Contractor Specification & Performance Manual

NY Rising Housing Recovery Program

(one and two-unit homeowner occupied)

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PART 1 - INTRODUCTION

Purpose of Contractor Specifications and Performance Manual

The purpose of the Contractor Specifications and Performance Manual is to provide and make a part of each contract, subcontract and contract bid certain minimum standards of quality of workmanship and materials expected in the Work and required by the STATE, as well as certain contractual obligations expected in the performance of Work under the Program. It is intended that these minimum specifications shall prevail except when in conflict with, or less stringent than local governments, the State, or Federal Regulations or Codes, in which instance the more stringent standards will prevail. The Contractor Specifications and Performance Manual are set forth as a guideline for contractors. Where a direct conflict exists between a provision of the Contractor Specifications and Performance Manual and a provision of a separate Contract Document on a Project, the specific Contract Document shall control. Otherwise, the provisions of the Contractor Specifications and Performance Manual shall be deemed to supplement the contractual requirements.

While the STATE, through NYS-HCR/HTFC, has undertaken due diligence in creating the Contractor Specifications and Performance Manual, the STATE, through NYS-HCR/HTFC, reserves the right to make changes as deemed necessary. Contractors selected to rehabilitate homes within the STATE for the Program will be notified of any changes to the Contractor Specifications and Performance Manual in writing. All changes become effective immediately upon receipt. Any questions or concerns regarding applicable changes must be submitted in writing to the Master Construction Manager (MCM) within 24 hours of notification.

The “Contractor Specifications and Performance Manual” is specifically designed to serve as a guide for the Rehabilitation and Reconstruction of residences receiving Disaster Recovery Program assistance.

Materials and Workmanship

All work shall be performed by competent workman pursuant to cost estimates and/or bid documents under the supervision of the CONTRACTOR or his agent. All sizes and grades of materials shall be new, of a generally acceptable standard and in first class condition. All finished work shall be clean and free from tool marks or other foreign blemishes. All measurements shall be verified at building site. All work shall be in conformity with manufacturer’s printed directions. All fittings, off-sets, etc. required shall be furnished and installed without additional expense to HOMEOWNER. All work and supplies shall be protected from the weather during the course of construction. Under no circumstances whatsoever shall CONTRACTOR install any materials supplied by the HOMEOWNER.

Hazardous Materials Abatement

As outlined in the Work Write Ups, the CONTRACTOR shall be required to complete Lead- Based Paint Abatement, Mold Remediation, Removal and Disposal of Universal and Hazardous Wastes, Asbestos Containing Materials Abatement and Radon Mitigation in accordance with all local, State and Federal Regulations and Codes. Refer to related specification sections in this Manual for Requirements of this work.

Historic Preservation

If any Historic Properties are identified, the CONTRACTOR shall comply with the all historic preservation requirements including those identified in Part 2 of the Historic Preservation Certification Application to the National Parks Service, or those identified by the New York State Historic Preservation Office. Additional, historic rehabilitation and building element specifications are outlined in Appendix A. In the event of any conflict between the requirements, the requirements imposed by the New York State Office of Parks, Recreation and Historic Preservation shall control.

Required Minimum Certification

The intent of the NY Rising Storm Recovery Housing Programs is to pursue and receive a "Green" building certification by an organization recognized/approved by HUD to fulfill the program requirements for Substantially-damaged residential buildings.

Applicants assisted under the NY Rising Housing Programs, whose homes have been destroyed or substantially damaged, will have their homes reconstructed to a single "Green" Building standard that will be noted in a future revision. An example of a "Green" Building Standard could include one of the "Energy Star Certified Home" programs, "LEED NC or LEED Homes" programs or qualified New York State Energy Research and Development Authority (NYSERDA) program.

Standards for rehabilitation of nonsubstantially-damaged residential buildings must follow the guidelines specified in the HUD CPD Green Building Retrofit Checklist, available on the CPD Disaster Recovery Web site. Grantees must apply these guidelines to the extent applicable to the rehabilitation work undertaken, including the use of mold resistant products when replacing surfaces such as drywall. When older or obsolete products are replaced as part of the rehabilitation work, rehabilitation is required to use ENERGY STAR-labeled, WaterSense-labeled, or Federal Energy Management Program (FEMP)-designated products and appliances. For example, if the furnace, air conditioner, windows, and appliances are replaced, the replacements must be ENERGY STAR-labeled or FEMP-designated products; WaterSense-labeled products (e.g., faucets, toilets, showerheads) must be used when water products are replaced. Rehabilitated housing may also implement measures recommended in a Physical Condition Assessment (PCA) or Green Physical Needs Assessment (GPNA).

END OF SECTION

PART 2 – TECHNICAL REQUIREMENTS

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SECTION 010000 - GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DEFINITIONS

A. Capitalized words used in the General Requirements have the meanings in Article 2 of the Contract.

1.02 VERIFY QUANTITIES & MEASUREMENTS

A. All quantities stated in the attached Specifications for this Dwelling using units of measure other than Each (EA), Room (RM) or Dwelling Unit (DU) (e.g., SF of drywall) are for the Contractor's convenience and must be verified by the Contractor at the Joint Scope Meeting. All quantities stated in the Units of Measure as Each (EA), Room (RM) or Dwelling Unit (DU) are as stated. Discrepancies in quantities found by the Contractor must be communicated to the Engineer prior to the acceptance of a Job Order. Claims for additional funds due to discrepancies in Quantities shall be rejected if submitted after the Job Order has been signed by the Contractor.

1.03 CONFLICT

A Should any conflict occur in or between the Unit Price Book and Specifications, the Contractor shall be deemed to have estimated the more expensive way of doing the Work, unless its shall have asked for and obtained a decision in writing from the MCM before the execution of the Job Order as to what shall govern.

1.04 POINTS NOT COVERED BY SPECIFICATIONS

A Whenever any feature of the Work is not fully set forth in these Specifications, it shall be understood that the same will be governed by the rules of the best prevailing practice for that class of Work.

1.05 COMPLIANCE WITH LAW, PERMITS & CERTIFICATES, AND INSPECTIONS

A. Compliance with Law: The Contractor shall comply with all Laws applicable to this Contract and to the Work to be done hereunder, including laws pertaining to building construction, zoning, environmental protection, energy efficiency, and worker safety. The Contractor’s attention is directed to federal requirements. If a provision in the Contract conflicts with the Law, the Contractor shall comply with the Law. This, however, shall not be interpreted as permitting the use of material or equipment inferior to that specified, unless such materials or equipment is specifically mentioned as violating the rules and regulations.

B. Permits and Certificates: The Contractor shall obtain and pay for all permits, certifications and licenses as may be necessary and required to complete the Work during the Term and the Maintenance and Guaranty Period. Contractor shall not commence Work on a Dwelling unless and until required permits are obtained. Prior to submission of a Job Order Payment Request, the Contractor shall obtain a Certificate of Occupancy for the Dwelling if required by Law and it shall provide all required certificates of inspection to the Engineer.

C. Inspections: Contractor shall facilitate inspections by NYS HCR/HTFC or their agents, pursuant to Article 3D of the Contract.

1.06 ACCESS TO SITE – WORK TIMES

A. Contractors and their Subcontractors shall schedule normal working hours between 7:00 a.m. and 6:00 p.m. Monday through Friday or as specified by Law. A Contractor must obtain an After Hours Variance from the local jurisdiction.

1.07 TEMPORARY FACILITIES AND CONTROLS

A. Provide temporary toilet facility at each Dwelling from commencement of Work on the Job Order until approval of permanent facilities. The Contractor shall prohibit and prevent the committing of nuisances on the site of the work or on adjoining premises and shall discharge any employee who violates sanitary regulations

B. The Contractor shall provide temporary lighting, power and water facilities if required in addition to existing facilities.

C. Provide dumpster of appropriate yardage at each site. Dumpster to be emptied weekly.

D. Provide onsite storage unit such as “POD” sufficient to accommodate furniture in the Dwelling. Remove all furniture from rooms affected by the Work and store on Site. Replace furniture upon completion of the Work prior to Final Inspection. The Homeowner and/or Occupants are required to remove and store small household items, unless the Job Order specifically requires the Contractor to remove and store small items. If the Contractor is required to remove and store small household items, the Contractor shall pack the items in boxes and shall store the items in a secure facility approved by the Homeowner and, after Final Inspection, Contractor shall place the boxes of small household items in the rooms of origin for unpacking by the Homeowner or Occupants.

1.08 PRODUCT OPTIONS

A. NYS HCR/HTFC will offer a selection of products that will be chosen by the Homeowner at the time of the Joint Scope Meeting with the Homeowner, Head Inspector (H-I), and Contractor. Product selections will include a limited choice of:

1. Kitchen Appliances
2. Cabinetry & Countertops
3. Bathroom Fixtures and Tile
4. Flooring
5. Siding & Roofing
6. Lighting Fixtures
7. Paint Colors
8. Doors

1.09 OWNER-FURNISHED PRODUCTS

A. Contractor shall not install items supplied by the Homeowner or Occupants.

1.10 MAINTAINING A CLEAN AND SAFE WORK SITE

A. As the Work progresses and also before the completion and Final Acceptance of the Job Order Work, the Contractor shall maintain a safe Site and remove all rubbish and unused materials relating to the Work. The Contractor shall leave the structure and grounds in a neat, broom-swept condition, satisfactory to the Design Professional (DP), on a daily basis. Prior to Final Acceptance, the Contractor shall also remove all temporary structures.

B. Contractor will lower debris from the structure to the ground or dumpster, in a controlled manner, and not throw materials The contractor also has the option to use a trash chute instead of controlled lowering of debris.

C. In any emergency affecting the safety of persons or property, the Contractor shall act at its discretion to prevent threatened damage, injury, or loss. Any additional compensation or extension of time requested by the Contractor resulting from emergency Work in accordance with the Contract, will be considered.

D. An "Emergency Contact List" will be posted on the job site that include Emergency Services listed with area code and phone number (Fire, Police, Ambulance) Emergency contact information for Contractor that will be responded to 24 hours a day, Emergency number for utility shut offs, and Number for local dig safe.

1.11 "OR EQUAL" MATERIALS

A. When it is impractical or uneconomical to make a clear and accurate description of the technical requirements of an item in the Specifications, the Specifications refer to a brand name or equal description as a means to define the performance or other salient requirements of an item. Where a brand name or catalogue number is specified, an "equal" product may be offered that meets the relevant requirements, including the construction standards in HUD Docket No. FR-5696-N-01 section IV(A)(1)(a)(5) , unless the specification expressly states that no "equal" products may be offered. If the Contractor wishes to use an item other than the brand name specified, it shall submit proof to the DP that such item meets the relevant requirements. The DP shall determine whether the item meets the relevant requirements. The Contractor shall be responsible for any additional costs or delays resulting from having furnished products other than those specified.

1.12 EPA RENOVATION, REPAIR AND PAINTING AND LEAD SAVE HOUSING RULE

A. CONTRACTORS participating in this Program will be required to comply with RRP and LSHR requirements described in 40 CFR 745.80 Subpart E effective April 22, 2010, and 24 CFR Part 35 affecting work on houses constructed prior to 1978 and containing lead-based paint.

1.13 EPA LEAD CERTIFICATION

A. This Program will require CONTRACTORS conducting renovation, repairs and painting to be EPA certified and employees trained in the use of lead-safe work practices. These regulations will require resident notification, lead- safe working practices, cleanup procedures, documentation and record keeping.

1.14 ADHESIVES AND SEALANTS

A. All adhesives must comply with Part 205 of the New York State Environmental Conservation Law. Seal all wall, floor, and joint penetrations with low-VOC caulking or other appropriate sealing methods to prevent pest entry.

1.15 RADON TESTING AND MITIGATION

A. For buildings in EPA Radon Zone 1 or 2, test for radon using the current edition of American Association of Radon Scientists and Technologist (AARST)'s Protocols for Radon Measurement in Homes Standard for Single-Family Housing or Duplexes, or AARST's Protocol for Conducting Radon and Radon Decay Product Measurements in Multifamily Buildings. To install radon mitigation systems in buildings with radon level of 4 pCi/L or more, use ASTM E 2121 for single-family housing or duplexes, or AARST's Radon Mitigation Standards for Multifamily Buildings. For new construction, use AARST's Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses, or ASTM E 1465.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 013300 - SUBMITTALS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes the requirements for compiling, processing and transmitting submittals required for execution of the project.

B. Submittals are categorized into two types: Action Submittals and Informational Submittals, as follows:

1. Action Submittal: Written and graphic information submitted by the Contractor that requires Design Professional's (DP) approval. The following are examples of action submittals:

   a. Shop drawings (including working drawings and product data)
   b. Schedule of values

2. Informational Submittal: Information submitted by the Contractor that does not require the DP's approval. The following are examples of informational submittals:

   a. Shop drawing schedule
   b. Construction schedule
   c. Contract close-out documents

1.02 RELATED WORK

A. Additional requirements may be specified in the General Conditions for the Contract.

B. Additional submittal requirements may be specified in the respective technical Specification Sections.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. All submittals shall be clearly identified as follows:

1. Date of submission
2. Project number
3. Project name
4. Contractor identification
   a. Contractor
   b. Supplier
   c. Manufacturer
   d. Manufacturer or supplier representative
5. Identification of the product
6. Reference to Work Write-up
7. Reference to specification section number, page and paragraph(s)

8. Indication of Contractor's approval
9. Identification of deviations from the Work Write-up
10. Reference to previous submittal (for resubmittals)

B. Submittals shall be clear and legible, and of sufficient size for legibility and clarity of the presented data.

C. SUBMITTAL LOG. Maintain a log of all submittals. The submittal log shall be kept accurate and up to date. This log should include the following items (as applicable):

1. Description
2. Submittal number
3. Date transmitted to DP
4. Date returned to Contractor (from DP)
5. Status of Submittal (Approved/Not Approved/etc.)
6. Date of Resubmittal to DP and Return from DP (if applicable and repeat as necessary)

D. NUMBERING SYSTEM. Utilize a 10-character submittal identification numbering system in the following manner:

1. The first character shall be a D or I which represents Shop Drawing (including working drawings and product data) or Informational, respectively.
2. The next six digits shall be the applicable Section Number.
3. The next two digits shall be the numbers 01 to 99 to sequentially number each separate item or drawing submitted under each specific Specification Section, in the order submitted.
4. The last character shall be a letter, A to Z, indicating the submission (or resubmission) of the same submittal, i.e., "A" = 1st submission, "B" = 2nd submission, "C" = 3rd submission, etc. A typical submittal number would be as follows:
   a. D-033205-08-B
   b. D= Shop Drawing
   c. 033205 = Section for Concrete
   d. 008 = the eighth different submittal under this section
   e. B = the second submission (first resubmission) of that particular shop drawing.

E. Variances

1. Notify DP in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents

2. Notify DP in writing, at the time of re-submittal (resubmission), of all deviations from previous submissions of that particular shop drawing, except those deviations which are the specific result of prior comments from DP.

F. Action Submittals

1. Shop Drawings and Product Data
   a. Shop Drawings
      1) Shop drawings as defined in the General Conditions, and as specified in individual Sections include, but are not necessarily limited to, custom prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, wiring diagrams, coordination drawings, equipment inspection and test reports, including performance curves and certifications, as applicable to the work.
      2) Contactor shall verify all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data, and coordinate each item with other related shop drawings and the Contract requirements.
      3) Shop Drawings shall only be required for new cabinetry, and new HVAC duct work
   b. Product Data
      1) Product data, as specified in individual Specification Sections, include, but are not limited to, the manufacturer's standard prepared data for manufactured products (catalog data), such as the product specifications, installation instructions, availability of colors and patterns, rough-in diagrams and templates, product photographs, product operating, maintenance instructions, and product warranties, as applicable.
      2) Contractor shall submit Product Data submittals for items to be incorporated into the project as specified in Division 2-16 Specification Sections where applicable to the work indicated in the Work Write-up.
      3) When multiple options are shown on a cut sheet or Product Data submittal and some products will not be used, those unused options will be boldly crossed out.
2. The review and approval of shop drawings, working drawings, product data, or samples by the Engineer shall not relieve the Contractor from the responsibility for the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and DP will have no responsibility therefore.

G. Informational Submittals

1. Shop drawing schedule
   a. Prepare and submit a schedule indicating when shop drawings are required to be submitted to support the as-planned construction schedule. The submittal schedule shall allow sufficient time for preparation and submittal, review and approval, and fabrication and delivery to support the construction schedule.
2. Construction schedule

a. Prepare and submit construction schedules and monthly status reports as specified.

3. Other requirements of the technical Specification Sections
   a. Comply with all other requirements of the technical specifications.
   b. Warranties and bonds
      1) Assemble a book(let) of all warranties and bonds as specified in the various technical specifications and in accordance with the specification on Warranties and Bonds and provide to DP.
   c. Contract close-out documents
      1) Submit Contract documentation as indicated in the specification for Contract Close-out.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 SUBMITTAL SCHEDULE

A. Provide an initial submittal schedule at the pre-construction meeting.

3.02 TRANSMITTALS

A. Prepare separate transmittal sheets for each submittal. Each transmittal sheet shall include at least the following: the Contractor's name and address, Owner's name, project name, project number, submittal number, description of submittal and number of copies submitted.

B. Submittals shall be transmitted or delivered directly to the office of DP, as indicated in the Contact Documents or as otherwise directed by DP.

3.03 PROCEDURES

A. Contractor's responsibilities

1. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work of other related Sections, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required). Extensions to the Contract Time will not be approved for the Contractor's failure to transmit submittals sufficiently in advance of the Work.

B. DP'S RESPONSIBILITIES

1. DP will not review shop drawings (including working drawings and product data) that do not include the Contractor's approval stamp. Such submittals will be returned to the Contractor, without action, for correction.
   a. Submittals which are transmitted in accordance with the specified requirements will be reviewed by DP within seven (7) working days. The

time for review will commence upon receipt of submittal by DP. Shop drawings will be returned to the Contractor with one of the following codes.

Code 1 – "APPROVED" – This code is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture. Approval is for conformance with the design concept only. The Contractor is responsible for dimensions, field measurements, quantities, coordination with other trades for all details pertaining solely to fabrication, erection and/or construction techniques.

Code 2 – "APPROVED AS NOTED" - This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. Approval is for conformance with the design concept only. The Contractor is responsible for dimensions, field measurements, quantities, coordination with other trades for all details pertaining solely to fabrication, erection and/or construction techniques.

Code 3 – "APPROVED AS NOTED/RESUBMIT" - This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the entire package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the DP within 10 working days of the date of DP's transmittal requiring the resubmittal. Approval is for conformance with the design concept only. The Contractor is responsible for dimensions, field measurements, quantities, coordination with other trades for all details pertaining solely to fabrication, erection and/or construction techniques.

Code 4 – "NOT APPROVED" – This code is assigned when the submittal does not meet the intent of the contract documents and/or design concept. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the requirements of the contract documents. The Contractor is responsible for dimensions, field measurements, quantities, coordination with other trades for all details pertaining solely to fabrication, erection and/or construction techniques.

2. ELECTRONIC TRANSMISSION

a. ACTION SUBMITTALS may be transmitted by electronic means provided the following conditions are met:
   1) The above-specified transmittal form is included.
   2) All other requirements specified above have been met including, but not limited to, coordination by the Contractor, review and approval by the Contactor, and the Contractor's Certification.
   3) The submittal contains no pages or sheets large than 11 x 17 inches.
   4) With the exception of the transmittal sheet, the entire submittal is included in a single file.
   5) The electronic files are PDF format (with printing enabled).
   6) In addition, transmit three hard-copy (paper) originals to DP.

END OF SECTION

SECTION 020000 - CLEAN-UP

PART 1 – GENERAL

1.01 CLEANUP AND DISPOSAL OF EXCESS MATERIAL

A. During the course of the work, keep the site of operations as clean and neat as possible. Dispose of all residue resulting from the construction work and, at the conclusion of the work, remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and leave the entire site of the work in a neat and orderly condition.

B. In order to prevent environmental pollution arising from the construction activities related to the performance of this Contract, comply with all applicable Federal, State and local laws and regulations concerning waste material disposal, as well as the specific requirements stated in this Section and in other related sections.

C. Disposal of excess excavated material in wetlands, stream corridors and plains is strictly prohibited even if the permission of the property owner is obtained. Any violation of this restriction by the Contractor or any person employed by him will be brought to the immediate attention of the responsible regulatory agencies, with a request that appropriate action be taken against the offending parties. The Contractor will be required to remove the fill and restore the area impacted at no increase in the Contract Price.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

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SECTION 021120 - IDENTIFICATION AND DISPOSAL OF HAZARDOUS WASTE

PART 1 - GENERAL

A. Description Of Work
   1. This specification covers the identification and disposal of hazardous waste, and related hazardous materials. Products shall be as follows or as directed by the Owner and or their representative. Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.
   2. Special Wastes:
      a. Asbestos-Containing Materials (ACM): ACM is regulated by EPA TSCA Rules, NY Code Rule 56 and OSHA standards, and is not Hazardous Waste.
      b. PCB Bulk Waste and non-liquid PCB materials (NLPCB): Window caulk and other caulk may contain NLPCB; if so, when disposed these materials are EPA-regulated PCB Bulk Waste under TSCA, and are NYS hazardous waste. PCB Caulk is governed under Specification 028400.

B. Definition
   1. Hazardous waste shall be any materials to be disposed that possess at least one of four characteristics, ignitability, corrosivity, reactivity or toxicity, as defined and regulated by the Resource Conservation and Recovery Act (RCRA) and applicable state and federal regulations, or a material specifically identified as hazardous waste by applicable Federal or State lists, in 40 CFR 261 or 6 NYCRR 371.
   2. A Conditionally Exempt Small Quantity Generator (CESQG) of hazardous waste shall be a waste handler who generates no more than 100 kilograms per month of listed and/or characteristic hazardous waste, generates no more than 1 kilogram of acute hazardous waste in any calendar month, and stores no more than 1000 kilograms of listed and/or characteristic hazardous waste or more than 1 kilogram of acutely hazardous waste.
   3. A Small Quantity Generator (SQG) of hazardous waste shall be a waste handler who generates no more than 1000 kilograms per month of listed and/or characteristic hazardous waste, generates no more than 1 kilogram of acute hazardous waste per month, and stores no more than 6000 kilograms of listed and/or characteristic hazardous waste or more than 1 kilogram of acutely hazardous waste.
   4. Large Quantity Generator (LQG) of hazardous waste shall be a waste handler who generates more than 1000 kilograms per month of listed and/or characteristic hazardous waste, generates more than 1 kilogram of acute hazardous waste per month, or stores more than 6000 kilograms of hazardous waste or 1 kilogram of acutely hazardous waste.
   5. The Owner’s Consultant: The Owner shall provide a third party consultant to provide pre-work assessments, project monitoring assessments for the construction procedures for the work area and surrounding areas and final clearance assessments. The Contractor shall be responsible for the worker protection requirements.

