that field measurements are as shown on the drawings.
  - F. Verify that conditions are satisfactory for installation prior to starting work.
- 3.2 PREPARATION
- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.
- 3.3 INSTALLATION
- A. Circuiting Requirements:
    - 1. All wiring shall be run concealed in finished areas. Install in ceiling spaces, wall stud space or below slab unless specifically indicated otherwise.
    - 2. Unless dimensioned, circuit routing indicated is diagrammatic.
    - 3. When circuit destination is indicated and routing is not shown, determine exact routing required.
    - 4. Arrange circuiting to minimize splices.
    - 5. Include circuit lengths required to install connected devices within 10 ft of location shown.
    - 6. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
  - B. Install products in accordance with manufacturer's instructions.
  - C. Install conductors and cable in a neat and workmanlike manner in accordance with NECA 1.
  - D. Install nonmetallic-sheathed cable (Type NM-B) in accordance with NECA 121.
  - E. Install armored cable (Type AC) in accordance with NECA 120.
  - F. Installation in Raceway:
    - 1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
    - 2. Pull all conductors and cables together into raceway at same time.
    - 3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
    - 4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
  - G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
  
- I. Terminate cables using suitable fittings.
  - 1. Armored Cable (Type AC):
    - a. Use listed fittings and anti-short, insulating bushings.
    - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
  
- J. Install conductors with a minimum of 12 inches of slack at each outlet.
  
- K. Where conductors are installed in enclosures for future termination by others, provide a minimum of 5 feet of slack.
  
- L. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
  
- M. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
  
- N. Make wiring connections using specified wiring connectors.
  - 1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
  - 2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  - 3. Do not remove conductor strands to facilitate insertion into connector.
  - 4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
  - 5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
  
- O. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
  - 1. Dry Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For taped connections, first apply adequate amount of rubber splicing electrical tape or electrical filler tape, followed by outer covering of vinyl insulating electrical tape.
    - b. For taped connections likely to require re-entering, including motor leads, first apply varnished cambric electrical tape, followed by adequate amount of rubber splicing electrical tape, followed by outer covering of vinyl insulating electrical tape.
  - 2. Damp Locations: Use insulating covers specifically designed for the connectors, electrical tape, or heat shrink tubing.
    - a. For connections with insulating covers, apply outer covering of moisture sealing electrical tape.
    - b. For taped connections, follow same procedure as for dry locations but apply outer covering of moisture sealing electrical tape.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- P. Insulate ends of spare conductors using vinyl insulating electrical tape.
- Q. Color Code Legend: Provide identification label identifying color code for ungrounded conductors at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
- R. Provide wire and cable markers in accordance with Section 260553 identifying circuit number or other designation indicated at the following locations:
  - 1. At each source and load connection.
  - 2. Within boxes when more than one circuit is present.
  - 3. Within equipment enclosures when conductors and cables enter or leave the enclosure.
- S. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07841.
- T. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.
- U. Install wire and cable securely, in a neat and workmanlike manner, as specified in NECA 1.
- V. Route wire and cable as required to meet project conditions.
  - 1. Wire and cable routing indicated is approximate unless dimensioned.
  - 2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.
  - 3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.
- W. Use wiring methods indicated.
- X. Pull all conductors into raceway at same time.
- Y. Use suitable wire pulling lubricant for building wire 4 AWG and larger.
- Z. Neatly train and lace wiring inside boxes, equipment, and panelboards.
- AA. Clean conductor surfaces before installing lugs and connectors.
- AB. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.
- AC. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.
- AD. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

- AE. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.
- AF. Identify and color code wire and cable under provisions of Section 260553. Identify each conductor with its circuit number or other designation indicated.

3.4 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS, except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- C. Correct deficiencies and replace damaged or defective conductors and cables.
- D. Perform inspections and tests listed in NETA STD ATS, Section 7.3.2.

END OF SECTION



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Grounding and bonding components.
  - 1. Metal underground water pipe.
  - 2. Metal frame of the building.
  - 3. Concrete-encased electrode.
  - 4. Rod electrodes.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING REQUIREMENTS

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
- B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
- C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
- D. Grounding System Resistance:
  - 1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Quisenberry Arcari Architects. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Bonding and Equipment Grounding:
  - 1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

## 2.2 GROUNDING AND BONDING COMPONENTS

### A. General Requirements:

1. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
2. Provide products listed and labeled as complying with UL 467 where applicable.