C. Submittals
   1. Before start of work: At the pre-construction meeting, the Contractor shall submit the following to the Owner’s Representative for review:
      a. Copy of State or local license for hazardous waste hauler.
      b. Certificate of at least one on-site supervisor which has satisfactorily completed the OSHA 40 hour Health and Safety course for handling hazardous waste and spills.*

c. Certificates of workers, which have successfully completed the OSHA 40-Hour Health and Safety Course for Hazardous Waste and spills.*
d. List of the employees scheduled to perform this work.
e. Schedule of start and finish times and dates for this work.
f. The name, address and EPA ID No. of the disposal facility where these waste materials are to be received. Include contact person, a copy of the facility permit and telephone number.
g. The facility permit must identify the waste material(s) to be received, and must be accompanied by a statement that the facility has the capacity and authority to accept the waste. Land Disposal Restriction (LDR) forms must also be provided.
h. Material Safety Data Sheet (MSDS) for all materials to be removed.
i. If the Contractor introduces any chemical into the work environment, a MSDS for that chemical must be presented to the Owner's Representative prior to use.
j. Transporter must have notified the EPA and/or other appropriate local government agency in advance of its intentions to transport hazardous materials and, if applicable, receive an identification number. The transporter shall submit a copy of the NYS DEC Part 364 Permit, for review.
k. Health and Safety/Contingency Plan for material handling and emergency procedures.
l. Certification for medical examinations.
m. Respiratory protection program.
n. Project Plan: Provide a description of the methods, procedures and materials to be used in performing the work and handling all hazardous wastes. Also provide a schedule identifying specific work areas and duration. The schedules will be utilized to schedule facility and third party consultant requirements.
o. Waste Sampling Plan: Provide a sampling plan that describes all samples to be taken and the parameters to be analyzed, as well as the laboratory providing the services; or provide another basis for identification of the waste, such as an MSDS.

2. Do not start work until submittals are returned with the Design Professional's (DP's) stamp indicating that the submittal is returned for unrestricted use.

D. Regulatory Requirements

1. All activities related to the work shall be conducted in compliance with all applicable laws, regulations, and requirements which may include, but not be limited to, the United States Environmental Protection Agency (US EPA), United States Department of Transportation (US DOT), Resource Conservation and Recovery Act (RCRA), Toxic Substances Control Act (TSCA), Occupational Safety and Health Administration (OSHA), New York State Department of Environmental Conservation (NYS DEC), New York City Department of Environmental Protection (NYC DEP), and New York City Fire Department.
2. The Contractor is required to secure and maintain all required regulatory permits necessary to perform all aspects of the work.
3. The Contractor shall containerize and store waste in accordance with all applicable regulations. All containers are to be appropriately marked/labeled.
4. Vermiculite insulation is likely to be an asbestos containing material. If your building contains vermiculite, refer to the current EPA regulations/guidelines for remediation available at this website:
http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation

PART 2 PRODUCTS

A. Materials
   1. Drums: Recovery or salvage drums acceptable for disposal of hazardous waste. Prior approval of drums is required. Drums or containers must meet the required OSHA, EPA (40 CFR Parts 260-264 and 300), and DOT Regulations (49 CFR Parts 171-178). Use of damaged containers shall not be allowed.
   2. Labels: As required by the EPA and OSHA for handling, transportation, and disposal of hazardous waste.
   3. Absorbent Material: Clay, soil or any commercially available absorbent used for the purpose of absorbing hazardous or potentially hazardous materials.

PART 3 EXECUTION

A. All waste shall be stored, handled, transported and disposed of in accordance with all federal, state and local guidelines and regulations. The Contractor is to obtain all permits, licenses, etc., which are necessary for the storing, transporting and disposing of hazardous waste. The Contractor shall develop all applicable manifests, Profile Sheets, Land Ban Forms and any other documentation and co-ordinate with the Owner regarding proper signatures. The Contractor may be required to notify the EPA of the hazardous waste activities, and obtain an EPA identification number specifically for the project, if one is not available.

B. The Contractor shall identify and classify the hazardous waste generated through the performance of the work as per the governing regulations, and in accordance with the Waste Sampling Plan submittal from Section 1.1 above. The Contractor shall conduct the required sampling and chemical analysis for handling, storing, transporting and disposing of the hazardous waste.

C. The Contractor is responsible for securing appropriate treatment or disposal for the waste streams at a permitted TSDF, in compliance with all requirements, and for obtaining a copy of the waste manifest as executed by the TSDF. If the manifest is not returned within the required time, the contractor shall notify the Owner and the NYS DEC, and initiate an investigation as required.

D. Transporters shall maintain waste manifest and shipment record forms. All transporters are required to obtain and maintain NYS DEC Part 364 Waste Transporter permit and, if applicable, a NYC Fire Department permit for transporting flammables. The Part 364 Permit shall have the license plate number of the vehicle, the expiration date of the permit, the type of waste the hauler can take and the treatment, storage and disposal (TSD) facility to which the hauler can take the waste. The transporter must also have all applicable, current waste transportation permits for states where proposed disposal facility is located.

E. The Contractor shall supply all required placard and labeling, and shall have an appropriately trained individual to prepare and sign the hazardous waste manifest, as the DOT shipper.

F. The Contractor shall furnish all certified copies of manifests (interim storage and final disposal) within regulatory requirements. Within 180 days from the acceptance of the waste by the disposal facility, the Contractor shall provide the Owner with Certificate of Disposal documents, as a requirement for final payment.

G. Unless directed otherwise, the Contractor shall file the annual report and fee report if applicable for the hazardous waste shipped, and provide closure notification to EPA and DEC upon completion of the work.

*HAZWOPER Training is not required if the waste is PCB Bulk waste alone, but OSHA HAZCOM and TSCA training are still required

END OF SECTION

SECTION 024221 - DEMOLITION

PART 1 – GENERAL

1.01 SUMMARY

A. This Section includes demolition and removal of the following:
   1. Buildings and structures.
   2. Site improvements including site utilities.
   3. Provide erosion protection for all disturbed areas as described in this Section.

B. Scope:
   1. The site work includes all labor material and equipment required for site excavation, vegetation removal, grading, and soil preparation as shown on the drawings and/or specified herein.
   2. Excavation and grading the site to sub-grade of paved or unpaved areas as shown on the drawings and/or specified herein.
   3. Excavation for footings, retaining walls, slabs, walks, curbs, and other structures.
   4. Excavation of trenches for the location of storm or footing drain tile.
   5. Installation of back-fill, base-course material, drain tile and catch basin.
   6. Stripping, storage and re-use of topsoil.
   7. Preparation of site to receive fill, topsoil or base course.
   8. Relocation and reuse of acceptable excavated material.
      a. Removal from the site of all debris and unsuitable material.
      b. Also included are:
         1) Concrete flatwork slabs and walks
         2) Bituminous flatwork driveways and walks
         3) Waterproofing
         4) Landscaping
         5) Fencing - metal and wood
         6) Railings
   9. CONTRACTOR shall provide erosion control as directed by Design Professional (DP) for all other disturbed areas damaged by CONTRACTOR's performance of the Work. DP may direct CONTRACTOR to apply sod as a corrective measure to repair property damage as an erosion control repair method.

   10. CONTRACTOR shall divert construction and demolition debris from disposal in landfills and/or incinerators, to redirect recyclable recovered resources back to the manufacturing process. Create and implement a construction waste management plan, to be reviewed by the DP. Consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation. Segregate recyclable materials and track recycled efforts throughout the construction process.

1.02 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.

B. Remove and Salvage: Detach items from existing construction and deliver them to Owner ready for reuse.

C. 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 recycled.

1.03 MATERIALS OWNERSHIP

A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered during building demolition remain Owner's property. Carefully remove and salvage each item or object in a manner to prevent damage and deliver promptly to Owner.

B. Salvaged Items for Sale and Donation is not permitted on the Project site.

1.04 SUBMITTALS

A. Qualification Data: For the following:
   1. Demolition firm.
   2. Professional engineer.
   3. Refrigerant recovery technician.

B. Schedule of Building Demolition Activities: Indicate detailed sequence of demolition and removal work, with starting and ending dates for each activity, interruption of utility services, and locations of temporary protection and means of egress.

C. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

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

1.05 QUALITY ASSURANCE

A. Demolition Firm Qualifications: An experienced firm that has specialized in demolition work similar in material and extent to that indicated for this Project.

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

C. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

D. Standards: Comply with ANSI A10.6 and NFPA 241.

E. Pre-demolition Conference: Conduct conference at Project site.

1.06 PROJECT CONDITIONS

A. Buildings and sections of buildings to be demolished will be vacated and their use discontinued before start of Work.

B. Owner assumes no responsibility for buildings and structures to be demolished.
   1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
   2. Before building demolition, give Owner the opportunity to remove items.

C. Hazardous Materials: Hazardous materials may be present in buildings and structures to be demolished. Reports on the presence of hazardous materials are included in the Contract Documents and/or on file for review and use. Examine reports to become aware of locations where hazardous materials are present.
   1. Lead-based paint risk assessments have been conducted on those homes considered to be at risk for lead-based paint and the scopes produced in the Work Write-Ups will include the items identified. Both the risk assessments and Work Write-Ups are included in the Contract Documents.
      a. In circumstances where lead-based paint was detected, a mitigation plan has been recommended and included as a proposal item under the contract.
      b. The Contractor shall acknowledge that he is aware of and will maintain strict compliance with all regulations, codes, standards, and ordinances governing the performance of his work. Furthermore, the Contractor shall be responsible for any failure to comply with applicable regulations.
      c. Applicable regulations include but are not limited to the following:
         1) OSHA Lead Regulations, Lead Exposure in Construction (CFR Title 29, Part 1926.62).
         2) OSHA 29 CFR 1910.1025, Lead, General Industry;
         3) OSHA 29 CFR 1910.1200, Hazard Communication;
         4) OSHA 29 CFR 1910.134, Respiratory Protection;
         5) OSHA 29 CFR 1910.145, Specifications for Accident Prevention Signs and Tags;
         6) OSHA 29 CFR 1926.59, Hazard Communication;
         7) National Ambient Air Quality Standard for Lead (CFR Title 40, Part 50, Appendix G).

8) U.S. Environmental Protection Agency, Hazardous Waste Regulations (CFR Title 40, Parts 260 - 268).
9) US HUD, Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing (HUD-1539-LBP, Second Edition, July, 2012 and 24 CFR Part 35);
10) Lead-Based Paint Hazard Elimination; Interim Rule Title 24, Part 35, 905, 941, 965, and 968 of the Code of Federal Regulations;
11) All local ordinances, regulations, or rules pertaining to lead, including its storage, transportation and disposal.
12) Standard Practice for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings, ASTM E 1465-08a.
13) Standard Practice for Installing Radon Mitigation Systems in Existing Low-Rise Residential Buildings, ASTM E2121-09.
14) New York State Industrial Code Rule 56.
15) EPA Renovation, Repair and Painting Rule (40 CFR, Part 745).
16) NYC Department of Health and Mental Hygiene "Guidelines on Assessment and Remediation of Fungi in Indoor Environments," November, 2008.
17) US Department of Housing and Urban Development "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing," Second Edition, July, 2012.
18) NYCRR Title X Part 67-2 – NYS Regulations for Lead Poisoning Prevention and Control

d. The particular Specifications are identified by appropriate prefix and number only, with the latest revision being applicable. Where conflict among requirements or with these specifications exists, the more strict or stringent requirement or interpretation shall apply.

2. If materials, other than those identified in the reports referenced above, suspected of containing hazardous materials are encountered, do not disturb; immediately notify DP.
3. For removal of asbestos containing materials see specification section 028200.

D. Storage or sale of removed items or materials on-site is not permitted.

1.07 COORDINATION

A. Arrange demolition schedule so as not to interfere with Owner's use of the property.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Satisfactory Soils: Shall be free of debris and other detrimental material. Fill shall be compacted to a density that will avoid damaging settlement. Fill shall be placed when ground is frost free and weather is favorable.

B. Back Fill: "Marine" Clay is not to be used as back fill for foundation, retaining walls, or compacted fill under slabs, walls or driveways. Back Fill material used following demolition shall be a 50/50 mixture of clay and sand, opposed to all clay. Dirt excavated must be removed with new soil brought in its place. Back Fill material shall be compacted with 6-inch lifts to 95% standard proctor density.

C. Topsoil: Shall be free of debris, rock or gravel. Shall consist of a sandy loam containing 2 to 2.5% organic matter. Furnish and place topsoil 4-inches thick over area to be sodded or seeded if called for in the work write up. Spread evenly to true contours and hand rake to an even, smooth surface, ready for sodding.

2.02 SOD

A. Contractors must utilize sod in native species to this area that is drought tolerant, e.g. Jubilee Tall Fescue, Cochise III Tall Fescue, Amazing Perennial Ryegrass, Baron Kentucky Bluegrass, or others. Because of the chemical content in the soil, seed will not be a suitable mitigation alternative as it cannot thrive under those conditions.

B. Approved Sod shall be either field grown grass or nursery grown grass delivered in rolls or slabs. Sod shall be free from noxious weeds or other vegetation.

2.03 DAMPROOFING MATERIALS

A. Manufacturers Approved
1. Anti-Hydro Waterproofing Co.
2. Celotex Corp.
3. Chem Master Corp.
4. Euclid Chemical Co.
5. Flintkote Co.
6. Grace & Co.
7. Karnak Chemical Corp.
8. Koppers Co., Inc.
9. Meadows, Inc.
10. Sika Chemical Corp.
11. Sonneborn/Contech
12. Weatherguard Products Corp.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Survey existing conditions and correlate with requirements indicated to determine extent of building demolition required.

B. Inventory and record the condition of items to be removed and salvaged.

C. When unanticipated mechanical, electrical, or structural elements are encountered, investigate and measure the nature and extent of the element. Promptly submit a written report to DP.

D. Engage a professional engineer to perform an engineering survey of 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 building demolition operations.

E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.

3.02 PREPARATION

A. Refrigerant: Remove and store refrigerant according to 40 CFR 82 and regulations of authorities having jurisdiction.

B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings or sections of buildings to be demolished.
1. Arrange to shut off indicated utilities with utility companies.
2. If utility services are required to be removed, relocated, or abandoned, before proceeding with building demolition provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
3. Cut off pipe or conduit a minimum of 24-inches (610-mm) below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.

C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

D. Removed and Salvaged Items: Comply with the following:
1. Clean salvaged items of dirt and demolition debris.
2. Pack or crate items after cleaning. Identify contents of containers.
3. Store items in secure area until delivery to Owner.
4. Transport items to Owner's storage area indicated on Drawings.
5. Protect items from damage during transport and storage.

3.03 PROTECTION

A. Existing Facilities: Protect adjacent walkways, and remaining building elements, if any.

B. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during demolition. When permitted by DP, items may be removed to a suitable, protected storage location during demolition, and cleaned and reinstalled in their original locations after demolition operations are complete.

C. Existing Utilities: Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations. Maintain utility services indicated to remain and protect them against damage during demolition operations.
   1. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
   2. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. If contractor damages existing utility lines during the course and/or scope of work, the contractor shall repair such utility lines at the contractors own expense to the satisfaction of the utility company and authorities having jurisdiction.
   3. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and to authorities having jurisdiction.

D. Temporary Protection:
   1. Protect existing site improvements, appurtenances, and landscaping to remain.
   2. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   3. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.

E. Exits:
   1. Required means of egress shall be maintained at all times during construction, demolition, remodeling or alterations and additions to any building in compliance with Building Code of New York State.
   2. Horizontal exit shall not be destroyed until a substitute means of egress has been provided and approved.

3.04 DEMOLITION, GENERAL

A. Extent of demolition identified in work order. Demolition and partial demolition of items to be removed or replaced shall be done in a safe and orderly manner without damage to other portions of the property or adjacent properties. Any resulting damage or loss shall be corrected at the expense of the contractor. Complete demolition shall include building, foundation, and paving in its entirety unless otherwise in Work Order.

B. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Do not use cutting torches until work area is cleared of flammable materials. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
   2. Maintain adequate ventilation when using cutting torches.
   3. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

C. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner or building manager and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
   2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

3.05 MECHANICAL DEMOLITION

A. Remove indicated buildings, structures, and site improvements intact when permitted by authorities having jurisdiction. Contractor shall remove and haul away the structure indicated. Contractor shall be responsible for the safe removal of all utilities (gas, water, sewer and electric). If structure is attached to an existing structure that is not to be removed, utilities shall be discontinued for the demolished section only. All parts and debris from the demolition shall be removed from the site within 72 hours from commencement of work unless otherwise written into the contract.

B. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on next lower level.
   1. Remove structural framing members and lower to ground by method suitable to minimize ground impact or dust generation.

C. Vegetation and Tree/Brush Removal:
   1. Contractor shall remove the following vegetation from the site:
      a. Remove all trees or vegetation described or marked in RED on site;
      b. All vegetation shall be cut a minimum of 4-inch below ground surface;
      c. A fill shall be installed into the cleared area, and properly compacted and graded;
      d. Fill material shall be a local loam and placed properly on location and compacted to avoid erosion;
      e. Color of fill shall blend with location;
      f. No clay or debris in fill will be accepted;
      g. Final work will result in proper area drainage.

D. Concrete: Cut concrete full depth at junctures with construction indicated to remain, using power-driven saw, then remove concrete between saw cuts.
   1. Patching Concrete:
      a. Mix and apply bonding agent to prepared concrete areas in accordance with manufacturer's printed instructions.

b. Mix concrete mortar for patches, using Portland cement, sand and water in proper proportions for a workable mix.

c. The amount of mixing water shall be as little as is consistent with the requirements for handling and placing. Retemper mortar without the addition of water.

d. Thoroughly compact mortar into place and screed off to leave patches slightly higher than surrounding surfaces.

e. Leave patch undisturbed for a period of 1 to 2 hours to permit initial shrinkage before finally finishing. Finish patches in such a manner to match adjoining surfaces.

f. When repairing concrete all patches shall be mechanically cut, doweled and re-poured. Depth, width and height for new reinforced concrete retaining wall; install a 2-inch sand cushion and No. 3 and No. 4 steel rebar tied in an "H" pattern the full length of the beam; pour a premixed concrete into forms; temperature must be a minimum of 40 degrees F and rising; rough finish all surfaces. Remove all debris and excess materials.

E. Masonry: Cut masonry at junctures with construction indicated to remain, using power-driven saw, then remove masonry between saw cuts.

F. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished at junctures with construction indicated to remain, then break up and remove.

G. Structural Steel: Dismantle field connections without bending or damaging steel members. If using flame-cutting torches, obtain approval and coordinate operations with DP.

1. Transport steel trusses and joists as whole units without dismantling them further.

H. Carpet and Pad: Remove in large pieces and roll tightly after removing demolition debris, trash, adhesive, and tack strips.

I. Building Components: Remove the following components, as whole units, intact and undamaged:

1. Doors.
2. Windows.
3. Door hardware.
4. Cabinets.
5. Mirrors.
6. Plumbing fixtures.
7. Light fixtures.

J. Equipment: Disconnect equipment at nearest fitting connection to services, complete with service valves. Remove as whole units, complete with controls.

K. Existing Utilities: Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.

3.06 EARTHWORK

A. Excavation:

1. Clearing, grubbing, clean-up of vegetation, and tree trimming and/or removal is to be done where excavation and grading are required
2. Excavate to elevations and dimensions indicated, plus sufficient space to permit erection of forms, shoring, drain tile, waterproofing, masonry and the inspection of foundations. Control the grading around buildings so that ground is pitched to prevent water from running into the excavated areas of buildings or damaging other structures. Furnish all pumping required to keep excavated spaces clear of water during construction. Water shall not be conducted onto an adjacent property. All property shall be protected with straw bales or earth berms, per applicable soil erosion standards, to prevent dirt runoff.
3. Excavations shall be properly shored and braced to assure against any danger to life and/or property. Drainage to be provided by contractor as necessary.
4. Except where rock is encountered, care shall be taken not to excavate below the depths indicated. Where rock excavation is required, the rock shall be removed and the over depth filled with certified compacted backfill. Unauthorized over depths in excavation shall be backfilled with concrete or certified compacted fill to correct elevation or bear cost of a deeper wall. Whenever wet or otherwise unstable soil is encountered, such soil shall be removed to the depth and extent directed, and the trench backfilled to the proper grade with concrete or certified compacted fill at the Contractor's expense.
5. Excavations for footings shall be in neat and accurately cut trenches. Contractor is to backfill upon completion of foundation work. Footing excavations for single-story dwellings, are to be a minimum of 12-inch into undisturbed soil and 12-inch wide; for two story dwellings a minimum of 15-inch wide and 12-inch into undisturbed soil, footings are to be 20-inch in depth.
    a. In no case shall the load per square foot, under any portion of any footing, due to the combined dead load, live load, wind, and/or any other loads exceed the safe bearing capacity of the soil upon which the footing rests.
6. Water shall not be permitted to accumulate in excavated or crawl space areas. Drain by standard accepted method to a storm sewer or natural drainage area.

B. Backfill:

1. Backfill all areas with clean, dry soil free from wood, root matt, or other debris. Only approved granular materials shall be used for backfill. Soil should be carefully placed by a machine located perpendicular to the wall being backfilled. It shall be brought to a suitable elevation above finished grade and properly compacted in order to prevent lateral displacements of soil.
2. Care is to be taken not to fracture the wall by having heavy equipment located too near to the structure.

3. Backfill is to be compacted to prevent excess settling. No backfill shall be placed until the construction adjacent thereto, or the utility to be backfilled, has been inspected, tested and approved.
4. Use only earth materials, free from perceptible amounts of debris, wood, or topsoil. It shall be free of frost at the time of placement, and shall not contain marl or other elements which tend to keep it in a plastic state. Rock of proportional size may be included in the backfill when so distributed as to permit proper compaction without creating voids. Rock shall not be placed closer than twelve (12-inch) inches to a wall or utility.

3.07 EROSION CONTROL

A. The CONTRACTOR shall manage surface water runoff for compliance with the STATE and any and all applicable federal, state, and local requirements.

B. The CONTRACTOR shall limit the area disturbed by the contract activities to maximum extent practicable. Contractors will be required to replace grassy areas disturbed by their work to match the existing turf condition using sod and not seed. The CONTRACTOR is required to install erosion control measures at sites to ensure no erodible waste enter the roadways or drainage systems when necessary.

C. The CONTRACTOR shall be required to:
1. Install sediment controls prior to beginning construction activities.
2. Install sedimentation controls prior to beginning construction activities.
3. Schedule land stabilization activities, such as landscaping, immediately after land has had final contouring.

D. Areas to receive sod shall be uniformly graded and cleared of weeds, grass, stones, and other debris. Sod shall be transferred onto the surface soil. Sod shall be placed with no space between edges. Slab and roll edges shall be staggered to avoid a continuous seam along the line of flow. Slab edges which do not fit closely shall be pulled together by hand without stretching or tearing and pegged when necessary.

3.08 SITE RESTORATION

A. Below-Grade Areas: Rough grade below-grade areas ready for further excavation or new construction.

B. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

C. Grading for Drainage: Slope all ground away from structure a minimum grade of 6-inches in 10-feet for the first 20-feet. Water must always be directed away from the structure. Use swails or earth berms to direct water flow from grades and to aid in positive drainage.

D. Landscaping:

1. Seeding: Prepare the area to be seeded by removing all debris, grading, spreading topsoil if required and hand raking. Sow lawn grass seed, working seed into soil by raking and watering. Cover seeded area with straw. All areas disturbed during the course of construction or as indicated in the work write-up or drawings shall be seeded. Contractor shall guarantee a 3" stand of grass. Grass with less than 80% coverage in any 12” x 12” area will not be accepted.
2. Sodding: Sod areas indicated:
   a. Sod: Sod shall be as specified above and shall be a minimum 1" thick, reasonably free of weeds and crab grass; approved by the State before laying; laid with tight joints. After laying thoroughly, water and tamp or roll until bonded to topsoil.
   b. Slopes one (1) foot rise in two (2) feet or steeper: carefully pegged to hold sod until roots spread and firmly grip soil beneath.
   c. Guarantee: Sodded areas which do not show a prompt catch shall be re-sodded at no expense to the Owner.

3.09 REPAIRS

A. General: Promptly repair damage to adjacent construction caused by building demolition operations.

B. Where repairs to existing surfaces are required, patch to produce surfaces suitable for new materials.

C. Restore exposed finishes of patched areas and extend restoration into adjoining construction in a manner that eliminates evidence of patching and refinishing.

3.10 PEST CONTROL

A. General: Pest Control shall be performed by a licensed professional pest control operator using termiticides which bear a federal registration number of the U.S. Environmental Protection Agency. Termiticides used may be Chloropyrifos (“Dursban TC”) or Permathrin (“Dragnet”, Torpedo”) or approved equal. Pest control applicator of the above shall furnish to the owner a Certificate of Warranty for each building, certifying that the applied soil termiticide treatment will prevent infestation of subterranean termites for a period of (5) five years.

1. Termite Extermination: Contractor shall treat the structure for termites and provide termite certificate to Head Inspector (H-I) prior to final payment.
2. Rodent Extermination: Contractor shall treat the structure for rodents and provide treatment certificate to H-I prior to final payments.
3. Cockroach Extermination: Contractor shall treat the structure for cockroaches and provide treatment certificates H-I prior to final payments.

3.11 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 in an EPA-approved landfill.
   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.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.12 CLEANING

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

END OF SECTION

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SECTION 028200 - ASBESTOS REMOVAL (MINOR)

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This asbestos abatement Project will consist of the removal and disposal of asbestos containing materials (ACM) and presumed asbestos containing materials (PACM) as contained in the Hazardous Materials Report.

B. The work shall include but not be limited to the removal as contained in the Hazardous Materials Report. As the amount of asbestos containing material to be disturbed is less than 10 square feet or 25 lineal feet, it is considered a minor project.

C. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.

D. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.

E. Vermiculite insulation is likely to be an asbestos containing material. If your building contains vermiculite, refer to the current EPA regulations/guidelines for remediation available at this website:
http://www2.epa.gov/asbestos/protect-your-family-asbestos-contaminated-vermiculite-insulation

1.02 PERMITS AND COMPLIANCE

A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work. Regulations for the training of workers shall be as prescribed in 10 NYCRR Part 73.

B. Perform asbestos related Work in accordance with New York State Industrial Code Rule 56 (herein referred to as Code Rule 56), 40 CFR 61, and 29 CFR 1926. Where more stringent requirements are specified, adhere to the more stringent requirements.

C. The Contractor must maintain current licenses pursuant to New York State Department of Labor and Department of Environmental Conservation for all Work related to this Project, including the removal, handling, transport, and disposal of asbestos containing materials. Waste transportation permits shall be in compliance with 6 NYCRR Part 364.

D. The Contractor must have and submit proof upon request that any persons employed by the Contractor to engage in or supervise Work on any asbestos Project have a valid NYS asbestos handling certificate pursuant to Code Rule 56.

1.03 SUBMITTALS

A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below, with 1 copy going directly to the Design Professional (DP) for review and approval prior to the commencement of asbestos abatement activities:

1. Contractor license issued by New York State Department of Labor.
2. Building Occupant Notification: As required by regulatory agencies.
3. Abatement Work Plan: Provide plans that clearly indicate the following:
    a. All Work Areas/containments numbered sequentially.
    b. Locations and types of all decontamination enclosures.
    c. Type of abatement activity/technique for each Work Area/containment.
4. Disposal Site/Landfill Permit from applicable regulatory agency.
5. NYS Department of Environmental Conservation Waste Transporter Permit.

B. Project Close-out Submittals: Within 30 days of the completion of each abatement phase, the Contractor shall submit 4 copies of the documents listed below. One set of the documents shall be transmitted to the Owner , one set to the DP for review and approval and one set to the Head Inspector (H-I) prior to the Contractor's final payment.
1. All waste disposal manifests and disposal logs.
2. OSHA compliance air monitoring records conducted during the Work.
3. Daily progress log, including the entry/exit log.
4. Provide the Contractor's Acknowledgement Statement that lists all Workers used in the performance of the Project, including name and NYS DOL certification number.

PART 2 EXECUTION

2.01 GENERAL REQUIREMENTS

A. Should visible emissions or water leaks be observed outside the Work Area, immediately stop Work and institute emergency procedures per Code Rule 56. Should there be elevated fiber levels outside the Work Area, immediately stop Work, institute emergency procedures per Code Rule 56, and notify all employers and occupants in adjacent areas. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.

B. NYS DOL Asbestos Handler certification cards shall be on site prior to admittance of any Contractor's employees to the asbestos Work Area.

C. Asbestos danger signs shall be posted at all approaches to the asbestos Work Area. Provide all non-Work Area stairs and corridors accessible to the asbestos Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.

2.02 TENT ENCLOSURES

A. The tent shall be a single use barrier constructed with a rigid frame and constructed of at least one layer of six mil polyethylene and shall include walls, ceilings and a floor. All seams shall be sealed airtight using duct tape and/or spray adhesive.

B. The tent shall be constructed with at least one airlock for worker/waste egress.

C. A manometer shall be used for all OSHA Class I abatement.

D. Negative air shall be maintained at four (4) air changes per hour for non-friable and glovebag abatement tent enclosure work areas. Eight (8) air changes shall be maintained for friable gross removal tent enclosure work areas. A HEPA vacuum may be used to maintain the required air changes.

E. OSHA compliance air monitoring is required.

F. Waste material shall be placed in properly labeled 6 mil plastic bags or other appropriate containers. The outside of the bags or containers shall be wet wiped and/or HEPA vacuumed and shall then be placed in a second bag/container before being transported to the waste storage container. All transportation of waste bags and containers outside the Work Area shall be in watertight carts. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.

G. Following completion of gross abatement and after all accumulations of asbestos waste materials have been containerized, the following decontamination procedures shall be followed.
   1. All bagged asbestos waste and unnecessary equipment shall be decontaminated and removed from the Work Area.
   2. All surfaces in the Work Area shall be wet cleaned. A wet-purpose shop vacuum may be used to pick up excess liquid, and shall be decontaminated prior to removal from the Work Area.
   3. The Asbestos Project Monitor shall conduct a visual inspection of the Work Area for cleanliness and completion of abatement.
   4. After the waiting/settling/drying time requirements have elapsed, aggressive final clearance air sampling shall then be conducted by the Environmental Consultant.
   5. Upon receipt of satisfactory final clearance air sampling results, the tent shall be collapsed into itself, placed in suitable waste disposal bags, and transported to the waste decontamination enclosure. Isolation and critical barriers shall then be removed.

2.03 GLOVEBAG REMOVAL

A. Glovebag removals are only permitted to be conducted within tent enclosures complying with these specifications.

B. Glovebag removals shall utilize commercially available glovebags of at least six mil thickness. Use shall be in accordance with the manufacturer's instructions and the following minimum requirements:
   1. The sides of the glovebag shall be cut to fit the size pipe being removed. Tools shall be inserted into the attached tool pocket.
   2. The glovebag shall be placed around the pipe and the open edges shall be folded and sealed with staples and duct tape. The glovebag shall also be sealed at the pipe to form a tight seal.
   3. Openings shall be made in the glovebag for the wetting tube and HEPA vacuum hose. The opening shall be sealed to form a tight seal.
   4. After first wetting the materials to be removed, removal may commence. ACM shall be continuously wetted. After removal of the ACM, the piping shall be scrubbed or brushed so that no visible ACM remains. Open ends of pipe insulation shall be encapsulated.
   5. After the piping is cleaned, the inside of the glovebag shall be washed down and the wetting tube removed. Using the HEPA vacuum, the glovebag shall be collapsed and then twisted and sealed with tape with the ACM at the bottom of the bag.
   6. A disposal bag shall be placed around the glovebag that is then detached from the pipe. The disposal bag is then sealed and transported to the decontamination enclosure.

PART 3 DISPOSAL OF ASBESTOS WASTE

3.01 OWNER'S AND HAULER'S ASBESTOS WASTE MANIFESTS

A. An Asbestos Waste Manifest shall be provided by the Owner and shall be utilized in conjunction with the Asbestos Hauler's Manifest.

B. The Owner's Manifest and the Hauler's Manifest shall be completed by the Contractor and verified by the Environmental Consultant that all the information and amounts are accurate and the proper signatures are in place.

C. The Manifests shall have the appropriate signatures of the Environmental Consultant, the Contractor, and the Hauler representatives prior to any waste being removed from the site.

D. Copies of the completed Owner's Manifest and the Hauler's Manifest shall be retained by the Environmental Consultant and the Contractor and shall remain on site for inspection.

E. Upon arrival at the Disposal Site, the Owner's Manifest and the Hauler's Manifest shall be signed by the Disposal Facility operator to certify receipt of ACM covered by the manifest.

F. The Disposal Facility operator shall return the original Owner's Manifest and the Hauler's Manifest to the Contractor.

G. The Contractor shall forward copies of the Owner's Manifest and the Hauler's Manifest to the Environmental Consultant within 14 days of the waste container being removed from the site. Failure to do so may result in payment being withheld from the Contractor.

END OF SECTION

SECTION 028400 - NON-LIQUID PCB MATERIAL REMOVAL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This demolition, renovation or abatement Project will include the removal and disposal of non-liquid PCB materials (herein referred to as PCB materials) as identified in Hazardous Materials Report.

B. The work shall include but not be limited to the removal as identified in Hazardous Materials Report.

C. The Contractor shall be aware of all conditions of the Project and is responsible for verifying quantities and locations of all Work to be performed. Failure to do so shall not relieve the Contractor of its obligation to furnish all labor and materials necessary to perform the Work.

D. All Work shall be performed in strict accordance with the Project Documents and all governing codes, rules, and regulations. Where conflicts occur between the Project Documents and applicable codes, rules, and regulations, the more stringent shall apply.

E. Working hours shall be as required and approved by the Owner. PCB material removal activities including, but not limited to, work area preparation, gross removal activities, cleaning activities, waste removal, etc. may need to be performed during 'off-hours' (including nights and weekends). In addition, multiple mobilizations may be required to perform the work identified in this project. The Contractor shall coordinate and schedule all Work with the facility and Owner's representative.

1.02 SPECIAL JOB CONDITIONS

A. Any special job conditions are described below.

1.03 PERMITS AND COMPLIANCE

A. The Contractor shall assume full responsibility and liability for compliance with all applicable Federal, State, and local laws, rules, and regulations pertaining to Work practices, protection of Workers, authorized visitors to the site, persons, and property adjacent to the Work.

B. Perform PCB related Work in accordance with DEC Hazardous Waste Regulations (6 NYCRR 370-374, i.e. Hazardous Waste Rules), 40 CFR 761, and 29 CFR 1926, as specified herein. Where more stringent requirements are specified, adhere to the more stringent requirements.

C. The Contractor must maintain current licenses or registrations pursuant to DEC and EPA regulations for all Work related to this Project, including the removal, handling, transport, and disposal of hazardous and industrial waste.

D. The Contractor shall be prepared to obtain an EPA ID number if so directed by the Design Professional (DP).

E. Failure to adhere to the Project Documents shall constitute a breach of the Contract and the Owner shall have the right to and may terminate the Contract provided, however, the failure of the Owner to so terminate shall not relieve the Contractor from future compliance.

1.04 SUBMITTALS

A. Pre-Work Submittals: Within 7 days prior to the pre-construction conference, the Contractor shall submit 3 copies of the documents listed below, with 1 copy going directly to the DP for review and approval prior to the commencement of PCB abatement activities:
   1. Progress Schedule:
      a. Show the complete sequence of abatement activities and the sequencing of Work within each building or building section.
      b. Show the dates for the beginning and completion of each major element of Work including substantial completion dates for each Work Area, building, or phase.
   2. Abatement Work Plan: Provide plans that clearly indicate the following:
      a. All Work Areas/containments numbered sequentially.
      b. Entrances and exits to the Work Areas/containments.
      c. Type of abatement activity/technique for each Work Area/containment.
      d. Proposed location and construction of storage facilities and field office.
   3. Disposal Site/Landfill Permit from applicable regulatory agency.
   4. Letter identifying the presence of PCB bulk product waste, with Acknowledgement by the landfill. See section 4.01.A
   5. NYS Department of Environmental Conservation Waste Transporter Permit.

B. On-Site Submittals: Refer to Part 3.01.B for all submittals, documentation, and postings required to be maintained on-site during abatement activities.

C. Project Close-out Submittals: Within 30 days after project completion, the Contractor shall submit 4 copies of the documents listed below. One set of the documents shall be forwarded to the Owner and 1 set to the DP and Head Inspector (H-I) for review and approval prior to the Contractor's final payment.
   1. **Originals** of all waste disposal manifests and disposal logs.
   2. Daily progress log.
   3. A list of all Workers used in the performance of the Project, including name and last 4 digits of social security number.
   4. Disposal Site/Landfill Permit from applicable regulatory agency.
   5. Copy of PCB notification with acknowledgement from the disposal facility/landfill, if applicable.

1.05 PRE-CONSTRUCTION CONFERENCE

A. Prior to start of preparatory Work under this Contract, the Contractor shall attend a pre-construction conference attended by Owner, Facility Personnel, and Environmental Consultant.

B. Agenda for this conference shall include but not necessarily be limited to:
   1. Contractor's scope of Work, Work plan, and schedule to include number of workers and shifts.
   2. Contractor's safety and health precautions including protective clothing and equipment and decontamination procedures.
   3. Environmental Consultant's duties, functions, and authority.

4. Contractor's Work procedures including:
   a. Methods of job site preparation and removal methods.
   b. Disposal procedures.
   c. Cleanup procedures.
   d. Fire exits and emergency procedures.
5. Contractor’s required pre-work and on-site submittals, documentation, and postings.
6. Contractor's plan for twenty-four (24) hour Project security both for prevention of theft and for barring entry of unauthorized personnel into Work Areas.
7. Temporary utilities.
8. Handling of furniture and other moveable objects.
9. Storage of removed PCB materials.
10. Waste disposal requirements and procedures.

C. In conjunction with the conference the Contractor shall accompany the Owner and Environmental Consultant on a pre-construction walk-through documenting existing condition of finishes and furnishings, reviewing overall Work plan, location of fire exits, fire protection equipment, water supply and temporary electric tie-in.

1.06 APPLICABLE STANDARDS AND REGULATIONS

A. The Contractor shall comply with the following codes and standards, except where more stringent requirements are shown or specified:

B. Federal Regulations:
1. 29 CFR 1910.1200, "Hazard Communication" (OSHA)
2. 29 CFR 1910.134, "Respiratory Protection" (OSHA)
3. 29 CFR 1910.145, "Specification for Accident Prevention Signs and Tags" (OSHA)
4. 29 CFR 1926, "Construction Industry" (OSHA)
5. 29 CFR 1926.500 "Guardrails, Handrails and Covers" (OSHA)
6. 40 CFR 761, “PART 761—POLYCHLORINATED BIPHENYLS (PCBs)” (EPA)
7. 49 CFR 171-173, Transportation Standards (DOT)

C. New York State Regulations:
1. 6 NYCRR, Parts 360, 364, Disposal and Transportation (DEC)
2. 6 NYCRR, Parts 370-373, “Hazardous Waste Management System”

D. Standards and Guidance Documents:
1. American National Standard Institute (ANSI) Z88.2-80, Practices for Respiratory Protection

1.07 PROJECT MONITORING

A. The Owner shall engage the services of an Environmental Consultant (the Consultant) who shall serve as the Owner's Representative in regard to the performance of the PCB abatement Project and provide direction as required throughout the entire abatement Project period.

B. The Contractor is required to ensure cooperation of its personnel with the Consultant for the sampling and Project monitoring functions described in this section. The Contractor shall comply with all direction given by the Consultant during the course of the Project.

C. The Consultant shall provide the following administrative services:

1. Review and approve or disapprove all submittals, shop drawings, schedules, and samples.
2. Assure that all notifications to governmental agencies or landfills by the Contractor are submitted in a timely manner and are correct in content.
3. Review and approve the Contractor's compliance testing laboratory.

D. The Consultant shall staff the Project with a trained and certified person(s) to act on the Owner's behalf at the job site. This individual shall be designated as the Abatement Project Monitor (APM).
   1. The APM shall be on-site at all times the Contractor is on-site. The Contractor shall not be permitted to conduct any Work unless the APM is on-site (except for inspection and planning purposes during non-working days).
   2. The APM shall have the authority to direct the actions of the Contractor verbally and in writing to ensure compliance with the Project documents and all regulations. The APM shall have the authority to Stop Work when gross Work practice deficiencies or unsafe practices are observed.
      a. Such Stop Work order shall be effective immediately and remain in effect until corrective measures have been taken and the situation has been corrected.
      b. Standby time required to resolve the situation shall be at the Contractor's expense.
   3. The APM shall provide the following services:
      a. Inspection of the Contractor's Work, practices, and procedures, including temporary protection requirements, for compliance with all regulations and Project specifications.
      b. Monitor the progress of the Contractor's Work, and report any deviations from the schedule to the Owner.
      c. Monitor, verify, and document all waste load-out operations.
      d. The APM shall maintain a log on site that documents all project related and Consultant and Contractor actions, activities, and occurrences.
      e. The APM shall take air, swipe, wipe, or bulk samples upon the Owner’s request.
   4. The following inspections shall be conducted by the APM. Additional inspections shall be conducted as required by Project conditions. Progression from one phase of Work to the next by the Contractor is only permitted with the written approval of the APM.
      a. Pre-Construction Inspection: The purpose of this inspection is to verify the existing conditions of the Work Areas and to document these conditions.
      b. Pre-Commencement Inspection: This inspection shall take place only after the Work Area is fully prepped for removal.
      c. Work Inspections: The purpose of this inspection is to monitor the Work practices and procedures employed on the Project and to monitor the continued integrity of the containment system. Inspections within the removal areas shall be conducted by the APM during all preparation, removal, and cleaning activities at least twice every Work shift. Additional inspections shall be conducted as warranted.
      d. Visual Clearance Inspection: The purpose of this inspection is to verify that: all materials in the scope of work have been properly removed; no visible PCB material debris/residue remains.
      e. Punch List Inspection: The purpose of this inspection is to verify the Contractor's certification that all Work has been completed as contracted and the existing condition of the area prior to its release to the Owner.
   5. The Owner may, at his discretion, choose to conduct air sampling. If air samples collected during abatement indicate any airborne PCB concentration(s) above the OSHA PEL of 0.5 mg/m3 or EPA recommended thresholds, work shall be stopped

immediately and Work methods shall be altered to reduce the airborne PCB concentration(s).

1.08 PROJECT SUPERVISOR

A. The Contractor shall designate a full-time Project Supervisor who shall meet the following qualifications:
   1. The Project Supervisor shall be trained in PCB removal and hazardous waste management in NYS, via a 40-hour HAZWOPER/Supervisor training course.
   2. The Project Supervisor shall have a minimum of one year experience as a supervisor.
   3. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.

B. If the Project Supervisor is not on-site at any time whatsoever, all Work shall be stopped. The Project Supervisor shall remain on-site until the Project is complete. The Project Supervisor cannot be removed from the Project without the written consent of the Owner and the Environmental Consultant. The Project Supervisor shall be removed from the Project if so requested by the Owner.

C. The Project Supervisor shall maintain a bound Daily Project Log that includes the Waste Disposal Log required by section 4.03 of the specifications.

D. The Project Supervisor shall be responsible for the performance of the Work and shall represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the APM.

1.09 TRAINING

A. As required by applicable regulations, prior to assignment to PCB Work instruct each employee with regard to the hazards of PCB, safety and health precautions, and the use and requirements of protective clothing and equipment.

B. Employees managing Hazardous Waste as described in Section 3.03 must also meet the Personnel training requirements in section 6 NYCRR 373-3.2.