### B. Conductors for Grounding and Bonding, in addition to requirements of Section 260519:

1. Use insulated copper conductors unless otherwise indicated.

### C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
2. Unless otherwise indicated, use mechanical connectors or compression connectors for accessible connections.

## 2.3 MANUFACTURERS

A. Cooper Power Systems, a division of Cooper Industries: [www.cooperindustries.com](http://www.cooperindustries.com).

B. Framatome Connectors International: [www.fciconnect.com](http://www.fciconnect.com).

C. Erico: [www.erico.com](http://www.erico.com).

D. Manufacturers:

E. Rod Electrodes: Copper.

1. Diameter: 3/4 inch.
2. Length: 10 feet.
3. Shape: Straight.
4. Length: 8 feet.
5. Connector: Connector for exothermic welded connection.

F. Foundation Electrodes: 4 AWG.

2.4 CONNECTORS AND ACCESSORIES

- A. Mechanical Connectors: Bronze.
- B. Wire: Stranded copper.
- C. Grounding Electrode Conductor: Size to meet NFPA 70 requirements.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as shown on the drawings.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify existing conditions prior to beginning work.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install grounding and bonding system components in a neat and workmanlike manner in accordance with NECA 1.
- C. Make grounding and bonding connections using specified connectors.
  - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
  - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
  - 3. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 4. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- D. Install 4 AWG bare copper wire in foundation footing where indicated.
- E. Equipment Grounding Conductor: Provide separate, insulated conductor within each feeder and branch circuit raceway. Terminate each end on suitable lug, bus, or bushing.

3.3 FIELD QUALITY CONTROL

- A. Inspect and test in accordance with NETA ATS except Section 4.
- B. Perform inspections and tests listed in NETA ATS, Section 7.13.
- C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

PART 2 PRODUCTS

2.1 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
  - 1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
  - 2. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated, where applicable.
  - 3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 2. Include consideration for vibration, equipment operation, and shock loads where applicable.
  - 4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - 5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
  - 1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
  - 2. Conduit Clamps: Bolted type unless otherwise indicated.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  - 1. Comply with MFMA-4.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- F. Anchors and Fasteners:

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
2. Hollow Masonry: Use toggle bolts.
3. Hollow Stud Walls: Use toggle bolts.
4. Steel: Use beam clamps, machine bolts, or welded threaded studs.
5. Wood: Use wood screws.

## 2.2 MANUFACTURERS

- A. Thomas & Betts Corporation: [www.tnb.com](http://www.tnb.com).
- B. Threaded Rod Company: [www.threadedrod.com](http://www.threadedrod.com).
- C. Caddy Fasteners: [www.erico.com](http://www.erico.com).

## 2.3 MATERIALS

- A. Hangers, Supports, Anchors, and Fasteners - General: Corrosion-resistant materials of size and type adequate to carry the loads of equipment and conduit, including weight of wire in conduit.
- B. Supports: Fabricated of structural steel or formed steel members; galvanized.
- C. Anchors and Fasteners:
  1. Obtain permission from Quisenberry Arcari Architects before using powder-actuated anchors.
  2. Concrete Structural Elements: Use precast inserts, expansion anchors, powder-actuated anchors, or preset inserts.
  3. Steel Structural Elements: Use beam clamps, steel spring clips, steel ramset fasteners, or welded fasteners.
  4. Concrete Surfaces: Use self-drilling anchors or expansion anchors.
  5. Hollow Masonry, Plaster, and Gypsum Board Partitions: Use toggle bolts or hollow wall fasteners.
  6. Solid Masonry Walls: Use expansion anchors or preset inserts.
  7. Wood Elements: Use wood screws.
- D. Formed Steel Channel:
- E. Powder-Actuated Anchors:
- F. Steel Spring Clips:

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that field measurements are as shown on the drawings.
- B. Verify that mounting surfaces are ready to receive support and attachment components.

- C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install support and attachment components in a neat and workmanlike manner in accordance with NECA 1.
- C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
- E. Conduit Support and Attachment: Also comply with Section 260534.
- F. Secure fasteners according to manufacturer's recommended torque settings.
- G. Remove temporary supports.

### 3.3 FIELD QUALITY CONTROL

- A. Inspect support and attachment components for damage and defects.
- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective support and attachment components.
  - 1. Do not drill or cut structural members.