1.10 RESPIRATORY PROTECTION

A. Establish a respirator program as required by ANSI Z88.2 and 29 CFR 1910.134. Provide respirator training.

B. Select respirators from those approved by the Mine Safety and Health Administration (MSHA), and the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services. High Efficiency Particulate Air (HEPA) respirator filters shall be approved by NIOSH and shall conform to the OSHA requirements in 29 CFR 1910.134.

C. Respirators shall be individually fit-tested to personnel under the direction of an Industrial Hygienist on a yearly basis. Fit-tested respirators shall be permanently marked to identify the individual fitted, and use shall be limited to that individual.

D. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the work day.

E. Any authorized visitor, Worker, or supervisor found in the Work Area not wearing the required respiratory protection shall be removed from the Project site and not be permitted to return.

1.11 DELIVERY AND STORAGE

A. Deliver all materials to the job site in original packages with containers bearing manufacturer's name and label.

B. Store all materials at the job site in a suitable and designated area.
   1. Store materials subject to deterioration or damage away from wet or damp surfaces and under cover.
   2. Protect materials from unintended contamination and theft.
   3. Storage areas shall be kept clean and organized.

C. Remove damaged or deteriorated materials from the job site. Materials contaminated with PCB shall be disposed of as PCB material as specified herein.

1.12 TEMPORARY UTILITIES

A. Where available, obtain power from Owner's existing system. Otherwise provide power from other sources (i.e. generator).
   1. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
   2. Provide wiring and receptacles as required by the Environmental Consultant for air sampling equipment.

B. Provide temporary lighting for all Work Areas.
   1. The entire Work Area shall be kept illuminated at all times.
   2. Provide lighting as required by the Environmental Consultant for the purposes of performing required inspections.

C. Utilize domestic water service, if available, from Owner's existing system.

PART 2 PRODUCTS

2.01 PROTECTIVE CLOTHING

A. Provide personnel utilized during the Project with disposable protective whole body clothing, head coverings, and foot coverings. Provide disposable plastic or rubber gloves to protect hands.

B. Provide sufficient quantities of protective clothing to assure a minimum of four (4) complete disposable outfits per day for each individual performing abatement Work.

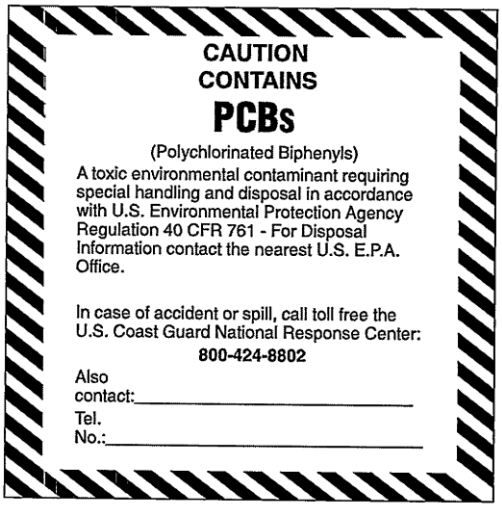
C. Eye protection and hard hats shall be provided and made available for all personnel entering any Work Area.

D. Authorized visitors shall be provided with suitable protective clothing, headgear, eye protection, and footwear whenever they enter the Work Area.

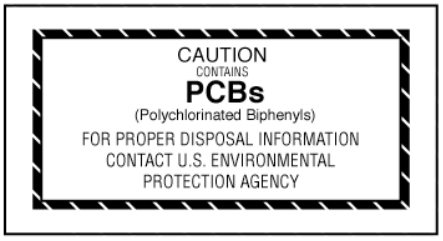
2.02 SIGNS AND LABELS, CONTAINERS

A. Provide warning signs and barrier tapes at all approaches to PCB Work Areas. Locate signs at such distance that personnel may read the sign and take the necessary protective steps required before entering the area.

B. Provide the appropriate "Large PCB Marking" or "Small PCB Marking" (M_L or M_S per 40 CFR 761) as shown below, of sufficient size to be clearly legible, for display on waste containers (bags, boxes, rolloffs or drums) which will be used to contain or transport PCB contaminated material, in accordance with 40 CFR 761. In addition, U.S. Department of Transportation (DOT) 49 CFR Parts 171 and 172 requires the name and UN number of the material to be on the bags or drums, and, if shipped in bulk (rolloffs, Gaylord boxes, etc) the bulk container must also be labeled: Polychlorinated biphenyl, solid mixture UN 3432.



M_L



M_S

C. The PCB materials are also NYS Hazardous Waste, and must have a label stating the following on each container :

HAZARDOUS WASTE--Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority, or the U.S. Environmental Protection Agency.

Generator's Name and Address_____
Generator's EPA Identification Number_____
Manifest Tracking Number _____

D. Provide 6 mil polyethylene disposal bags with PCB caution labels.
   1. The "Small PCB Label" (M_S per 40 CFR 761) may be used as shown above. Bags shall also be labeled with U.S. DOT required markings per 49 CFR 172, Polychlorinated biphenyl, solid mixture UN 3432.
   2. Labeled PCB waste containers or bags shall not be used for non-PCB waste or trash. Any material placed in labeled containers or bags, whether turned inside out or not shall be handled and disposed of as PCB waste.

2.03 DAILY PROJECT LOG

A. Provide a Daily Project Log. The log shall contain on title page the Project name, name, address and phone number of Owner; name, address and phone number of Environmental Consultant; name, address and phone number of Abatement Contractor; emergency numbers including, but not limited to local Fire/Rescue department.

B. All entries into the log shall be made in non-washable, permanent ink and such pen shall be strung to or otherwise attached to the log to prevent removal from the log-in area. Under no circumstances shall pencil entries be permitted.

C. The Project Supervisor shall document all Work performed daily and note all inspections.

2.04 SCAFFOLDING AND LADDERS

A. Provide all scaffolding and/or staging as necessary to accomplish the Work of this Contract. Scaffolding may be of suspension type or standing type such as metal tube and coupler, tubular welded frame, pole or outrigger type or cantilever type. The type, erection and use of all scaffolding and ladders shall comply with all applicable OSHA construction industry standards.

B. Provide scaffolding and ladders as required by the Environmental Consultant for the purposes of performing required inspections.

2.05 SHIPPING CONTAINERS AND PACKAGING

A. Provide packaging in accordance with 49 CFR 173 Packaging Group 9, such as 30 or 55 gallon capacity fiber, plastic, or metal drums, Gaylord Boxes or other Intermediate Bulk Containers (IBCs), or non-siftable bulk containers, capable of being sealed air and water tight if PCB waste has the potential to damage or puncture disposal bags. Affix PCB caution labels on lids of drums, and opposite sides of drums or bulk containers, as well as the ends of bulk containers.

2.06 EQUIPMENT AND MATERIALS

A. All dry vacuuming performed under this contract shall be performed with High Efficiency Particulate Absolute (HEPA) filter equipped industrial vacuums conforming to ANSI Z9.2.

B. Any power tools used to drill, cut into, or otherwise disturb PCB material shall be manufacturer equipped with HEPA filtered local exhaust ventilation.

C. All polyethylene (plastic) sheeting used on the Project (including but not limited to sheeting used for critical and isolation barriers, fixed objects, walls, floors, ceilings, waste container) shall be at least 6 mil fire retardant sheeting.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Should visible PCB debris be observed outside the Work Area, immediately stop Work notify the Owner; institute emergency procedures as directed. All costs incurred in decontaminating such non-Work Areas and the contents thereof shall be borne by the Contractor, at no additional cost to the Owner.

B. The following submittals, documentation, and postings shall be maintained on-site by the Contractor during abatement activities at a location approved by the Abatement Project Monitor:
   1. NYS Department of Environmental Conservation Waste Transporter Permit.
   2. Project documents (specifications and drawings.)
   3. Applicable regulations.
   4. Material Safety Data Sheets of supplies/chemicals used on the Project.
   5. Approved Abatement Work Plan.
   6. List of emergency telephone numbers.
   7. Waste Disposal Log.
   8. Daily Project Log.

C. The following documentation shall be maintained on-site by the Abatement Project Monitor during abatement activities:
   1. Project Monitor Daily Log.
   2. PCB Survey Report.

3.02 WORK AREA PREPARATION

A. PCB caution signs shall be posted at all approaches to the PCB Work Area. Post all emergency exits as emergency exits only on the Work Area side, post with PCB caution signs on the non-Work Area side. Provide all non-Work Area stairs and corridors accessible to the PCB Work Area with warning tapes at the base of stairs and beginning of corridors. Warning tapes shall be in addition to caution signs.

B. Access to areas of work shall be regulated to prevent unauthorized visitors.

C. For Exterior Removal:
   1. All ground surfaces exterior to the work area shall have a layer of 6 mil fire retardant polyethylene sheeting, attached to the building face and laid down on the surface below the exterior abatement work area, at least 10 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further.
   2. All operable windows within the work area and 25 ft. from all sides of the work area shall be closed.
   3. In the vicinity of the removals, isolate all HVAC equipment intakes by temporarily shutting down units during removals and installing plastic sheeting over the opening.

D. For Interior Removal:
   1. Isolate all HVAC equipment, including installing plastic sheeting on all air returns and exhausts.
   2. All floor areas adjacent to the work area shall have a layer of 6 mil fire retardant polyethylene sheeting, attached to the interior wall and laid down on the surfaces below the abatement work area, at least 5 feet wide or to the furthest point of gravity fall for dislodged debris by methods used, whichever is further.
   3. All movable objects shall be removed from the immediate work area. All non-movable objects shall be covered with one layer of 6 mil fire retardant polyethylene sheeting and sealed at the edges.
   4. All operable windows within the work area shall be closed.

3.03 REMOVAL OF PCB MATERIALS - GENERAL

A. PCB-containing materials shall be removed in accordance with the Contract Documents and the approved PCB Work Plan.

B. Non-PCB items such as windows, doors, masonry, and all other building construction and components from which PCB materials are removed shall be decontaminated by physical or chemical means (such as stripper) such that no visible residue remains. The removal of the PCB materials may require the use of scrapers, solvents, mastic removal chemicals, or other methods/procedures to ensure complete removal.

C. Mechanical cutting or grinding of PCB materials is not permitted, unless the equipment has factory- equipped HEPA filtered exhaust.

D. Remove accessible caulk that could be disturbed before cutting building components, such as window frames.

E. All removed PCB material shall be placed into 6 mil plastic disposal bags or other suitable container upon detachment from the substrate. Large components with PCB material or PCB residue shall be wrapped in one layer of 6 mil polyethylene sheeting. Sharp components likely to tear disposal bags shall be placed in fiber drums or boxes and then wrapped with sheeting.

F. Power or pressure washers are not permitted for PCB removal or clean-up procedures

G. All construction and demolition debris determined by the Environmental Consultant to be contaminated with PCB shall be handled and disposed of as PCB waste. If the 40 CFR 761 Subpart S double wash-rinse technique is used to decontaminate non-porous surfaces, sampling is not required and the material may be considered non-PCB.

H. All PCB waste must be located at or near the point of generation, under the control of the Project Supervisor. Up to 55 gallons may be stored at the point of generation for an indefinite period, but any more than 55 gallons must be moved within 3 days to a Container storage area (CSA) as specified in 6 NYCRR Section 372.2 “Standards Applicable to Generators of Hazardous Waste”, or off site. Waste may be stored at the CSA for 90 days, during which labeling, inspections, and other requirements must be met as described in 6 NYCRR Section 372.2, Section 373-3.1(d) and Subpart 373-3.

I. The CSA and personnel managing it must also meet the following requirements of 6 NYCRR 373:
   1. Preparedness and Prevention provisions of Section 373-3.3
   2. Secondary containment requirements of 373-2.9(f)(1)
   3. Personnel training in section 373-3.2
   4. Contingency plans and emergency procedures in section 373-3.4 subparagraph 376.1(g)(1)(v)
   5. The containers must be dated when placed in storage, and accumulation times must be observed
   6. The total amount of hazardous waste stored in the storage area at one time is 13,200 lb.
   7. A label or sign stating "Hazardous Waste" must identify all areas and containers used to accumulate hazardous waste

J. Closure of the CSA. If an EPA ID number and CSA were created specifically for the PCB removal work, the Contractor must also close out the CSA and the Consultant shall notify the

DEC/EPA that the hazardous waste activity has concluded, and that the storage area is to be closed per 373-3.7(b) and (e).

K. The Contractor is required to provide temporary protection of the building (i.e. roof, window openings, construction joints, etc.) at the end of each Work shift so as to maintain the building in a watertight condition.

L. Personal protective equipment, including respirators, shall be utilized and worn during all removal operations until the Work Area is cleared by the APM.

M. Following completion of gross abatement and after all accumulations of PCB waste materials have been containerized, the decontamination procedures in Section 3.04 shall be followed.

N. Finishes damaged by PCB abatement activities shall be restored prior to final payment. Finishes unable to be restored shall be replaced under this Contract.

O. Dry sweeping and any other methods that raise dust shall be prohibited.

3.04 EQUIPMENT AND AREA DECONTAMINATION

A. When removal of PCB materials is completed, the decontamination process shall consist of vacuuming (with a HEPA filter), wet wiping/mopping and a repeated vacuuming (with a HEPA filter) of the entire work area. All surfaces in and around the work area must be free of dust generated during the work.

B. Decontaminate all tools and equipment before removal from the work area.

C. If dust or debris has migrated to areas of the building other than the immediate work area, those areas shall be incorporated into the work area and thoroughly decontaminated to ensure all visible dust generated by the activity is eliminated.

D. Uncontaminated dust barriers and other protective sheeting shall be placed in disposable construction bags and disposed of as normal trash.

E. Visually inspect the area for any remaining dust or debris. Vacuum (with HEPA filter) and wet wipe until space is clean. Dispose of vacuum contents as PCB waste.

F. Upon completion of decontamination and removing temporary dust barriers, a final inspection shall be performed by the Contractor and Abatement Project Monitor. As a result of any visual inspection by the Abatement Project Monitor, the Contractor will clean or reclean the affected areas at no additional expense to the Owner.

PART 4 DISPOSAL OF PCB WASTE

4.01 TRANSPORTATION AND DISPOSAL SITE

A. The Contractor's Hauler and Disposal Site shall be approved by the Design Professional (DP). For any permitted out-of-state landfill not specifically authorized for disposal of PCBs, written notice must be provided 15 days prior to the first shipment of the same waste stream that the waste may contain PCBs greater than 50ppm, in accordance with 40 CFR 761.62. The letter shall be acknowledged via a disposal facility representative's signature, printed name and title.

If the facility is permitted to accept PCB waste, no letter is required. Note: For disposal within New York State, facilities must be specifically permitted to accept PCB waste.

B. The Contractor shall give twenty-four (24) hour notification prior to removing any waste from the site. Waste shall be removed from the site only during normal working hours unless otherwise specified. No waste may be taken from the site unless the Contractor and Environmental Consultant are present and the Environmental Consultant authorizes the release of the waste as described herein.

C. All waste generated as part of the PCB project shall be removed from the site within ten (10) calendar days after successful completion of all PCB abatement work.

D. Upon arrival at the Project Site, the Hauler must possess and present to the Environmental Consultant a valid New York State Department of Environmental Conservation Part 364 Waste Hauler's Permit. The Environmental Consultant may verify the authenticity of the hauler's permit with the proper authority.

E. The Hauler, with the Contractor and the Environmental Consultant, shall inspect all material in the transport container prior to taking possession and signing the Hazardous Waste Manifests.

4.02 WASTE STORAGE CONTAINERS

A. All waste containers shall be fully enclosed and lockable (i.e. enclosed dumpster, trailer, etc.).

B. The Environmental Consultant shall verify that the waste storage container and/or truck tags (license plates) match that listed on the New York State Department of Environmental Conservation Part 364 permit. Any container not listed on the permit shall be removed from the site immediately.

C. The container shall be plasticized and sealed with one layer of 6 mil polyethylene. Once on site, it shall be kept locked at all times, except during load out. The waste container shall not be used for storage of equipment or contractor supplies.

D. While on-site, the container shall be labeled with PCB Warning Labels and DEC Hazardous Waste Labels as specified in Section 2.02.

E. The New York State Department of Environmental Conservation Waste Hauler's Permit number shall be stenciled on both sides and back of the container.

F. The container is not permitted to be loaded unless it is properly plasticized, has the appropriate danger signage affixed, and has the permit number appropriately stenciled on the container.

G. The Owner may initiate random checks at the Disposal Site to insure that the procedures outlined herein are complied with.

4.03 HAZARDOUS WASTE MANIFESTS

A. A New York State Uniform Hazardous Waste Manifest shall be utilized solely as the waste Manifest for transportation. A hauler billing form or bill of lading may be used if the hauler needs an independent record, but shall not be used as a shipping document.

B. The Manifest shall be completed by the Contractor and verified by the Environmental Consultant that all the information and amounts are accurate and the proper signatures are in place.

C. The Manifest shall have the appropriate signatures of the Owner's Representative (the Generator) and the Hauler representative prior to any waste being removed from the site.

D. Copies of the completed Manifest shall be retained by the Environmental Consultant and shall remain on site for inspection.

E. Upon arrival at the Disposal Site, the Manifest shall be signed by the Disposal Facility operator to certify receipt of PCB materials covered by the manifest.

F. The Disposal Facility operator shall return the original Manifest to the Owner's Representative (the Generator) as required by the DEC in 6 NYCRR 372 within 45 days. The Environmental Consultant must call the facility to investigate if not returned within 35 days, and call the DEC and file an Exception report if not returned within 45 days.

G. The Contractor shall utilize the Waste Disposal Log provided by the Owner. This log shall be maintained by the Project Supervisor and shall be kept on site at all times. (See Appendix 1.)

H. Originals of all waste disposal manifests disposal logs shall be submitted by the Contractor to the Owner with the final close-out documentation.

J. The Contractor must also submit reports and records per the requirements of 6 NYCRR 372.2

APPENDIX 1

WASTE MANIFEST LOG

WASTE MANIFEST LOG

Facility: _____

Building: _____

Project: _____

Project Number: _____

PCB Contractor: _____

Environmental Consultant: _____

Load No.	Hauler	NYSDEC #	License Plate No.	Size of Container	DATES (Chain of Events)		
					Departed from Site	Rec'd at Disposal Site	Manifest Returned

COMMENTS:

END OF SECTION

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SECTION 028420 - REMOVAL AND DISPOSAL OF UNIVERSAL WASTE AND FLUORESCENT LAMPS

PART 1 GENERAL

A. Description Of Work
   1. This specification covers the removal and disposal of Universal waste, including fluorescent lamps, high-intensity discharge (HID) lamps, mercury thermostats and switches, batteries and pesticides. Demolition and removal of materials shall be as required to support the work.

B. Submittals
   1. Before Start of Work: Submit the following to the Design Professional (DP) for review. Do not start work until these submittals are returned with DP's approval.
      a. Copy of State or local license for hazardous waste hauler;
      b. Certification of at least one on-site supervisor which has satisfactorily completed the OSHA 40 Hour Health and Safety Course for Handling Hazardous Materials;
      c. Certificates of workers which have successfully completed at least the OSHA 40-Hour Health and Safety Course for Hazardous Materials;
      d. Certificates of workers which have successfully completed the required employee training for universal waste or appropriate type of training to the type of wastes being managed;
      e. Schedule of start and finish times and dates for this work;
      f. Name and address of the universal waste handler or a destination facility where the waste materials is to be treated, deposited or recycled in accordance with all regulatory requirements (include contact person and telephone numbers), if the universal waste meets the definition of hazardous waste, the name and address of the hazardous waste treatment, storage and disposal (TSD) facility;
      g. Material Safety Data Sheets for all materials requiring removal;
      h. If Contractor introduces any chemical into the work environmental, a MSDS for that chemical is required before use;
      i. Contingency Plan for handling emergency spills or leaks;
      j. Provide a copy of the NYS DEC Part 364 Waste Transporter permit for Universal Waste Transporters that transport more than 500 pounds of universal waste in a single shipment since they must be a permitted waste transporter;
      k. Large Quantity Handlers of universal waste must provide documentation of notification to the EPA and/or the appropriate local government agency in advance of its intentions to transport the waste and receive from the facility or provide an EPA identification number prior to exceeding 5,000 kilograms of waste on-site;
      l. Provide a record of all universal waste shipments received and sent offsite from the project.

C. Definitions
   1. Large Quantity Handler (LQH) of Universal Waste shall be a waste handler who accumulates 5,000 kilograms or more of universal waste (batteries, pesticides, thermostats, or lamps, calculated collectively) at any time. This designation as a large quantity handler of universal waste is retained through the end of the calendar year in which 5,000 kilograms (11,000 pounds) or more total of universal waste is accumulated. The LQH shall notify the EPA, acquire or co-ordinate with a facility regarding an EPA identification number, and provide records for each shipment. The LQH shall ensure all

employees are thoroughly familiar with proper waste handling and emergency procedures, relative to their responsibilities during normal facility operations and emergencies.

2. Small Quantity Handler of Universal Waste (SQH) shall be a waste handler who does not accumulate 5,000 kilograms (11,000 pounds) or more of total universal waste (batteries, pesticides, thermostats, or lamps, calculated collectively) at any time.
3. Destination Facility shall be a facility that legitimately and can legally accept universal waste from offsite so that the universal waste can be treated, disposed, or recycled in accordance with the regulatory requirements of 6 NYCRR Parts 370 through 374-3 and 376.
4. Universal Waste Transporter shall be anyone who transports universal waste. In New York, universal waste transporters that transport greater than 500 pounds of universal waste in a single shipment must be a permitted hazardous waste transporter pursuant to Federal and State regulations. Proper notification with the receiving handler agreeing to receive the shipment is required by the Universal Waste Transporter.
5. Universal Waste consists of the following discarded materials, as identified in 6 NYCRR 374-3: Fluorescent light bulbs high-intensity discharge (HID) lamps, mercury thermostats and switches, batteries, and pesticides. PCB ballasts/capacitors from light fixtures shall be treated as hazardous waste (see Section 21120 Identification and Disposal of Hazardous Waste.