END OF SECTION



**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 260534 - CONDUIT

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Flexible metal conduit (FMC).
- B. Liquidtight flexible metal conduit (LFMC).
- C. Electrical metallic tubing (EMT).
- D. Conduit fittings.
- E. Conduit, fittings and conduit bodies.

1.3 SUBMITTALS

- A. Product Data: Provide for flexible metal conduit, liquidtight flexible metal conduit, metallic tubing, fittings, and conduit bodies.
- B. Project Record Documents: Accurately record actual routing of conduits larger than 2 inches.

PART 2 PRODUCTS

2.1 CONDUIT REQUIREMENTS

- A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- B. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
- C. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.2 FLEXIBLE METAL CONDUIT (FMC)

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc: [www.afcweb.com](http://www.afcweb.com).

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Electri-Flex Company: [www.electriflex.com](http://www.electriflex.com).
3. International Metal Hose: [www.metalhose.com](http://www.metalhose.com).

B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

C. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

D. Description: Interlocked steel construction.

E. Fittings: NEMA FB 1.

### 2.3 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Manufacturers:

1. AFC Cable Systems, Inc: [www.afcweb.com](http://www.afcweb.com).
2. Electri-Flex Company: [www.electriflex.com](http://www.electriflex.com).
3. International Metal Hose: [www.metalhose.com](http://www.metalhose.com).

B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

C. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.

D. Description: Interlocked steel construction with PVC jacket.

E. Fittings: NEMA FB 1.

### 2.4 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:

1. Allied Tube & Conduit: [www.alliedeg.com](http://www.alliedeg.com).
2. Republic Conduit: [www.republic-conduit.com](http://www.republic-conduit.com).
3. Wheatland Tube Company: [www.wheatland.com](http://www.wheatland.com).

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

---

2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use compression (gland) or set-screw type.
  - a. Do not use indenter type connectors and couplings.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

- A. All conduits shall be run concealed in finished areas. Install in ceiling spaces, wall stud space or below slab unless specifically indicated otherwise.
- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.
- D. Verify routing and termination locations of conduit prior to rough-in.
- E. Conduit routing is shown on drawings in approximate locations unless dimensioned. Route as required to complete wiring system.

#### 3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Install conduit in a neat and workmanlike manner in accordance with NECA 1.
- C. Conduit Support:
  1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
  2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
- D. Connections and Terminations:
  1. Use suitable adapters where required to transition from one type of conduit to another.
  2. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  3. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
  4. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- E. Penetrations:
  1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  4. Conceal bends for conduit risers emerging above ground.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.

F. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.

G. Provide grounding and bonding in accordance with Section 260526.

END OF SECTION

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 260537 - BOXES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Wall and ceiling outlet boxes.
- D. Pull and junction boxes.

1.3 REFERENCE STANDARDS

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; National Electrical Manufacturers Association; 2012 (ANSI/NEMA FB 1).
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; National Electrical Manufacturers Association; 2008 (Revised 2010) (ANSI/NEMA OS 1).
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); National Electrical Manufacturers Association; 2008.
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's standard catalog pages and data sheets for outlet and device boxes and junction and pull boxes.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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**PART 2 PRODUCTS**

**2.1 BOXES**

**A. General Requirements:**

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled by Underwriter's Laboratories Inc. (UL) or testing firm acceptable to authority having jurisdiction as suitable for the purpose indicated.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

**B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:**

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use suitable concrete type boxes where flush-mounted in concrete.
4. Use suitable masonry type boxes where flush-mounted in masonry walls.
5. Use raised covers suitable for the type of wall construction and device configuration where required.
6. Use shallow boxes where required by the type of wall construction.
7. Do not use "through-wall" boxes designed for access from both sides of wall.
8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes.
12. Wall Plates: Comply with Section 262726.

**2.2 MANUFACTURERS**

- A. Appleton Electric: [www.appletonelec.com](http://www.appletonelec.com).
- B. Arc-Co./Division of Arcade Technology: [www.arc-co.com](http://www.arc-co.com).
- C. Unity Manufacturing: [www.unitymfg.com](http://www.unitymfg.com).
- D. Substitutions: See Section 016000 - Product Requirements.