PART 2 PRODUCTS

A. Materials

1. Polyethylene Sheet: A single polyethylene film in the largest sheet size possible to minimize seams, 6.0 mil thick, clear, frosted, or black.
2. Duct Tape: Provide duct tape in 3" widths, witty an adhesive which is formulated to stick aggressively to sheet polyethylene.
3. Spray Cement: Provide spray adhesive in aerosol cans which is specifically formulated to stick tenaciously to sheet polyethylene.
4. Disposal Bags: Provide 6 mil thick leak-tight polyethylene bags.
5. Labels: As required by the EPA and OSHA for handling, transportation, and disposal of hazardous waste.
6. Drums: Recovery or salvage drums acceptable for disposal of hazardous waste. Prior approval of drums is required. Drums or containers must meet the required OSHA EPA (40 CFR Parts 264265 and 300), and DOT regulations (49 CFR Parts 171-178). Use of damaged drums will not be allowed.

PART 3 EXECUTION

A. Universal Waste

1. Employee training shall ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures, relative to their responsibilities during normal operations and emergencies and to the type of waste they are handling.
2. Once the properly labeled containers holding the universal waste have been filled and sealed, they shall be stored in designated accumulation areas as agreed upon by the DP and Contractor. They shall not be allowed to store in transportation vehicles, or onsite for more than one year from when the waste has been generated.
3. Documentation when a universal waste in storage was first accumulated shall be provided. This is to be done by dating and labeling the waste with the date of the earliest

accumulation that can document the length of time the universal waste has been accumulated.

4. Maintenance of an inventory system on-site that identifies the earliest date that any universal waste in a group of universal waste items or a group of containers of universal waste became a waste was received.
5. Any waste developed from the work that exhibits one or more characteristics of hazardous waste, that are not specifically identified by EPA and DEC as Universal Waste, must be handled accordingly and not as a universal waste. See the Hazardous Waste Disposal Specification for those wastes.

B. Off-Site Shipment of Universal Waste

1. Off-Site shipments shall meet the requirements for offsite shipments and is prohibited from sending or taking universal waste to a place other than a designated universal waste handler or a universal waste destination facility.
2. LQH's of universal waste must notify EPA in writing and develop an EPA identification number or co-ordinate with the facility regarding use of their EPA identification number, prior to exceeding 5,000 kilograms of universal waste onsite.
3. SQH's do not need to notify EPA, receive and EPA identification number or deep records of shipments of universal waste.
4. LQH's must keep a record of all universal waste shipments received or sent offsite, and must retain those records for at least three years from the date of receipt or shipment. Records may include invoices, manifests, logs, bills or lading, or other shipping documents.

END OF SECTION

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SECTION 028500 - REMOVAL AND DISPOSAL OF LEAD-CONTAINING PAINT

PART 1 - GENERAL

1.1 Description Of Work

A. This specification covers the removal and disposal of lead-based or lead-containing paint. Products shall be as follows or as directed by Design Professional (DP). Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 Definitions

A. Action Level: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an 8 hour period in an occupational/industrial environment.

B. Area Sampling: Sampling of lead concentrations within the lead control area and inside the physical boundaries, which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel. This sampling will be conducted by DP's third party consultant, if required.

C. Certified Contractor: Certified under 40 CFR 745.226 to inspect, assess or remove lead-based paint, dust or soil. Certification as required to provide notification to the Environmental Protection Agency prior to the commencement of lead-based paint abatement activities in residential dwellings and child occupied facilities.

D. Contaminated Room: Room for removal of contaminated personal protective equipment (PPE).

E. Decontamination Shower Facility: That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

F. Eight-Hour Time Weighted Average (TWA): Airborne concentration of lead to which an employee is exposed, averaged over an 8 hour workday as indicated in 29 CFR 1926.62.

G. EPA Notification: The certified contractor shall notify the Environmental Protection Agency at least 5 business days prior to conducting lead-based paint abatement in residential or child occupied facilities. The notification requirements for updating and canceling projects shall also be completed as required.

H. High Efficiency Particulate Air (HEPA) Filter Equipment: HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high efficiency particulate filter means 99.97 percent efficient against 0.3 micron or larger size particles.

I. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps.

J. Lead-Based Paint (LBP): Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

K. Lead-Based Paint Hazard (LBP Hazard): Any condition that causes exposure to lead from lead-contaminated dust, lead-contaminated soil, lead-based paint that is deteriorated or present in accessible surfaces, friction surfaces, or impact surfaces that would result in adverse human health effects.

L. Lead-Containing Paint (LCP): Lead-based paint or other similar surface coating containing lead or lead compound in excess of 0.06 percent by weight of the total nonvolatile content of the paint.

M. Lead Control Area: An enclosed area or structure, constructed as a temporary containment equipped with HEPA filtered local exhaust, which prevents the spread of lead dust, paint chips, or debris existing as a condition of lead-based paint removal operations. The lead control area is also isolated by physical boundaries to prevent unauthorized entry of personnel.

N. Lead Permissible Exposure Limit (PEL): Fifty micrograms per cubic meter of air as an 8 hour time weighted average as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a workday, the PEL shall be determined by the following formula: PEL (micrograms/cubic meter of air) = 400/No. Hours worked per day.

O. Personal Sampling: Sampling of airborne lead concentrations within the breathing zone of an employee to determine the 8 hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employees' work tasks. The sampling, conducted by the Contractor, shall provide information to complete the required exposure assessment to identify the level of exposure a worker would be subject to without respiratory protection. Whenever there has been a change of equipment, process, control, personnel or a new task has been initiated, the Contractor shall conduct additional personal sampling.

P. Physical Boundary: Area physically roped or partitioned off around an enclosed lead control area to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead control area but inside boundary."

Q. Project Supervisor (PS): As used in this section, refers to a person employed by the Contractor who is trained and certified in the recognition and control of lead hazards in accordance with current federal, State, and local regulations. The PS shall be trained and certified to inspect, assess or remove lead based paint, dust or soil.

R. Third Party Consultant: DP will provide a third party consultant to provide pre-work assessments, project monitoring assessments for the work area and surrounding areas and final clearance assessments.

S. Worker certifications: All workers inspecting, assessing, or removing lead-based paint, dust or soil who are trained and certified to conduct these activities. As per 40 CFR Part 745 and 29 CFR 1926.

1.3 Submittals: Submit the following:

A. Product Data:

1. Vacuum and negative air filters (if units are required)
2. Respirators

B. Test Reports
1. Compliance Assessment report

C. Certificates
1. Certifications of PS
2. Testing laboratory qualifications
3. Contractor Consultant qualifications, if any required
4. Respiratory protection program
5. Hazard communication program
6. EPA approved hazardous waste treatment or disposal facility for lead disposal
7. Hazardous waste management plan
8. Vacuum filters
9. Employee training certifications
10. Certification of medical examinations

D. Manufacturer's Instructions
1. Chemicals and equipment
2. Materials
3. Material safety data sheets for all chemicals

E. Lead-Based Paint/Lead-Containing Paint Removal Plan (LBP/LCPRP) including PS approval (signature, date, and certification number):
1. The job specific plan for the work procedures to be utilized,
2. The job specific plan for worker protection issues regarding personal protective equipment, the work procedures, and exposure assessment procedures,
3. The job specific plan for protecting the work area, ventilation and drainage systems,
4. Collected waste water disposal,
5. Paint debris disposal (hazardous and non-hazardous waste).

F. Containment Design
1. The containment design proposed for use during surface preparation and clean up activities as required to perform the work. The Plan for staging, installing, moving and removing the containment. Include all data, calculations and assumptions used for the design of the containment and ventilation system to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air and baseline lead dust/soil concentrations are not reached or exceeded outside of the lead control area;
2. Methods to be used to verify adequate air flow characteristics and negative pressure within containment;
3. The plan for staging and storing any waste material;
4. The plan for establishing barriers to control access of personnel within the exposure zones;

G. Compliance Plan
1. Establish monitoring programs for the monitoring activities that are the responsibility of the Contractor and include provisions for complying with the results of any monitoring and analysis that is conducted by the Contractor and DP;
2. Establish procedures for monitoring of airborne exposures surrounding project activities and the establishment of visible barriers to control the access of personnel within the

exposure zones. DP will provide instrument monitoring of airborne exposure and/or wipe sampling within the work area or the surrounding areas by a third party consultant.

3. Provide procedures for the visual assessment of the ground (soil) to determine whether it has been impacted by project activities, if required. Identify the corrective action that will be taken in the event of unacceptable results. In the event visual assessments of the ground show unacceptable results, the Contractor will undertake the necessary clean up of the ground (soil) as appropriate as directed by DP. Clean up to pre-project levels will be required. The third party consultant will provide final visual, instrument and wipe sampling to clear the work and surrounding areas.
4. Final Clearance Evaluation – Provide written procedures identifying the methods that will be used to conduct final project clean up and the final cleanliness inspections and evaluations that will be undertaken in compliance with the project requirements.

H. Closeout Submittals
1. Completed and signed hazardous waste manifest from treatment or disposal facility
2. Certification of medical examinations, if required

1.4 Qualifications Of Project Supervisor (PS): Submit name, address, telephone number and the EPA certification number of the PS selected to perform responsibilities specified in paragraph entitled "Project Supervisor (PS) Responsibilities." Provide at least two (2) years of previous experience with lead-based paint abatement projects. Submit proper documentation that the PS is trained and certified in accordance with federal, State, and local laws.

1.5 Contractor Consultant Qualifications: Submit the name, address, telephone number and the EPA certification number of the Contractor Consultant (Contractor) if one is selected to perform the worker protection sampling and any additional sampling the Contractor may decide to take. Submit proper documentation that the Contractor consultant is trained and certified as an inspector technician or inspector/risk assessor by the USEPA and authorized State (or local) certification and accreditation program. The Contractor consultant shall have at least two (2) years of previous experience with lead-based paint abatement projects.

1.6 Testing Laboratory: Submit the name, address, and telephone number of the testing laboratory selected to perform the air sampling and disposal testing. The air sampling results shall be utilized for reporting of airborne concentrations of lead for Contractor worker protection issues. This sampling will be separate from the third party consultant sampling that will be conducted by DP. Use a laboratory accredited under the EPA National Lead Laboratory Accreditation Program (NLLAP) by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis.

1.7 Lead-Based Paint/Lead-Containing Paint Removal Plan (LBP/LCPRP): Information to also be included in the LBP/LCPRP not indicated in Section 1.3,C 5 & 6 shall include but not be limited to the following items. The plan shall include a sketch showing the location, size, and details of lead control areas, location and details of the decontamination facilities. Include in the plan, eating, drinking, smoking and sanitary procedures, interface of trades and sequencing

of lead related work. Include site preparation and cleanup procedures. Include occupational and environmental sampling (if any by the Contractor), frequency and duration of sampling.

1.8 Occupational And Environmental Sampling Results: Submit occupational and environmental sampling results to the DP within three working days of collection, signed by the testing laboratory responsible official, the employee that performed the sampling, and the PS.

A. The sampling results shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures in accordance with 29 CFR 1926.62. The data shall represent the worker's regular daily exposure to lead.

B. Submit worker exposure data conducted during the task based trigger operations of 29 CFR 1926.62.

C. The initial monitoring shall determine the requirements for further monitoring and the need to fully implement the control and protective requirements including the compliance program (LBP/LCP) in accordance with 29 CFR 1926.62.

1.9 Occupational And Environmental Assessment Data Report:

A. Some LBP/LCP removal work may not require full implementation of the requirements of 29 CFR 1926.62. Based on the experience of the Contractor and/or the use of a specific process or method for performing the work, the Contractor may be able to provide historic data (previous 12 months) to demonstrate that airborne exposures are controlled below the action level. Such methods or controls shall be fully presented in the LBP/LCPRP. To reduce the full implementation of 29 CFR 1926.62, the Contractor shall provide documentation in an Assessment Data Report.

B. Submit occupational and environmental assessment report to DP prior to start of work, signed by the testing laboratory responsible official, and the PS.
   1. Submit a report that supports the determination regarding the reduction of the need to fully implement the requirements of 29 CFR 1926.62 and supporting the LBP/LCP. The exposure assessment shall represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures in accordance with 29 CFR 1926.62. The data shall represent the worker's regular daily exposure to lead for stated work.
   2. Submit worker exposure data conducted during the task based trigger operations of 29 CFR 1926.62 with a complete process description in supporting a negative assessment.
   3. The initial assessment shall determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the compliance program (LBP/LCPRP) in accordance with 29 CFR 1926.62.

1.10 Quality Assurance

A. Medical Examinations: Initial medical surveillance as required by 29 CFR 1926.62 shall be made available to all employees exposed to lead at any time (1 day) above the action level. Full medical surveillance shall be made available to all employees on an annual basis who are or

may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records shall show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62, and 29 CFR 1926.103.

1. Medical Records: Maintain complete and accurate medical records of employees for a period of at least 30 years or for the duration of employment plus 30 years, whichever is longer.
2. Medical Surveillance: Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62.

B. Project Supervisor (PS) Responsibilities
1. Certify training as meeting all federal, State, and local requirements.
2. Review and approve lead-based paint/lead-containing paint removal plan for conformance to the applicable referenced standards.
3. Continuously inspect lead-based paint removal work for conformance with the approved plan.
4. Perform air sampling, if required by Contractor.
5. Ensure work is performed in strict accordance with specifications at all times.
6. Control work to prevent hazardous exposure to human beings and to the environment at all times.
7. Certify the conditions of the work as called for elsewhere in this specification.

C. Training: Train each employee performing inspection, assessing, paint removal, disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 40 CFR 745.225, 29 CFR 1926.21, 29 CFR 1926.62, and State and local regulations.
1. Training Certification: Submit a certificate for each employee, signed and dated by the approved training source, stating that the employee has received the required lead training.

D. Respiratory Protection Program
1. Furnish each employee required to wear a negative pressure respirator or other appropriate type with a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.
2. Establish and implement a respiratory protection program as required by ANSI Z88.2, 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

E. Hazard Communication Program: Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

F. Hazardous Waste Management: The Hazardous Waste Management Plan shall comply with applicable requirements of federal, State, and local hazardous waste regulations and address:
1. Identification and classification of hazardous wastes associated with the work.
2. Estimated quantities of wastes to be generated and disposed of.
3. Names and qualifications of each Contractor that will be transporting, storing, treating and/or disposing of the wastes. Include the facility location and operator and a 24-hour point of contact. Furnish two copies of EPA, or State and local hazardous waste permit applications or permits or manifests, as required, and co-ordinate with DP regarding the use of an existing EPA Identification number or developing separate EPA Identification numbers.
4. Names, qualifications and training (experience and training) of personnel who will be working on-site with hazardous wastes.

5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
6. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.
7. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.
8. Unit cost for hazardous waste disposal according to this plan.

G. Environmental, Safety and Health Compliance: In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding removing, handling, storing, transporting, and disposing of lead waste materials. Comply with the applicable requirements of the current issue of 40 CFR Part 745, 24 CFR Part 35, US Department of Housing and Urban Development "Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing" and 29 CFR 1926.62. Submit matters regarding interpretation of standards to DP for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirement shall apply.

H. Pre-Construction Conference: Along with the PS, meet with DP and any facility or consultant representatives to discuss in detail the hazardous waste management plan and the lead-based paint/lead-containing paint removal plan, including work procedures and precautions for the removal plan.

1.11 Equipment

A. Respirators: Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust. Respirators shall comply with the requirements of 29 CFR 1926.62.

B. Special Protective Clothing: Furnish personnel who will be exposed to lead-contaminated dust with proper disposable uncontaminated, reusable protective whole body clothing, head covering, gloves, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the PS.

C. Vacuum Filters: UL 586 labeled HEPA filters.

D. Equipment for Owner's Personnel: Furnish DP with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the paint removal work within the lead controlled area. Personal protective equipment shall include disposable whole body covering, including appropriate foot, head, and hand protection. PPE shall remain the property of the Contractor.

1.12 Removal

A. All housing units in a project assisted with CDBG funds must comply with the regulations found at 24 CFR Part 35. CONTRACTORS participating in this Program will be required to comply with Section 302 of the Lead- Based Paint Poisoning Prevention Act (42 U.S.C. Sec. 4831(b)) and the procedures established hereunder by HUD. HUD and the Environmental

Protection Agency (EPA) also have regulations on lead-based paint abatement. All housing receiving federal assistance must comply with HUD Lead Safe Housing Rule (LSHR) and EPA Renovation, Repair and Painting (RRP) respectively.

B. For properties built before 1978, if the project will involve disturbing painted surfaces or cleaning up lead contaminated dust or soil, use certified renovation or lead abatement contractors and workers using lead-safe work practices and clearance examinations consistent with the more stringent of EPA's Renovation, Repair, and Painting Rule and HUD's Lead Safe Housing Rule.

C. Title to Materials: Materials resulting from demolition work, except as specified otherwise, shall become the property of the Contractor and shall be disposed of in accordance with all federal, State and local regulations.

PART 2 - PRODUCT

2.1 Chemicals: Submit applicable Material Safety Data Sheets for all chemicals used in paint removal work. Use the least toxic product approved by DP.

PART 3 - EXECUTION

3.1 Protection

A. Notification: Notify DP 20 days prior to the start of any lead based paint removal work.

B. Notification: Notify the Environmental Protection Agency at least 5 days prior to conducting lead-based paint abatement activities in a residential dwelling or child occupied facility.

C. Lead Control Area Requirements
   1. If LBP will be removed by means which will not likely create airborne, lead-containing dust (such as careful wet scraping or chemical stripping), establish a lead control area by situating critical barriers and physical boundaries around the area or structure where LBP/LCP removal operations will be performed.
   2. If removal practice will create airborne, lead-containing dust (such as sanding, abrasive blasting, thermal cutting, demolition, or needle gun use), utilize full containment procedures - Contain removal operations by the use of critical barriers and HEPA filtered exhaust or a negative pressure enclosure system with decontamination facilities and with HEPA filtered exhaust if required by the PS, as directed.

D. Protection of Existing Work to Remain: Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.

E. Boundary Requirements: Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.
   1. Physical Boundary: Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other

enclosures to ensure that airborne concentrations of lead will not reach 30 micrograms per cubic meter of air outside of the lead control area.

2. Warning Signs: Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.

F. Furnishings:

1. The Owner will remove furniture and equipment from the building before lead-based paint removal work begins.
   or
   Furniture and equipment will remain in the building. Protect and cover furnishings or remove furnishings from the work area and store in a location approved by DP.
   or
   Existing furniture and equipment is lead contaminated, decontaminate, dispose of as lead contaminated waste.

G. Heating, Ventilating and Air Conditioning (HVAC) Systems: Shut down, lock out, and isolate HVAC systems that supply, exhaust, or pass through the lead control areas. Seal intake and exhaust vents in the lead control area with 6 mil plastic sheet and tape. Seal seams in HVAC components that pass through the lead control area. Provide temporary HVAC system for areas in which HVAC has been shut down outside the lead control area.

H. Decontamination Shower Facility: Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

I. Eye Wash Station: Where eyes may be exposed to injurious corrosive materials, suitable facilities for quick drenching or flushing of the eyes shall be provided within the work area.

J. Mechanical Ventilation System

1. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62.
2. To the extent feasible, use fixed local exhaust ventilation connected to HEPA filters or other collection systems, approved by the PS. Local exhaust ventilation systems shall be designed, constructed, installed, and maintained in accordance with ANSI Z9.2.
3. Vent local exhaust outside the building only and away from building ventilation intakes.
4. Use locally exhausted, power actuated, paint removal tools.

K. Personnel Protection: Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.2 Work Procedures: Perform removal and disposal of lead-based paint in accordance with approved lead-based paint/lead-containing paint removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-based paint is removed in accordance with 29 CFR 1926.62, 40 CFR Part 745 and 24 CFR Part 35, except as specified herein.

A. Personnel Exiting Procedures: Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:
   1. Vacuum themselves off.
   2. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.
   3. Shower or Wash hands and face at the site, as directed, don appropriate disposable or uncontaminated reusable clothing; move to an appropriate facility; shower.
   4. Change to clean clothes prior to leaving the physical boundary designated around the lead control area.

B. Sampling
   1. Air sample for lead in accordance with 29 CFR 1926.62 and as specified herein. Air sampling shall be directed or performed by the PS.
      a. The PS shall be on the job site directing the air sampling and inspecting the lead-based paint removal work to ensure that the requirements of the contract have been satisfied during the entire lead-based paint removal operation.
      b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the PS. In addition, collect air samples on at least 25 percent of the work crew or a minimum of two employees; whichever is greater, during each work shift.
      c. Submit results of air samples, signed by the PS, within 24 hours after the air samples are taken. Notify DP immediately of exposure to lead at or in excess of the action level of 30 micrograms per cubic meter of air outside of the lead control area.
   2. Surface and/or soil sampling shall be conducted as required by 40 CFR Part 745 and 24 CFR Part 35,
   3. for residential dwellings and child occupied facilities or as may be required for high profile, sensitive work areas, such as administrative buildings, kitchens, barracks, etc., to determine clearance (i.e., that the work has not contaminated surfaces within and adjacent to the control area) will be performed by a third party consultant provided by DP. Notification to DP will also outline any sampling requirements to be provided for the work.
      a. Before any work begins, DP's third party consultant will collect and analyze baseline soil or wipe samples in accordance with methods defined in federal, State, and local standards inside and outside of the physical boundary to assess the degree of soil and/or dust contamination prior to lead-based paint removal activities are initiated.
      b. After all work is completed, DP's third party consultant will collect and analyze soil or wipe samples in accordance with methods defined in federal, State, and local standards inside and outside of the physical boundary to assess the degree of soil and/or dust contamination after the lead-based paint removal activities are completed.
   4. Area Air Sampling During Paint Removal Work: DP will conduct area air sampling while lead-based paint removal operations are performed, in areas immediately adjacent to the lead control area. Area monitoring shall be conducted to ensure unprotected personnel adjacent to the lead control area are not exposed at or above 30 micrograms per cubic meter of air. If 30 micrograms per cubic meter of air is reached or exceeded, the Contractor will be advised to stop work, and correct the conditions(s) causing the increased levels. DP will determine if condition(s) require any further change in work

methods. Removal work shall resume only after approval is given by DP. For outdoor operations, at least one sample on each shift shall be taken on the downwind side of the lead control area.

C. Lead-Based Paint Removal

1. Provide methodology for removing LBP/LCP in the work plan. Remove paint within the areas designated on the drawings in order to completely expose the substrate. Take whatever precautions necessary to minimize damage to the underlying substrate.
2. Avoid flash rusting or deterioration of the substrate. Co-ordinate surface preparations as required by DP.
3. Provide methodology for LBP/LCP removal processes to minimize contamination of work areas outside the control area with lead-contaminated dust or other lead-contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this LBP/LCP removal process in the LBP/LCPRP.
4. Indoor Lead Paint Removal: Perform manual or mechanical or thermal or chemical, as directed, paint removal in lead control areas using enclosures, barriers, or containments and powered locally exhausted paint removal tools. Collect residue and/or debris for disposal in accordance with federal, State, and local requirements.
5. Outdoor Lead Paint Removal: Perform outdoor removal as indicated in federal, State, and local regulations and in the LBP/CPRP. The worksite preparation (barriers or containments) shall be job dependent and presented in the LBP/LCPRP.
6. Sampling After Paint Removal: After the visual inspection, DP's third party consultant will conduct soil sampling if bare soil is present during external removal operations and collect area air samples inside and outside the lead control area to determine the airborne levels of lead inside and outside the work area. DP's third party consultant will collect wipe samples according to 40 CFR Part 745, 24 CFR Part 35, and the HUD protocol contained in HUD Guidelines, to determine the lead content of settled dust and dirt in micrograms per square foot of surface area and parts per million (ppm) or micrograms per gram (µg/g) for soil.

D. Cleanup and Disposal

1. Cleanup: Maintain surfaces of the lead control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the PS. Re-clean areas showing dust or residual paint chips or debris. After visible dust, chips and debris is removed, wet wipe and HEPA vacuum all surfaces in the work area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The PS shall then certify in writing that the area has been cleaned of lead contamination before restarting work.
2. Clearance Certification
   a. The Contractor shall document in writing and provide analytical documentation to certify that the employee exposure to an airborne concentration of lead were below the required action level, respiratory protection used for the employees was adequate; the work procedures were performed in accordance with 29 CFR 1926.62, 24 CFR Part 35, 40 CFR 745 and the HUD protocol contained in HUD Guidelines; and that there were no visible accumulations of material and dust containing lead left in the work site. Do not remove the lead control area or roped

off boundary and warning signs prior to DP's acknowledgement of the third party sampling results, if required, and upon receipt of the Contractor certification.

b. The DP third party consultant shall certify surface wipe sample results collected inside and outside the work area are less than 40 micrograms per square foot on carpeted or uncarpeted floors, less than 250 micrograms per square foot on interior window sills and less than 400 micrograms per square foot on window troughs.

c. For exterior paint removal work, the DP third party consultant will provide soil samples taken at the exterior of the work site to be used to determine if soil lead levels are less than 400 micrograms per gram at play areas and less than 1200 micrograms per gram at other soil areas. If soil lead levels are above any applicable Federal or State standard for lead in soil, the soil shall be remediated to acceptable levels.

d. Based upon the results of the visual inspection and clearance samples, the third party consultant shall determine and certify that the area is safe for non-protected workers and shall also certify that the area is safe for reoccupancy.

3. Testing of Lead-Based Paint Residue and Used Abrasive: The Contractor shall test paint residue and used abrasive in accordance with 40 CFR 261 for hazardous waste.

4. Disposal

a. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and lead-contaminated clothing, which may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62 and 40 CFR 261. Dispose of lead-contaminated waste material at an EPA or State approved hazardous waste treatment, storage, or disposal facility off Owner's property.

b. Store waste materials in U.S. Department of Transportation (49 CFR 178) approved 55-gallon drums. Properly label each drum to identify the type of waste (49 CFR 172) and the date the drum was filled. DP or an authorized representative will assign an area for interim storage of waste-containing drums. Do not store hazardous waste drums in interim storage longer than 90 calendar days from the date affixed to each drum.

c. Handle, store, transport, and dispose lead or lead-contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. The Contractor shall provide documentation the transporter is authorized to transport the waste, authorized to deliver the waste to the treatment, storage, or disposal facility and the treatment, storage, or disposal facility is authorized to accept the waste. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

d. All material, whether hazardous or non-hazardous shall be disposed in accordance with laws and provisions and federal, State, or local regulations. Ensure waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

E. Disposal Documentation: Submit written evidence the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA and State or local regulatory agencies. Submit one copy of the completed manifest, signed and dated by the initial transporter in accordance with 40 CFR 262.

F. Payment for Hazardous Waste: Payment for disposal of hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility certifying the amount of lead-containing materials delivered is returned and a copy is furnished to the Owner.

END OF SECTION

SECTION 028600 - MOLD REMEDIATION

PART 1 - GENERAL

1.1 Description Of Work

A. This specification covers the removal and disposal of mold. Products shall be as follows or as directed by Design Professional (DP). Installation procedures shall be in accordance with the product manufacturer's recommendations. Demolition and removal of materials shall be as required to support the work.

1.2 Submittals: (Items A-G will be considered Pre-Work Submittals)

A. List of all personnel to be involved in the work with their training and certifications.

B. List of all products and procedures proposed for use in performance of the work, when required:
1. List all work areas and containments.
2. Locations and types of all decontamination enclosures.
3. Entrances and exists to the work area and/or containments.
4. Type of remediation activity, technique for each work area and/or containment.
5. Number and location of negative air units and exhausts.
6. Calculations for determining number of negative air pressure units.
7. Location of water and electric connections to building services.
8. Waste transport routes from the work area to the waste storage container.

C. Respiratory Protection Program
1. Provide a copy of the firm’s written respiratory protection program.

D. Employee Training Program
1. Provide a copy of the firm’s written employee hazard communication program.
2. The communication program will provide a review the potential exposure with fungal spores during remediation work.
3. The communication program will provide a review of the potential exposure with the cleaning agents to be used during the remediation work.

E. Employee Instruction
Provide documentation showing that each employee has been instructed on the following items:
1. Use and fit of respirator
2. Protective clothing
3. Protective measures
4. Safety and Emergency Egress Procedures
5. Site specific fall protection plan and training

F. Material Safety Data Sheets (MSDS)
Provide a MSDS on the cleaning agents selected for use on this project. Substitution of alternative products is not permitted without authorization from DP.

G. Preliminary Schedule:
Provide an estimate of manpower to be utilized and the time required for completion of each major Work Area. Include estimated size and number of crews and work shifts.

H. Project Close-out Submittals:
1. All waste disposal tickets.
2. Daily progress logs.
3. A list of all Workers used in the performance of the project.

1.3 Quality Assurance

A. Conform to all Federal, State, and Local regulations, guidelines and rules which govern the handling and disposal of mold materials.
1. New York City Department of Health & Mental Hygiene Guidelines on Assessment and Remediation of Fungi in Indoor Environments.
2. Occupational Safety and Health Administration (OSHA) Respiratory Protection Standard, 29 Code of Federal Regulations (CFR) 1910.134.
3. OSHA – Fall Protection, 29 CFR 1926.451 to 1926.1060.
4. OSHA Lockout Tag-out 29 CFR 1926.417 and 1926.702.
5. OSHA Hazard Communication Standard 29 CFR 1910.1200.

1.4 Record Keeping

A. Daily Log
The Contractor shall maintain a Daily Project Log consisting of a three ring binder. The daily project log will be utilized each day to document the following information:
1. Date and time of the project.
2. Name of Project Superintendent.
3. Brief description of daily work activities.
4. Contained area sign in and sign out sheet.
5. Clearance check by DP.

PART 2 - PRODUCT

2.1 Protective Clothing

A. The Contractor will provide the workers with the required protective disposal clothing as recommended in the referenced guidelines, consisting of full-body coveralls, head covers, gloves and boots.

B. The Contractor will not under any circumstances permit any person to enter the work areas without the appropriate protective clothing and equipment. The Contractor will provide protective clothing for use by DP and the Environmental Consultant. The Contractor will furnish as many sets as required for full-time monitoring.

2.2 Respiratory Protection

A. Respirators and High Efficiency Particulate Air (HEPA) filters will be used, when required, as recommended in the guidelines and approved by the National Institute of Occupation Safety and Health (NIOSH).

B. Respirators will be individually fit-tested to personnel on a yearly basis.

C. No respirator will be issued to personnel without such personnel participating in a respiratory training program.

D. The Contractor shall provide and make available a sufficient quantity of respirator filters so that filter changes can be made as necessary during the workday. Filters will be removed and discarded during the decontamination process. Filters cannot be reused. Filters must be changed if breathing becomes difficult.

2.3 HEPA Filter Equipment

A. All fan and vacuum units will be equipped with a High Efficiency Particulate Absolute (HEPA) filter.
   1. Containment areas, where required will be maintained under negative pressure relative to the surrounding area. This will be accomplished with a HEPA-filtered fan unit exhausted to the outside.
   2. All interior surfaces to be cleaned, exterior of plastic sheeting containing waste material, final vacuuming of the interior surfaces of the work area and surfaces outside of the work area where dust may have settled will be HEPA-vacuumed.

B. Cleaning Agent
   1. When specified, will be applied with a moist cloth, sprayed or as specified by the manufacturer.

PART 3 - EXECUTION

3.1 The scope of work includes removal of visual fungal growth on contaminated materials. The abatement procedures will be identified for each remediation project based on the size, complexity and remediation methods required. The size of the area impacted by fungal contamination will determine the type of remediation. The sizing levels will be based on professional judgment by DP and the Consultant, utilizing the EPA - Mold and Moisture in Homes or the NYC Department of Health & Mental Hygiene Guidelines on Assessment and Remediation of Fungi in Indoor Environments. These guidelines will be utilized to develop the remediation plan, along with any site-specific requirements.

A. Pre-construction Meeting:
   1. Prior to the start of preparatory work, the Contractor will attend a pre-construction meeting attended by DP, Facility Personnel and an Environmental Consultant. All pre-work submittals will be submitted 7 days prior to the pre-construction conference; the Contractor will submit 3 copies of the Pre-Work Submittals.

B. Project Monitoring and Air Sampling:

1. DP will engage the services of an Environmental Consultant (Consultant) who will serve as DP's Representative in regard to the performance to the remediation work and provide direction as required throughout the entire remediation phase. The above referenced Guidelines (3.1 C) will be utilized to develop the basis of the design for the remedial work.
2. The Contractor is required to ensure cooperation of its personnel with the Consultant for the air sampling and Project monitoring functions described below. The Contractor shall comply with all direction given by the Consultant during the course of the Project.
3. The Consultant will review and approve or disapprove all submittals, shop drawings and schedules. The Consultant will provide visual inspections prior to the start of work and final inspection of the work areas. The Consultant will provide bulk and air sampling services when required for the Project.

C. Project Supervisor
1. The Contractor will designate a full-time Project Supervisor who is qualified to enter the work areas and meets the requirements of a "Competent Person" as defined by OSHA 1926.1101. The Project Supervisor must be able to read and write English fluently, as well as communicate in the primary language of the Workers.
2. If the Project Supervisor is not on-site at any time whatsoever, all Work will be stopped. The Project Supervisor will remain on-site until the Project is complete.
3. The Project Supervisor will maintain a Project Log Book and a Waste Disposal Log.
4. The Project Supervisor will be responsible for the performance of the Work and will represent the Contractor in all respects at the Project site. The Supervisor shall be the primary point of contact for the Consultant.

D. Hazard Communication
1. The Contractor shall post warning signs at all entrances or openings to the work areas. Warning signs may be in the form of continuous plastic tape.
2. The Contractor will co-ordinate with DP, the Consultant and the building owner regarding notification of the occupants and other Contractors on-site.

E. Temporary Utilities
1. Shut down and lock out all electrical power to the Work Areas.
2. Provide temporary 120-240 volt, single phase, three wire, 100 amp electric service with Ground Fault Circuit Interrupters (GFCI) for all electric requirements within the Work Area.
   a. Where available, obtain from Owner's existing system. Otherwise provide power from other sources (i.e. generator).
   b. Provide temporary wiring and "weatherproof" receptacles in sufficient quantity and location to serve all HEPA equipment and tools.
   c. Provide wiring and receptacles as required by the Consultant for air sampling equipment.
   d. All power to the Work Area shall be brought in from outside the area through GFIC's at the source.
3. Provide temporary lighting with "weatherproof" fixtures for all Work Areas including decontamination chambers.
   a. The entire Work Area shall be kept illuminated at all times.
   b. Provide lighting as required by the Environmental Consultant for the purposes of performing required inspections.
4. All temporary devices and wiring used in the Work Area shall be capable of decontamination procedures including HEPA vacuuming and wet-wiping.

5. Utilize domestic water service, if available, from Owner's existing system. Provide hot water heaters with sufficient capacity to meet Project demands.

F. Containment Barriers
1. When containment of the work areas is not necessary, dust suppression methods will be utilized.
2. When containment of the work area is required, the Contractor must be careful not to disturb fungal contaminated building materials while isolating work areas to prevent the release of fungal spores. Any pre-cleaning prior to the erection of the containment will be completed as required. Workers shall wear respirators when installing isolation barriers if fungal contaminated surfaces (walls or surfaces with visible settled dusts) are likely to be disturbed. The Contractor shall completely isolate the work areas for the duration of the work by sealing off all walls, floors, openings, and fixtures in the work areas including, but not limited to, heating and ventilation supply air ducts and diffusers and return air ducts and grilles (HVAC system totally de-energized - no HVAC system airflow into or out of work area), return air grilles, common return air plenums, doorways, corridors, windows, skylights, and lighting with polyethylene sheeting held securely in place as described in this section.
3. Containment Entry and Exit Procedures will be established as required for the work.
4. Personnel, Equipment and Waste Decontamination Procedures will be established as required for the work.

G. Negative Pressure
1. When Negative Pressure is required, the Contractor shall establish a negative air pressure differential inside the enclosed areas relative to interior areas outside the containment before remedial operations begin. No air must flow from inside the enclosed work areas to the areas outside. Unless otherwise indicated in these specifications, the term "outside the work area" shall mean areas within the building that are not in the enclosed work areas. The Contractor shall ensure that air pressure differential is maintained demonstrated by manometer until the Consultant has determined that the work area has passed the final inspection.

H. Work Procedures
1. All materials will be decontaminated and/or removed under containment, or mini-containment. As waste is removed, it will be placed into a disposal container promptly. Disposal containers, at a minimum, will consist of double bagging using 6-mil polyethylene bags. Bags will be taped to form an airtight seal and labeled appropriately. Waste from HEPA-filtered vacuums shall be double bagged in 6-mil polyethylene bags.
2. The Contractor at all times will keep the site and work area free from accumulations of bagged dust material or rubbish caused by its operations and free from any flammable materials or other source of fire hazard. During the performance of the work, the Contractor shall remove all bagged material from and about the work site in strict accordance with the specifications and applicable codes and regulations.
3. All visually contaminated materials and adjacent visually uncontaminated material will be decontaminated and/or removed under full containment unless specified otherwise.
4. Cleaning agents will only be utilized when specified.
5. In the event that areas adjoining the enclosed project area become or are suspected of becoming contaminated with spores as a result of the Contractor's work, the Contractor shall thoroughly and totally decontaminate (for example, use separate HEPA vacuum in

occupied space) the affected areas. These areas shall be subject to detailed visual inspection and final clearance sampling as may be requested by the Consultant.

I. Clearance Preparation
   1. When containment areas are not utilized, the work area and areas used by remedial workers for egress will be cleaned as specified.
   2. When containment areas are utilized, all work area side surfaces and layers, of the polyethylene barrier sheeting will be cleaned as specified. If negative pressure is utilized, the negative air machines will remain on until notified by the Consultant.

J. Final Clearance Inspections
   1. After all visible accumulations of material and debris are removed, the Contractor will notify the Consultant for a final clearance visual inspection. The Contractor and Consultant will conduct a thorough visual inspection of the work area(s). If during this inspection, any visible dust or debris is observed, the Contractor will contain and re-clean the work area(s). The Contractor will pay all associated costs for the re-cleaning services.
   2. Breakdown of containment will proceed only upon receipt by the Contractor of clearance issued by DP or the Consultant.

K. Post-Remediation Air Sampling
   1. The Consultant will conduct post-remediation air sampling using fungal spore traps. Air samples will be analyzed by an AIHA accredited microbiological laboratory. If fungal spore concentrations inside containment are elevated when compared to outside ambient air, the Contractor will conduct additional cleaning, and then the sampling process will be repeated.

L. Restoration of Utilities, Firestopping and Finishes
   1. After final clearance remove locks and restore electrical and HVAC systems. All temporary power will be disconnected, power lockouts removed and power restored. All temporary plumbing will be removed.
   2. Finishes damaged by the Contractor including, but not limited to, plaster/paint damage due to duct tape and spray adhesives, and floor tile lifted due to wet or humid conditions, will be restored and/or replaced prior to final payment. All foam and expandable foam products and materials used to seal Work Area openings will be completely removed upon completion of remediation activities.
   3. All penetrations (including, but not limited to, pipes, ducts, etc.) through fire rated construction will be fire stopped using materials and systems tested in accordance with ASTM E814 on Projects where re-insulation is part of the required work.

END OF SECTION

SECTION 033205 - CONCRETE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes exterior Portland cement concrete for the following:
1. Walkways as required for access to ADA Ramps or Lifts.
2. Pad for Lift.
3. Exterior precast Steps.
4. Porch-decks.
5. Foundations/Elevations.
6. Repair, replacement, and installation of driveways and sidewalks.

B. Scope
1. All work associated with foundations, including but not limited to footings and piers, is to be designed by a registered New York State registered Engineer. Any references to portions of work related to foundations are provided for the purposes of identifying scope.
2. For repair and replacement, materials shall be such to produce finish textures and colors to closely match existing surfaces.
3. Bonding of repair work to existing concrete members is critical, and repair work shall become an integral part of existing members.

C. Related Sections: The following Sections contain requirements that relate to this Section:
1. Section 144210 “Lifts” for ADA Ramps or Lifts.

1.02 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections:
1. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, and others if requested by Design Professional (DP).
2. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.
3. Laboratory test reports for evaluation of concrete materials and mix design tests.

1.03 QUALITY ASSURANCE

A. Concrete Standards: Comply with provisions of the following standards, except where more stringent requirements are indicated.
1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
2. ACI 318, "Building Code Requirements for Reinforced Concrete."
3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."

4. FEMA P-550, Second Edition/ December 2009, "Recommended Residential Construction for Coastal Areas"

5. FEMA Technical Bulletin 2, "Flood Damage – Resistant Materials Requirements"

B. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C94 requirements for production facilities and equipment.

PART 2 - PRODUCTS

2.01 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel- type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
   1. Use flexible or curved forms for curves of a 100-foot or less radius.

B. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.02 REINFORCING MATERIALS

A. Welded Steel Wire Fabric: ASTM A185.

B. Hook Bolts: ASTM A307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly to hold coupling against pavement form and in position during concreting operations, and to permit removal without damage to concrete or hook bolt.

C. Supports for Reinforcement: Chairs, spacers, dowel bar supports and other devices for spacing, supporting, and fastening reinforcing bars, welded wire fabric, and dowels in place. Use wire bar-type supports complying with CRSI specifications.

D. At no time will more than 2% calcium chloride be used in freezing weather to accelerate concrete setting. No concrete shall be placed on frozen ground or when the temperature is less than 32 degrees. Concrete may be placed when temperature is 32 degrees or more, provided, however, that weather reports indicate a daily high of at least 40 degrees. After concrete has been finished, when temperatures are expected to be below 32 degrees, a 12" cover of straw shall be spread evenly to preclude freezing. All frozen or spelled concrete will be removed and replaced at Contractor's expense. A controlled environment with an interior temperature of 32 degrees or greater is acceptable if the temperature will remain 32 degrees or greater for five days thereafter.

2.03 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I.
   1. Use one brand of cement throughout Project unless otherwise acceptable to DP.

B. Normal-Weight Aggregates: ASTM C33, Class 4, and as follows. Provide aggregates from a single source.
   1. Maximum Aggregate Size: Comply with Structural Package, Section "Cast-In-Place Concrete" for concrete materials as required.
   2. Do not use fine or coarse aggregates that contain substances that cause spalling.
   3. Local aggregates not complying with ASTM C33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to DP.

C. Water: Potable.

2.04 ADMIXTURES

A. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.

2.05 CURING MATERIALS

A. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M182, Class 2.

2.06 EXPOSED AGGREGATE

A. Aggregate: Clean, washed, uniformly round gravel graded as follows to match existing installations:
   1. 25 percent by volume shall pass through a 1/2-inch screen and be retained on a 3/8-inch screen.
   2. 25 percent by volume shall pass through a 3/8-inch screen and be retained on a 1/4-inch screen.
   3. 50 percent by volume shall pass through a 3/8-inch screen and be retained on a 1/2-inch screen.

2.07 RELATED MATERIALS

A. Bonding Agent: Acrylic or styrene butadiene.

B. Epoxy Adhesive: ASTM C881, two-component material suitable for dry or damp surfaces. Provide material type, grade, and class to suit requirements.

C. Patching Materials: Approved Manufacturers include, but are not limited to the following:
   1. Chem-Masters Corporation, Chagrin Falls, Ohio.
   2. Protex Industries, Inc., Denver, Colorado.
   3. Larsen Products Corporation, Rockville, Maryland.
   4. Guardian Chemical Company, Atlanta, Georgia.
   5. Pecora Chemical Corporation, Philadelphia, Pennsylvania.
   6. Products Research & Chemical Corporation, Gloucester City, New Jersey.

D. Joint Sealer:
   1. Approved Manufacturers and products include, but are not limited to the following:
   2. Pecora Chemical Corporation NR-100, two part pourable polyurethane sealant, black color;
   3. Products Research & Chemical Corporation Rubber Caulk No. 230, three part polyurethane sealant, black color;
   4. Or equal.
   5. Fiber Expansion Joint Filler Strips: 1/2 inch wide by full depth of concrete members, ASTM D1751.

2.08 CONCRETE MIX

A. Prepare design mixes for each type and strength of normal-weight concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use a qualified independent testing agency for preparing and reporting proposed mix designs.

B. Proportion mixes according to ACI 211.1 and ACI 301 to provide normal-weight concrete with the following properties:
   1. Compressive Strength (28-Day): Minimum 4000 psi, air entrained (where indicated).
   2 Compressive Strength (28-Day): Minimum 3000 psi.
   3. Slump Limit at Point of Placement: 2 to 4 inches.

C. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content as follows with a tolerance of plus or minus 1-1/2 percent:
   1. Air Content: 5.5 percent for 1-1/2-inch maximum aggregate.
   2. Air Content: 6.0 percent for 1-inch maximum aggregate.
   3. Air Content: 6.0 percent for 3/4-inch maximum aggregate.
   4. Air Content: 7.0 percent for 1/2-inch maximum aggregate.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, project conditions, weather, test results, or other circumstances warrant.