2.3 OUTLET BOXES

- A. Sheet Metal Outlet Boxes: NEMA OS 1, galvanized steel.
  - 1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported; include 1/2 inch male fixture studs where required.
  - 2. Concrete Ceiling Boxes: Concrete type.
- B. Cast Boxes: NEMA FB 1, Type FD, aluminum. Provide gasketed cover by box manufacturer. Provide threaded hubs.
- C. Wall Plates for Finished Areas: As specified in Section 262726.
- D. Floor Boxes: NEMA OS 1, fully adjustable, minimum 1-1/2 inches deep.
- E. Material: Cast metal.
- F. Shape: Rectangular.
- G. Service Fittings: As specified in Section 262726.

2.4 PULL AND JUNCTION BOXES

- A. Sheet Metal Boxes: NEMA OS 1, galvanized steel.
- B. Hinged Enclosures: As specified in Section 262716.
- C. Surface Mounted Cast Metal Box: NEMA 250, Type 4X; flat-flanged, surface mounted junction box:
  - 1. Material: Cast aluminum.
  - 2. Cover: Furnish with ground flange, neoprene gasket, and stainless steel cover screws.
  - 3. Material: Cast aluminum.
  - 4. Cover: Smooth cover with neoprene gasket and stainless steel cover screws.
  - 5. Cover Legend: "ELECTRIC".

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that mounting surfaces are ready to receive boxes.
- B. Verify that conditions are satisfactory for installation prior to starting work.
- C. Verify locations of floor boxes and outlets in offices and work areas prior to rough-in.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
- C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- D. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
- E. Box Supports:
  - 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
  - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
- F. Install boxes plumb and level.
- G. Flush-Mounted Boxes:
  - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
  - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
  - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
- H. Install boxes as required to preserve insulation integrity.
- I. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- J. Close unused box openings.
- K. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- L. Provide grounding and bonding in accordance with Section 260526.
- M. Set wall mounted boxes at elevations to accommodate mounting heights indicated.
  - 1. Adjust box locations up to 10 feet if required to accommodate intended purpose.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- N. Inaccessible Ceiling Areas: Install outlet and junction boxes no more than 6 inches from ceiling access panel or from removable recessed luminaire.
  - O. Coordinate mounting heights and locations of outlets mounted above counters, benches, and backsplashes.
  - P. Locate outlet boxes to allow luminaires positioned as shown on reflected ceiling plan.
  - Q. Locate outlet boxes so that wall plates do not span different building finishes.
    - 1. Provide minimum 24 inches separation in acoustic rated walls.
    - 2. Provide minimum 24 inches separation in fire rated walls.
  - R. Do not install flush mounting box back-to-back in walls; provide minimum 6 inches separation. Provide minimum 24 inches separation in acoustic rated walls.
  - S. Secure flush mounting box to interior wall and partition studs. Accurately position to allow for surface finish thickness.
  - T. Use stamped steel bridges to fasten flush mounting outlet box between studs.
  - U. Install flush mounting box without damaging wall insulation or reducing its effectiveness.
  - V. Use adjustable steel channel fasteners for hung ceiling outlet box.
  - W. Do not fasten boxes to ceiling support wires.
  - X. Use gang box with plaster ring for single device outlets.
  - Y. Use cast outlet box in exterior locations exposed to the weather and wet locations.
- 3.3 ADJUSTING
- A. Install knockout closures in unused box openings.
- 3.4 CLEANING
- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.
- 3.5 PROTECTION
- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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B. Clean exposed surfaces and restore finish.  
END OF SECTION

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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SECTION 262726 - WIRING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SECTION INCLUDES

- A. Receptacles.
- B. Wall plates.

1.3 REFERENCE STANDARDS

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for; Federal Specification; Revision G, 2001.
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction; National Electrical Contractors Association; 2010.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices; National Electrical Contractors Association; 2010.
- D. NEMA WD 1 - General Color Requirements for Wiring Devices; National Electrical Manufacturers Association; 1999 (R 2010).
- E. NEMA WD 6 - Wiring Device -- Dimensional Specifications; National Electrical Manufacturers Association; 2002 (R2008).
- F. NFPA 70 - National Electrical Code; National Fire Protection Association; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.
- H. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.
- I. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.4 SUBMITTALS

- A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- B. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

1.5 DELIVERY, STORAGE, AND PROTECTION

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.
- B. Products: Provide products listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Hubbell Incorporated; : [www.hubbell-wiring.com](http://www.hubbell-wiring.com).
- B. Leviton Manufacturing Company, Inc; : [www.leviton.com](http://www.leviton.com).
- C. Pass & Seymour, a brand of Legrand North America, Inc; : [www.legrand.us](http://www.legrand.us)
- D. Source Limitations: Where possible, for each type of wiring device furnish products produced by a single manufacturer and obtained from a single supplier.