2.09 CONCRETE MIXING

A. All concrete shall be Ready-Mixed Concrete, from any local producer: Comply with requirements and with ASTM C94.
   1. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION

A. Remove loose material from sub-base surface immediately before placing concrete.

3.02 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations, to match existing installation. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork and screeds for grade and alignment to following tolerances:
   1. Top of Forms: Not more than 1/8-inch in 10-feet.
   2. Vertical Face on Longitudinal Axis: Not more than 1/4-inch in 10-feet.

C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.03 PLACING REINFORCEMENT

A. General: Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars" for placing and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

3.04 JOINTS

A. General: Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise.
   1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.
   2. For repairing existing joint sealer, new joint sealer shall match existing new joint sealer.

B. Contraction Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as specified. Construct contraction joints for a depth equal to at least 1/4 of the concrete thickness, as follows:
   1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into

hardened concrete when cutting action will not tear, abrade, or otherwise damage surface and before development of random contraction cracks.

C. Installation of joint fillers and sealants as specified.

D. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one half of dowel length to prevent concrete bonding to one side of joint.

3.05 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from sub-base surface and reinforcing before placing concrete. Do not place concrete on surfaces that are frozen.

C. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with ACI 304R for measuring, mixing, transporting, and placing concrete.

E. Place concrete in forms in one layer of the required thickness. After concrete has been placed in forms, use a strike-off device to bring the surface to the proper section to be compacted. Tamp and consolidate the concrete with a suitable wood or metal tamping bar. Where repair and replacement of new concrete is adjacent to or is a part of existing concrete, finish on new concrete shall match finish of existing concrete.

F. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

G. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

H. Consolidate concrete by mechanical vibrating equipment supplemented by hand- spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with ACI 309R:

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocating reinforcing, dowels, and joint devices.

I. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

J. Cold-Weather Placement: Comply with provisions of ACI 306R and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
   1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

K. Hot-Weather Placement: Place concrete complying with ACI 305R and as specified when hot weather conditions exist.
   1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
   2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
   3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.06 CONCRETE FINISHING

A. Broom Finish: Apply a non-slip broom finish to all exterior concrete slabs, stairs, walks, and ramps, and elsewhere as indicated. Immediately after float finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route.

B. Where repair and replacement of new concrete is adjacent to or is a part of existing concrete, finish on new concrete shall match finish of existing concrete.

3.07 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 305R for hot weather protection during curing.

3.08 EXTERIOR CONCRETE STEPS

A. Exterior Concrete Steps, Precast
   1. Concrete steps shall be cast-in-place or precast. The Contractor shall install steps as follows:
      a. Remove the designated step(s);
      b. Prepare site for manufactured concrete steps;

c. Minimum size shall be 44-inch wide;
d. Maximum riser height 7-3/4-inch;
e. Minimum run 10-inch and shall extend downward from 1-inch below exit door sill;
f. Rough finish all treads
g. 4000 psi mix with minimum of shrinkage reinforcing provided.

3.09 CONCRETE PORCH-DECKS/INSTALL

A. Concrete Porches, General:
1. Concrete porches shall be formed square and true using lumber of sufficient size to insure straight forms.
2. Adequately brace all forms to eliminate bellying or bows in concrete work.
3. All reinforcing steel, concrete thickness and porch size shall be as per drawings.
4. All concrete porch slab forms shall be inspected by local building inspectors before placing concrete.
5. Submit proof of inspection certificate.
6. All concrete shall contain 6 1/2 bags of cement per cubic yard of concrete and attain a stress of not less than 4000 psi at 28 days.
7. All porch slabs shall pitch 1/8-inch per foot away from structure for drainage.
8. Concrete shall be screened true floated and vibrated with a mechanical vibrator to insure that no voiding will occur and proper covering of reinforcing steel.
9. Steel trowel twice and lightly broom for a non-slip surface. Remove edge forms and finish all exposed ends.
10. Finish all edges with a concrete edger, including bottom edge of slab.
11. All porch slabs improperly finished and/or pitched will be removed and replaced at Contractor's expense.

B. Concrete Porch-Decks/Install
1. The Contractor shall install a new concrete porch as follows:
a. Prepare site for new built concrete porch; install forms of necessary depth, width and height;
b. Install a 2-inch sand cushion and 6-inch x 6-inch 10 ga. steel wire;
c. Pour a minimum of 3-1/2-inch if concrete into forms;
d. Temperature must be a minimum of 40 degrees F and rising;
e. Rough finish all walking surfaces;
f. Remove all debris and excess materials from site;
g. Use premix concrete or equal.

3.10 CONCRETE LIFT PAD

A. See Section 144210 - Lifts for ADA Ramps or Lifts.

B. The Contractor shall install a new concrete lift pad as follows:
1. Prepare site for new built concrete lift pad; install forms of necessary depth, width and height;

2. Install a 2-inch sand cushion and 6-inch x 6-inch 10 ga. steel wire;
3. Pour a minimum of 3-1/2-inch if concrete into forms;
4. Temperature must be a minimum of 40 degrees F and rising;
5. Rough finish all walking surfaces;
6. Remove all debris and excess materials from site;
7. Use premix concrete or equal.

3.11 CONCRETE FLOOR (SLAB) INSTALL/WOOD

A. Installation work consists of the following:
1. All work associated with foundations, including but not limited to footings and piers, is to be designed by a registered New York State Engineer. Any references to portions of work related to foundations are provided for the purposes of identifying scope.
2. Remove wood floor;
3. All load bearing beams and wall members shall be repaired and lifted to a stable structural position prior to concrete pour;
4. Install forms of the necessary depth, height and width;
5. Install a 2-inch sand cushion and 6-inch x 6-inch 6 ga. steel wire;
6. Pour a minimum of 3-1/2-inch of concrete into forms;
7. Temperature must be a minimum of 40 degrees F and rising;
8. Trowel finish all surfaces;
9. Remove all debris and excess materials;
10. For concrete mix see paragraph 2.08.
11. See Appendix B for Typical Elevation Details. The Contractor shall be responsible to have the elevation work designed by a registered New York State Engineer. The Typical Elevation Details are provided for informational purposes only.

3.12 CONCRETE FOOTERS FOR SLAB JACKING/REPAIR

A. The contractor shall repair the concrete slab as follows:
1. All work associated with foundations, including but not limited to footings and piers, is to be designed by a registered New York State Engineer. Any references to portions of work related to foundations are provided for the purposes of identifying scope.

3.13 CONCRETE WALKWAY/INSTALL

A. Concrete Sidewalks, General
1. Sidewalks shall be full 4-inch thick and of widths to match existing, or as hereinafter called for.
2. All sidewalk concrete shall contain 6.2 bags of cement per cubic yard of concrete and attain a stress of not less than 4000 psi at 28 days.
3. Where new concrete abuts existing, place a pre-molded asphalted expansion joint.

4. When old concrete is to be removed, remove to the nearest concrete joint.
5. If no joints exist, cut existing concrete square with a masonry saw to produce a true and square joint.
6. All concrete shall be placed on a well tamped earth or gravel bed free from any organic material.
7. Sides of wall shall be formed straight or curve in a true arc.
8. When concrete abuts a structure or lies in a drainage path, it shall be pitched ¼-inch per foot in the direction of drainage.
9. Concrete shall be screened true and floated so that at least 1/8-inch of "soup" comes to the top.
10. All stone will be at least 1/8-inch below the surface. Steel trowel concrete one time and lightly broom for a non slip surface.
11. Provide control joints every 5-foot and an asphalted expansion strip ever 30-foot.
12. All edges shall be finished with a concrete edger.
13. Concrete incorrectly placed for drainage or not true and/or straight will be removed and replaced at Contractor's expense.
14. Finished surface shall be flush with grade or to match that of existing.

B. The contractor shall install a new concrete walkway as follows:
1. Prepare site for new walk as required for barrier-free access;
2. Install forms of the necessary height, width, and depth;
3. Install a 2-inch sand cushion; and 6-inch x 6-inch 10 ga. steel wire into formed area;
4. Concrete shall be a minimum of 3-1/2-inch depth;
5. For every 5 Linear Feet of walk, run insert fiber joint material;
6. Pour concrete only when temperature is 40 degrees F and rising;
7. Use premix concrete or equal.

3.14 CONCRETE DRIVEWAY/INSTALL

A. Concrete Driveways, General
1. Driveways shall be full 4-inch thick and of widths to match existing, or as hereinafter called for.
2. All driveway concrete shall contain 6.2 bags of cement per cubic yard of concrete and attain a stress of not less than 4000 psi at 28 days.
3. Where new concrete abuts existing, place a pre-molded asphalted expansion joint.
4. When old concrete is to be removed, remove to the nearest concrete joint.
5. If no joints exist, cut existing concrete square with a masonry saw to produce a true and square joint.
6. All concrete shall be placed on a well tamped earth or gravel bed free from any organic material.
7. Sides of wall shall be formed straight or curve in a true arc.
8. When concrete abuts a structure or lies in a drainage path, it shall be pitched ¼-inch per foot in the direction of drainage.

9. Concrete shall be screened true and floated so that at least 1/8-inch of "soup" comes to the top.
10. All stone will be at least 1/8-inch below the surface. Steel trowel concrete one time and lightly broom for a non slip surface.
11. Provide control joints every 10-foot and an asphalted expansion strip every 30-foot.
12. Provide isolation joints where driveway meets the sidewalk, slab, or existing pavement.
13. All edges shall be finished with a concrete edger.
14. Concrete incorrectly placed for drainage or not true and/or straight will be removed and replaced at Contractor's expense.
15. Finished surface shall be flush with grade or to match that of existing.

B. The CONTRACTOR shall install a new concrete driveway as follows:
1. Prepare site for new driveway as required for barrier-free access;
2. Install forms of the necessary height, width, and depth;
3. Install a 2-inch sand cushion; and 6-inch x 12-inch 10 ga. steel wire into formed area;
4. Concrete shall be a minimum of 3-1/2-inch depth;
5. Pour concrete only when temperature is 40 degrees F and rising;
6. Use premix concrete or equal.

3.15 REPAIRS AND PROTECTION

A. Remove and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.

B. Protect concrete from damage. Exclude traffic from paving for at least 14 days after placement. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

C. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

END OF SECTION

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SECTION 035119 - INSULATING CONCRETE FORMS

PART 1 - GENERAL

1.01 SUMMARY

A. The ICF (Insulating Concrete Forms) can be used for new construction of foundation walls.

B. Supply and installation of the ICF (Insulating Concrete Forms) for structural cast in place concrete wall, installation of re-enforcing steel bars and placement of concrete within the insulation concrete forms.

C. Adequate bracing and scaffolding shall be provided by the installation contractor and shall comply with all local codes.

1.02 SCOPE

A. Furnish all labor, materials and tools and equipment to perform the installation on the ICF as specified by the manufacturer.
   1. All work associated with foundation wall for new construction, is to be designed by a registered New York State Engineer. Any references to portions of work related to foundations are provided for the purposes of identifying scope.
   2. For repair and replacement, materials shall be similar in thickness, insulating R-value, finish textures and colors to closely match existing surfaces.
   3. Bonding of repair work to existing ICF members is critical, and repair work shall become an integral part of existing members.

1.03 MATERIALS INSTALLED BUT NOT SPECIFIED OR SUPPLIED UNDER THIS SECTION

A. Reinforcing steel

B. Concrete

C. Anchors, sleeves and inserts

D. Window and door rough openings

E. Penetrations

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Include plans, sections, and details showing roof slopes, lightweight insulating concrete thicknesses, embedded insulation board, roof penetrations, roof perimeter terminations and curbs, control and expansion joints, and roof drains.

1.05 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Material test reports.

C. Research/evaluation reports.

1.06 QUALITY ASSURANCE

A. Qualification – Installers/ Applicators/ Erectors
   1. Contractor shall engage the services of a trained installer or technical associate for the duration of the work under this Section who has been trained in procedures pertaining to the correct installation of the specified form system (Trained installer may already be the designated ICF Installing Contractor if providing credentials as such).
   2. A trained installer shall furnish proof of training documentation to Contractor prior to commencement of work under this Section.

B. Mock-ups
   1. If required, construct sample wall mock-up panel to include full wall system and details, located where directed by Design Professional (DP). Panel may form part of finished work if approved by DP.

C. Standards: Comply with provisions of the following standards.
   1. FEMA P-550, Second Edition/ December 2009, “Recommended Residential Construction for Coastal Areas”

   2. FEMA Technical Bulletin 2, “Flood Damage – Resistant Materials Requirements”

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver products in original factory packaging, bearing identification of product, manufacturer and batch/lot number.

B. A trained installer shall furnish product packaging labels to contractor as required to maintain traceability of product for duration of contract.

C. Bulk of form shipment shall be delivered as pre-assembled units and folded flat to maximize shipping space. Only form panels and insert webs as may be required for floor interfaces or specialized construction on site are to be shipped unassembled but in labeled packages for traceability.

D. Handle and store products in location to prevent damaging and soiling.

E. Maintain form materials and accessories in original packaging (or provide similar protection to unpackaged form materials -should on-site storage prior to installation extend beyond 3 months).

F. Form units and related form installation materials and equipment to be stored flat until time of use.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Quad-Lock

B. NUDURA Corporation

C. Amvic Building System

D. Or Equal, to be reviewed and approved

2.02 MATERIALS

A. Expanded Polystyrene (for Regular Panels Type III in Canada and Type IX in US; for Plus Panels Type II in Canada and US) Requirements as per ASTM C578-95 Standard Specification for Rigid Cellular Polystyrene Thermal Insulation, DIN 54836 and MIL- P-19644.

1. Density (ASTM C 1622-98)
2. Compressive Strength (ASTM D 1621-94)
3. Shear Strength (ASTM C-273)
4. Tensile Strength (MIL-P-19644)
5. Flexural Strength (ASTM C 203-99)
6. Water vapor Permeance (ASTM E-96-94)
7. Water Absorption (96 hr) (ASTM C 272-91)
8. Dimensional Stability (ASTM D 2126-94)
9. Coefficient of Expansion (ASTM D-696)
10. Allowable Dimension Tolerances
11. STC Rating 6in (ASTM)
12. Flammability (ASTM E-84)
13. Flash Ignition Temperature (DIN 54836, Styropor, BASF)
14. Self Ignition Temperature (ASTM D1929)
15. UL/ULC Fire Resistance Rating for Load Bearing Walls Fastener Withdrawal and Lateral Shear Resistance in accordance with ICC-ES AC 353-07, Acceptance criteria for Stay-in-Place, Foam Plastic Insulating Concrete Form (ICF) Systems for Solid Concrete Walls and ASTM D 1761-06, Standard Test Methods/or Mechanical Fasteners in Wood.

2.03 ACCESSORIES

A. Shoring, bracing, and formworks

B. Sleeves for penetrations

C. Exterior and interior finishes

PART 3 - EXECUTION

3.01 EXAMINATION

A. Site verification of conditions
   1. Verify lines, levels, and centers before proceeding with formwork.
   2. Ensure dimensions are accurate with drawings.

B. SURFACE PREPARATION
   1. Clean top of footings and slabs prior to starting installation of ICF. Use methods and materials approved by ICF manufacturer.
   2. Cast anchor dowels into concrete footing as per ICF manufacturer recommended spacing and location related to the form size.

C. INSTALLATION
   1. Install the system in accordance with manufacturers' installation methods. Protect forms from damage.
   2. Install formwork, shoring and bracing to achieve design requirements and in accordance with ACI 301.
   3. Provide bracing to ensure stability and alignment of formwork. Shore or strengthen formwork subject to over stressing by construction loads.
   4. Align joints and install forms in a running bond pattern.
   5. Assure alignment of furring strips to facilitate siding attachment.
   6. Install reinforcing, as indicated in engineered shop drawings, over opening to provided for integral lintels with the wall.
   7. Ties and/or tie flanges placed in accordance with manufacturer's specifications at all horizontal and vertical joints.

D. CONSTRUCTION
   1. Interface with other work
      a. Provide formed openings where required for items to be embedded in or to pass through concrete work.
      b. Locate and set items to be cast directly into concrete.
      c. Coordinate with work of other trades in forming and placing openings, sleeves, bolts, anchors, other inserts.
      d. Install accessories in accordance with manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.
      e. Install floors and/or floor connections, such as Quad-Deck and Deck Forming System, precast panels, Open Web Steel Joist etc.
   2. Site Tolerances
      a. Construct formwork to maintain tolerances as indicated per ACI 301 or CSA S269.

E. FIELD QUALITY CONTROL
   1. Conformance to design drawings or pertinent Building Codes.

2. Plumbness of wall.
3. Rebar placement and proper mixing and disbursement of steel fiber in concrete mix.
4. Inspect stability of erected formwork, shoring and bracing to ensure that work is in accordance with design and that elements are secure.
5. Site testing.

F. CLEANING

1. Clean forms as installation proceeds, to remove foreign matter within forms.
2. Clean formed cavities of debris prior to placing concrete.
3. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.
4. Do not use water to clean out forms in freezing conditions, unless formwork and concrete construction proceed within heated enclosure. Use compressed air or other means to remove foreign matter.

G. PROTECTION

1. Provide temporary cover for insulating forms to reduce exposure to UV light in case the final finish is delayed longer than 8 weeks.
2. Prior to concrete placement, interlocking knobs along the top of the ICF wall shall be protected with steel track or tape or other means to ensure no concrete debris sets on and between the interlocking knobs.

END OF SECTION

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SECTION 040501 - UNIT MASONRY, RESTORATION AND CLEANING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes performance of masonry restoration work as indicated on work order.

B. Scope: Masonry restoration work includes the following:
1. Removal of plant growth.
2. Repair/replacement of damaged masonry.
3. Cleaning exposed masonry surfaces.
4. Re-pointing existing masonry.

C. All work related to repairs and replacement of historically eligible properties as deemed by the New York State Office of Parks, Recreation and Historic Preservation shall involve the repair and replacement of unit masonry elements to match the existing at locations on the exterior and are visible.

1.02 SUBMITTALS

A. Submit the following:
1. Product Data
   a. Manufacturer's technical data for each product to be used including recommendations for application and use.
   b. Include test reports and certifications substantiating that products comply with requirements.
2. Restoration Program
   a. If alternative methods and materials to those indicated are proposed for any phase of restoration work, provide written description, including evidence of successful use on other, comparable projects, and program of testing to demonstrate effectiveness for use on this project.

1.03 QUALITY ASSURANCE

A. Source of Materials Obtain materials for masonry restoration from a single source for each type material required (face brick, stone, cement, sand, etc.) to ensure match of quality, color, pattern, and texture.

B. Standards: Comply with provisions of the following standards.
1. FEMA P-550, Second Edition/ December 2009, "Recommended Residential Construction for Coastal Areas"

2. FEMA Technical Bulletin 2, "Flood Damage – Resistant Materials Requirements"

3. NPS Preservation Brief #2: "Repointing Mortar Joints in Historic Masonry Buildings"

1.04 DELIVERY, STORAGE AND HANDLING

A. Delivery
1. Carefully pack, handle, and ship masonry units and accessories strapped together in suitable packs or pallets or in heavy cartons. Unload and handle to prevent chipping and breakage.
2. Deliver other materials to site in manufacturer's original and unopened containers and packaging, bearing labels as to type and names of products and manufacturers.

B. Protection
1. Protect masonry restoration materials during storage and construction from wetting by rain, snow or groundwater, and from staining or intermixture with earth or other types of materials.
2. Protect grout, mortar and other materials from deterioration by moisture and temperature. Store in a dry location or in waterproof containers. Keep containers tightly closed and away from open flames. Protect liquid components from freezing. Comply with manufacturer's recommendations for minimum and maximum temperature requirements for storage.

1.05 PROJECT CONDITIONS

A. Ambient Conditions
1. Clean masonry surfaces only when air temperatures are 40 deg F (4 deg C) and above and will remain so until masonry has dried out, but for not less than 7 days after completion of cleaning. Do not repoint mortar joints or repair masonry unless air temperatures are between 40 deg F (4 deg C) and 80 deg F (27 deg C) and will remain so for at least for 48 hours after completion of work.

B. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602:
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but not less than 7 days after completing cleaning.

C. Sequencing/Scheduling
1. Perform masonry restoration work in the following sequence:
a. Repair existing masonry including replacing existing masonry with new masonry materials.
b. Rake-out existing mortar from joints indicated to be re-pointed.
c. Repoint existing mortar joints of masonry indicated to be restored.
d. Clean existing masonry surfaces.

PART 2 - PRODUCTS

2.01 MASONRY MATERIALS

A. Face Brick
1. Facing Brick (Exterior): ASTM C 216, Grade SW, Type FBS.
a. Size, Color, and Texture: Matching existing adjacent brickwork.
b. For existing brickwork that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range and variation rather than brick that matches an individual color within that range.
c. Provide units with physical properties not less than those determined from preconstruction testing, of selected existing units.
2. Facing Brick (Interior): ASTM C 216, Grade MW, Type FBS.
a. Size, Color, and Texture: Matching existing adjacent brickwork.
3. Option: Facing brick may be either cored or solid except that only solid brick shall be used for corbeling and where cores would be exposed to view. If cored brick are furnished, core holes shall be not less than 3/4 inch from any edge and no more than 25 percent of the gross area of the brick.

B. Building Brick
1. Provide building brick complying with ASTM C62 for masonry work concealed from view, of same vertical dimension as face brick.
a. Grade SW, MW, or NW for concealed back-up.

C. Concrete Masonry Units
1. Hollow Load-Bearing Units: ASTM C 90, Type I.
2. Solid Load-Bearing Units: ASTM C 90, Type I.
3. Hollow Non-Load-Bearing Units: ASTM C 129, Type I.
4. Concrete Building Brick: ASTM C 55, Type I, Grade N.
5. Fire Rated Units: Aggregate type and equivalent solid thickness as required to obtain the fire resistance rating indicated. Fire resistance ratings shall be based on fire tests in accordance with ASTM E 119.
6. Aggregate:
a. Lightweight Units: ASTM C 331; dry net weight not more than 105 lb per cu ft.
b. Normal Weight Units: ASTM C 33; dry net weight not less than 125 lb per cu ft.
7. Special Shapes: Units of shape and size required for lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions indicated.
a. Outside Corners: Square edge units.
b. Units for Walls and Partitions to be Filled with Loose Type Insulation: Two cell (core) units.