2.2 WIRING DEVICE APPLICATIONS

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.
- C. Provide weather resistant GFI receptacles with "weatherproof while in use" covers for all receptacles installed outdoors or in damp or wet locations.
- D. Provide tamper resistant receptacles for all receptacles installed in dwelling units.

2.3 ALL WIRING DEVICES

- A. Provide products listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

## 2.4 RECEPTACLES

- A. Manufacturers:
  - 1. Hubbell Incorporated; : [www.hubbell-wiring.com](http://www.hubbell-wiring.com).
  - 2. Leviton Manufacturing Company, Inc; : [www.leviton.com](http://www.leviton.com).
  - 3. Lutron Electronics Company, Inc: [www.lutron.com](http://www.lutron.com).
  
- B. All Receptacles: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
  
- C. GFI Receptacles:
  - 1. All GFI Receptacles: Provide with feed-through protection, light to indicate ground fault tripped condition and loss of protection, and list as complying with UL 943, class A.
  - 2. Tamper Resistant and Weather Resistant GFI Receptacles: Residential grade, duplex, 15A, 125V, NEMA 5-15R, rectangular decorator style, listed and labeled as tamper resistant type and as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

## 2.5 WALL PLATES

- A. Manufacturers:
  - 1. Hubbell Incorporated; : [www.hubbell-wiring.com](http://www.hubbell-wiring.com).
  - 2. Leviton Manufacturing Company, Inc; : [www.leviton.com](http://www.leviton.com).
  - 3. Pass & Seymour, a brand of Legrand North America, Inc; : [www.legrand.us](http://www.legrand.us)
  - 4. Substitutions: See Section 016000 - Product Requirements.
  
- B. All Wall Plates: Comply with UL 514D.
  - 1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  - 2. Size: Standard; .
  - 3. Screws: Metal with slotted heads finished to match wall plate finish.
  
- C. Weatherproof Cover Plates: Gasketed with hinged cover rated "Weatherproof while in use".

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
  
- B. Verify that wall openings are neatly cut and will be completely covered by wall plates.
  
- C. Verify that final surface finishes are complete, including painting.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- E. Verify that conditions are satisfactory for installation prior to starting work.

3.2 PREPARATION

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.3 INSTALLATION

- A. Perform work in a neat and workmanlike manner in accordance with NECA 1 and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260537 as required for installation of wiring devices provided under this section.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFI receptacles with integral GFI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install securely, in a neat and workmanlike manner, as specified in NECA 1.
- J. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- K. Install wall switches with OFF position down.

**DEPT. OF HOUSING, CDBG DISASTER RECOVERY PROGRAM (OORR)**  
**94 LONGDEAN ROAD, FAIRFIELD, CT**

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- L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
  - M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
  - N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
  - O. Install receptacles with grounding pole on top.
  - P. Connect wiring device grounding terminal to outlet box with bonding jumper.
  - Q. Install decorative plates on switch, receptacle, and blank outlets in finished areas.
  - R. Connect wiring devices by wrapping conductor around screw terminal.
  - S. Use jumbo size plates for outlets installed in masonry walls.
- 3.4 INTERFACE WITH OTHER PRODUCTS
- A. Coordinate locations of outlet boxes provided under Section 260537 to obtain mounting heights specified.
  - B. Install convenience receptacle 18 inches above finished floor.
  - C. Install convenience receptacle 6 inches above counter.
- 3.5 FIELD QUALITY CONTROL
- A. Inspect each wiring device for damage and defects.
  - B. Operate each wall switch with circuit energized and verify proper operation.
  - C. Verify that each receptacle device is energized.
  - D. Test each receptacle to verify operation and proper polarity.
  - E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
  - F. Correct wiring deficiencies and replace damaged or defective wiring devices.

3.6 ADJUSTING

- A. Adjust devices and wall plates to be flush and level.

3.7 CLEANING

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

END OF SECTION