2.02 MORTAR MATERIALS

A. Portland Cement
1. ASTM C150, Type I

B. Hydrated Lime
   1. ASTM C207, Type S.

C. Aggregate for Mortar: ASTM C144, unless otherwise indicated.
   1. For pointing mortar provide sand with rounded edges.
   2. Match size, texture and gradation of existing mortar as closely as possible. Blend several sands if necessary to achieve suitable match.
   3. For Historic Structures: Sand color, size and texture should match the original as closely as possible. Provide a sample of the sand for comparison to the original and have it approved by the SHPO before beginning work.

D. Water
   1. Clean, free of oils, acids, alkalis, and organic matter.

E. Cleaning Materials and Equipment
   1. Water for Cleaning
      a. Clean, potable, free of oils, acids, alkalis, salts, and organic matter.
   2. Brushes
      a. Fiber bristle only
   3. Acidic cleaner
      a. Manufacturer's standard strength acidic masonry restoration cleaner composed of hydrofluoric acid blended with other acids including trace of phosphoric acid and combined with special wetting systems and inhibitors.
         1) Available products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
            a) "Diedrich 101 Masonry Restorer," Diedrich Chemicals.
            b) "Sure Klean Restoration Cleaner," ProSoCo, Inc.
            c) "Price Restoration Cleaner," Price Research, Ltd.
   4. Chemical Paint Remover:
      a. Manufacturer's standard thixotropic/alkaline formulation for removing paint coatings from masonry.
         1) Available Products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
         2) "Diedrich 505/606/606C Paint Remover"; Diedrich Chemicals.
         3) "Sure Klean Heavy-Duty Paint Stripper"; ProSoCo, Inc.
   5. Liquid Strippable Masking Agent:
      a. Manufacturer's standard liquid, film forming, strippable masking material for protecting glass, metal and polished stone surfaces from damaging effect of acidic and alkaline masonry cleaners.

1) Available products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
   a) "Asphalt and Tar Remover"; ProSoCo, Inc.
   b) Approved Equal.

6. Asphalt and Tar Remover:
   a. Manufacturer's standard cleaning materials for removal of asphalt/tar roofing spills, grease, hydraulic oil, motor oil, and other similar stains.
      1) Available products: Subject to compliance with requirements, products which may be incorporated in the work include, but are not limited to, the following:
         a) "Asphalt and Tar Remover"; ProSoCo, Inc.
         b) Approved Equal

7. Spray Equipment:
   a. Provide equipment for controlled spray application of water and chemical cleaners, if any, at rates indicated for pressure, measured at spray tip, and for volume.
      1) For spray application of chemical cleaners provide low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray-tip.
      2) For spray application of water, provide fan-shaped spray-tip which disperses water at angle of not less than 15 degrees.

F. Mortar Mixes
1. General:
   a. Measure cementitious and aggregate material in a dry condition by volume or equivalent weight. Do not measure by shovel; use known measure. Mix materials in a clean mechanical batch mixer.
   b. Do not use admixtures of any kind in mortar, unless otherwise indicated.

2. Mortar Proportions
   a. Mortar for Brick: One part Portland cement, 3 parts lime, 9 parts mortar aggregate.
   b. Mortar for Stone: One part white Portland cement, 1 part lime, 6 parts mortar aggregate.

3. Mixes for Historic Structures
   a. Have the existing mortar completely analyzed to insure that the repointing mortar will not be less permeable/harder than the masonry units or the original mortar. IT IS BETTER TO HAVE MORTAR THAT IS MORE PERMEABLE THAN LESS.
   b. Measure all ingredients by cubic volume using a pre-established uniform measure, such as a small bucket, rather than a less uniform measure such as a shovel.
   c. For historic masonry set in lime mortar, use the following mortar mix:

      1 part Portland cement

3 parts lime
8-12 parts sand (To match existing mortar as closely as possible.)

NOTE: The exact mix required will relate to the grain size and sharpness of the sand and will vary depending on the supply.

-OR-

For historic masonry set in standard mortar, use the following mortar mix (ASTM C270 Type "0") as a starting point:

1 part Portland cement
2 parts lime or lime putty
6 to 9 parts sand and stone dust (To match existing mortar as closely as possible.)

d. Mix a final "job-size" batch once the correct sand color, cement content, etc. have been determined through small tests to ensure the on-site mixing conditions will result in the same final product.

G. Chemical Cleaning Solutions
1. General:
a. Unless otherwise indicated, dilute chemical cleaning materials with water to produce solutions of maximum 3% hydrofluoric acid concentration, but no greater than that recommended by chemical cleaner manufacturer.
2. Chemical Paint Remover: In concentration recommended by chemical cleaner manufacturer.

H. Accessories
1. Masonry Wall Reinforcement: Joint reinforcement factory fabricated from cold-drawn steel wire, truss or ladder design, 9 gage deformed steel wire longitudinal rods welded to 9 gage steel wire cross ties spaced 16 inches on center; width 1-1/2 to 2 inches less than wall thickness. Furnish factory-fabricated corner and tee sections for corners and wall intersections.
a. Finish for Exterior Walls: 1.5 oz per sq ft hot dipped galvanized after fabrication.
b. Finish for Interior Walls: 0.8 oz per sq ft mill galvanized.
c. Cavity Wall Construction: Ladder design fabricated with drip notch in cross ties centered over the cavity.
d. For walls with concrete masonry unit back-up wythe, reinforcement shall have a third longitudinal rod located for proper embedment at internal face shell of concrete masonry units.
e. Provide units with adjustable 2-piece rectangular ties where horizontal joints of facing wythe do not align with those of back-up.
2. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.

a. Rebar Positioner: Fabricate from galvanized steel wire, 9 gage or 6.5 gage as required. Design to fit concrete masonry units, and number, size and location of rebars indicated. Products; Steel-Wich Telescoping Rebar Positioner™, P. O. Box 1936, Buffalo, NY 14240, (716) 683-7526; or No. 376, 377 by Heckmann Accessories, 4015 West Carroll Avenue, Chicago, IL 60624, (800) 621-4140.

3. Buck Anchors (For Anchoring New Masonry to Existing Construction): 1-1/4 x 1/8 x 8 inch long Z type steel buck anchor with 2 inch long right angle bent ends, bolt hole in one bent end, 1.5 oz per sq ft hot dipped galvanized after fabrication. Furnish 3/8 inch diameter galvanized machine bolt and nonferrous metal expansion shield.
4. Continuous Steel Angle (For Anchoring New Masonry to Existing Masonry): Continuous galvanized steel angles of sizes indicated with holes spaced 18 inches on center. Furnish galvanized steel anchors of sizes and types indicated or required.
5. Masonry Veneer Anchors:
   a. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
      1) Structural Performance Characteristics: Capable of withstanding a 100-lbf (445-N) load in both tension and compression without deforming or developing play in excess of 0.05 inch (1.3 mm).
   b. Contractor's Option: Unless otherwise indicated, provide any of the following types of anchors:
   c. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal anchor section.
6. Flexible Anchors: 1.5 oz per sq ft hot dipped galvanized steel anchors which will permit horizontal and vertical movement of masonry but will maintain lateral restraint, and as follows:
   a. For Anchorage To Concrete Framework: 2 piece anchors with 12 gage sheet steel dovetail section and rectangular or vee-shaped 3/16 inch diameter wire tie section sized to extend to within one inch of face of masonry.
7. Dovetail Anchor Slot Concrete Inserts: 24 gage galvanized steel, with filler strip; slot sized to fit dovetail anchor.
8. Unit-Type Concrete Inserts: Cast iron or malleable iron, or fabricated 12 gage steel with 1.5 oz per sq ft hot-dip zinc coating.
9. Masonry Wall Ties: 3/16 inch diameter cold-drawn steel wire, with 1.5 oz per sq ft hot-dip zinc coating after fabrication; Z-shaped for solid unit masonry, rectangular shape for hollow unit masonry; 2 piece adjustable type where wythe courses are not aligned.
10. Tiebars: 1-1/4 x 1/4 x 28 inch long steel bars with 3 inch long right angle bent ends, 1.5 oz per sq ft hot dipped galvanized after fabrication. Adjust length of bars as required when obstructions are encountered.

11. Metal Lath: Galvanized, expanded metal lath weighing not less than 3.4 pounds per square yard.
12. Hardware Cloth: 16 gage, 1/2 inch square mesh, galvanized steel wire mesh.
13. Premolded Control Joint Strips: Solid rubber strips of profile indicated (to maintain lateral stability of wall); 60-80 Shore A durometer hardness.
14. Asphalt Felt (For Mortar Control Joints): No. 15 asphalt saturated organic felt; ASTM D 226.
15. Clay Flue Lining: ASTM C 315.
16. Masonry Flashing: Copper fabric consisting of 7 oz copper sheet with asphalt impregnated glass fabric bonded to both sides.
    a. Joint Sealant: Trowel grade asphalt roofing cement.
17. Weep/Vent Products: Use the following unless otherwise indicated:
    1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.

PART 3 - EXECUTION

3.01 PREPARATION

A. General: Comply with recommendations of manufacturers of chemical cleaners for protecting building surfaces against damage from exposure to their products.

B. Protection:
1. Protect persons, motor vehicles, surrounding surfaces of building whose masonry surfaces are being restored, building site, and surrounding buildings from injury resulting from masonry restoration work.
2. Prevent chemical cleaning solutions from coming into contact pedestrians, motor vehicles, landscaping, buildings, and other surfaces which could be injured or damaged by such contact.
3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
4. Dispose of runoff from cleaning operations by legal means and in manner which prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.
5. Erect temporary protection covers over pedestrian walkways and at points of entrance and exit for persons and vehicles which must remain in operation during course of masonry restoration work.
6. Protect glass, unpainted metal trim and polished stone from contact with acidic chemical cleaners by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape. Apply masking agent to comply with manufacturer’s recommendations. Do not apply liquid masking agent to painted or porous surfaces.

7. Protect unpainted metal from contact with alkali chemical cleaners by covering them either with liquid strippable masking agent or polyethylene film and waterproof masking tape.

3.02 CLEANING EXISTING MASONRY

A. Procedures:
1. Proceed with cleaning in an orderly manner; work from top to bottom of each scaffold width and from one end of each elevation to the other.
2. Use only those cleaning methods indicated for each masonry material and location.
3. Perform each cleaning method indicated in a manner which results in uniform coverage of all surfaces, including corners, moldings, interstices, and which produces an even effect without streaking or damage to masonry surfaces.
4. Rinse off chemical residue and soil by working upwards from bottom to top of each treated area at each stage or scaffold setting.

B. Removal of Plant Growth:
1. Remove plant and moss growth completely from masonry surfaces. Carefully remove plants, creepers and vegetation by cutting at roots and allowing to dry as long as possible prior to removal. Remove loose soil or debris from open masonry joints to whatever depth it occurs.
2. Apply ammonium sulfamate or other acceptable root killing material to plant roots, in accordance with manufacturer's instructions. Do not apply materials to plants or vegetation to remain.

C. Water Applications:
1. Spray-apply water to masonry surfaces to comply with requirements indicated for location, purpose, water temperature, pressure, volume and equipment. Unless otherwise indicated, hold spray nozzle no less than 6" from surface of masonry and apply water from side to tide in overlapping bands to produce uniform coverage and an even effect.

D. Chemical Cleaner Application Methods:
1. Apply chemical cleaners to masonry surfaces to comply with chemical manufacturer's recommendation using brush or spray application methods, at Contractor's option, unless otherwise indicated. Do not allow chemicals to remain on surface for periods longer than that indicated or recommended by manufacturer.
2. Do not apply chemical cleaners to same masonry surfaces more than twice.

E. Brickwork Cleaning: Clean brick masonry surfaces with acidic cleaner applied as follows:
1. Pre-wet masonry with cold water applied by low pressure spray.
2. Apply acidic cleaner to masonry. Let cleaner remain on surface for period recommended by chemical cleaner manufacturer before rinsing away.

3. Rinse masonry with cold water to remove chemicals and soil, applied at 400-800 psi, 3-6 gallons per minute.
4. Repeat chemical cleaning procedure above where required to produce an effect established by mock-up. Do not apply more than twice.

F. Paint Removal
1. Apply chemical paint remover to remain on surface for period recommended by paint remover manufacturer.
2. Apply chemical paint remover to remain on surface for period recommended by paint remover manufacturer.
3. Remove chemical and paint residue by rinsing with water applied by high pressure spray, 800-1200 psi, 3-6 gallons per minute.
4. Apply acidic cleaner as an after wash to masonry while it is still wet using low pressure spray equipment or soft fibered brush. Let cleaner remain on surface for period recommended by manufacturer, unless otherwise indicated.
5. Rinse masonry with cold water to remove chemicals and soil, applied by medium pressure spray, 400-800 psi, 3-6 gallons per minute.

3.03 BRICK REMOVAL AND REBUILDING

A. Brick Removal:
1. Carefully remove by hand at locations indicated any bricks which are buckled, damaged, spalled or deteriorated. Cut out full units from joint to joint and in manner to permit replacement with full size units.
2. Support and protect masonry indicated to remain which surrounds removal area.
3. Salvage as many whole, undamaged bricks as possible. Remove mortar, loose particles and soil from salvaged brick by cleaning with brushed and water. Store brick for reuse.
4. Clean remaining brick at edges of removal areas by removing mortar, dust, and loose debris in preparation for rebuilding.

B. Brick Rebuilding:
1. Install new or salvaged brick to replace removed brick. Fit replacement units into bonding and coursing pattern of existing bricks. If cutting is required use mortar driven saw designed to cut masonry with clean, sharp unchipped edges.
2. Lay replacement brick with completely filed, bed, head and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet clay bricks which have ASTM C67 initial rates of absorption (suction) of more than 30 grams per 30 sq. in. per minute. Use wetting methods ensure that units are nearly saturated but surface dry when laid. Maintain joint width for replacement units to match existing.
3. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.

C. REPOINTING EXISTING MASONRY

1. Joint Raking
   a. Rake out mortar from joints to depths equal to 2-1/2 times their widths but no less than 1-inch, nor less than required to expose sound, un-weathered mortar.
   b. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum or flush joints to remove dirt and loose debris.
   c. Do not spall edges masonry units or widen joints. Replace any masonry units which become damaged.
   d. Do not rake out and repoint joints where not required.
2. Joint Pointing
   a. Rinse masonry joint surfaces with water to remove any dust and mortar particles. Time application of rinsing so that, at time of pointing, excess water has evaporated or run off, and joint surfaces are damp but free of standing water.
   b. Apply first layer of pointing mortar to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8-inch until a uniform depth is formed. Compact each layer thoroughly and allow to become thumbprint-hard before applying next layer.
   c. After joints have been filled to a uniform depth, place remaining pointing mortar in 3 layers with each of first and second layers filling approximately 2/5 of joint depth and third layer the remaining 1/5. Fully compact each layer and allow to become thumb print hard before applying next layer. Where existing bricks have rounded edges recess final layer slightly from face. Take care not to spread mortar over edges onto exposed masonry surfaces, or to featheredge mortar.
   d. When mortar is thumbprint hard, tool joints to match original appearance of joints, unless otherwise indicated. Remove excess mortar from edge of joint by brushing.
   e. Cure mortar by maintaining in a damp condition for not less than 72 hours.
   f. Where repointing work precedes cleaning of existing masonry allow mortar to harden not less than 30 days before beginning cleaning work.
3. Cleaning
   a. After mortar has fully hardened thoroughly clean exposed masonry surfaces of excess mortar and foreign mater using stiff nylon or bristle brushes and clean water, spray applied at low pressure.
   b. Use of metal scrapers or brushes will not be permitted.

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SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Rough carpentry: All framing, furring and sheathing shall be completed with rough hardware and installed in conformance with the 2010 Residential Code of New York State (RC-NYS).

B. Framing is to resist wind load of 90 MPH.

C. Repair: Patches and scabs shall be installed in conformance with the Codes and with STATE and its local government adopted amendments.

D. Replacement: Complete removal of damaged material and all associated construction as required and the installation of all new construction shall be in conformance with the Codes and with STATE and its local government adopted Ordinance amendments.

E. All work related to repairs and replacement of historically eligible properties as deemed by the New York State Office of Parks, Recreation and Historic Preservation shall involve the repair and replacement of wood elements to match the existing at locations on the exterior and are visible.

F. It is the responsibility of the contractor to include historic material replacement and repairs and assembly requirements and it is the responsibility to field measure and verify existing conditions and materials.

G. Refer to Finish Carpentry Section 062000 for related construction.

H. Standards: Comply with provisions of the following standards.
1. FEMA P-550, Second Edition/ December 2009, “Recommended Residential Construction for Coastal Areas”

2. FEMA Technical Bulletin 2, “Flood Damage – Resistant Materials Requirements”

I. This Section includes the following:
1. Wood framing.
2. Wood supports.
3. Wood blocking.
4. Wood cants.
5. Wood nailers.
6. Wood furring.
7. Wood grounds.
8. Wood sheathing.
9. Wood subflooring.
10. Wood underlayment.

11. Plywood backing panels.
12. Building wrap.
13. Structural Steel.
14. Wood sleeper.

1.02 PROJECT CONDITIONS

A. Immediately upon delivery to job site, place materials in area protected from weather.

B. Store materials in a minimum of 6-inch above ground on framework or blocking and cover with protective water-proof covering providing for adequate air circulation or ventilation.

C. Do not store seasoned materials in wet, damp portions of building.

D. Protect fire retardant materials against high humidity and moisture during storage and erection.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.04 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Shear panels.
5. Power-driven fasteners.
6. Powder-actuated fasteners.
7. Expansion anchors.
8. Metal framing anchors.

PART 2 - PRODUCTS

2.01 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS20 and applicable rules of lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
   1. Factory mark each piece of lumber with grade stamp of grading agency.
   2. For exposed lumber indicated to receive stained or natural finish, 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. Provide dressed lumber, S4S, unless otherwise indicated.

B. Certified Wood: Boards and dimension lumber shall be certified as "FSC Pure" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."

C. Maximum Moisture Content:
   1. Boards: 19 percent.
   2. Dimension Lumber: 19 percent for 2-inch nominal (38-mm actual) thickness or less; no limit for more than 2-inch nominal (38-mm actual) thickness.
   3. Timber: No limit.

D. All adhesives used in this section must comply with Rule 1168 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51, of the Bay Area Air Quality Management District.

2.02 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

B. Kiln-dry material after treatment to a maximum moisture content of 15 percent for lumber and 15 percent for plywood.

C. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.

D. Application: Treat items indicated as follows:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   3. Wood framing members less than 15-inch above grade.
   4. Wood floor plates that are installed over concrete slabs directly in contact with earth.
   5. Wood members in contact with masonry or concrete, soil or water.

E. Preservative Chemicals: Acceptable to authorities having jurisdiction.
   1. Do not use chemicals containing arsenic or chromium, except for timber posts.

2.03 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, provide materials that comply with performance requirements in AWPA C20 (lumber) and AWPA C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

2.04 DIMENSION LUMBER

A. General: Of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

B. Non-Load-Bearing Interior Partitions: Standard, Stud.

C. Framing Other Than Non-Load-Bearing Partitions: Construction, Stud.

2.05 TIMBER AND MISCELLANEOUS LUMBER

A. Provide miscellaneous lumber for support or attachment of other construction, including the following:
   1. Rooftop equipment bases and support curbs.
   2. Blocking.
   3. Cants.
   4. Nailers.
   5. Furring.
   6. Grounds.

B. For items of dimension lumber size, provide Standard, Stud grade lumber with 15 percent maximum moisture content of any species.

2.06 SHEATHING

A. Plywood Wall Sheathing: Exterior sheathing.
   1. 5/8-inch Thick

B. Plywood Roof Sheathing: Exterior sheathing.
   1. 5/8-inch Thick

C. Insulated Sheathing
   1. Glass reinforced polyiso-cyanurate foam insulation board with aluminum foil facing on both sides.
   2. Size and Edges: 4-foot wide, not less than 8-foot long, with square edges on sides.

2.07 SUBFLOORING AND UNDERLAYMENT

A. Plywood Subflooring: Exterior, Structural I single-floor panels or sheathing, 3/4-inch thick.

B. Plywood Underlayment for Resilient Flooring: DOC PS1, Exterior A-C with fully sanded face, 3/4-inch thick.

C. Plywood Underlayment for Carpet: DOC PS1, Exterior, C-D Plugged, 3/4-inch

D. Plywood Sheathing for Exterior: DOCPS1, Exterior C-D Plugged, 5/8-inch thick.

E. Hardboard Underlayment: AHA A135.4, Class 4 (Service), Surface S1S; with back side sanded, 3/4-inch thick.

F. Underlayment for Wood Flooring (Sold and Engineered Wood): Underlayment for wood flooring shall include Plywood and a Vapor Retardant.
   1. Plywood: DOC PS1, Exterior A-C with fully sanded face, 3/4 in. thick.
   2. Vapor Retardant: ASTM D4397, polyethylene sheet not less than 6.0 mils (0.15 mm) thick.

2.08 MISCELLANEOUS MATERIALS

A. Fasteners:
   1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
   2. Power-Driven Fasteners: CABO NER-272.
   3. Bolts: Steel bolts complying with ASTM A307, Grade A (ASTM F568M, Property Class 4.6); with ASTM A563 (ASTM A563M) hex nuts and, where indicated, flat washers.
   4. Fasteners for pressure treated wood.

B. Metal Framing Anchors: Made from hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.

C. Building Wrap: ASTM E 1677, Type 1 air retarder; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E84; UV stabilized; and acceptable to authorities having jurisdiction.

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

E. Sheathing Tape: Pressure-sensitive plastic tape for sealing joints and penetrations in sheathing and recommended by sheathing manufacturer for use with type of sheathing required.

F. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32-inch (0.8-mm); selected from manufacturer's standard widths to suit width of sill members indicated.

G. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.

H. Leveling and Patching Compound: Latex modified, hydraulic-cement based suitable for plywood substrate and as formulated to meet floor finish manufacturer's requirements.

2.09 STRUCTURAL STEEL

A. Minimum thickness, not including rolled beams and channels, shall be as follows:
1. Steel not exposed to weather: 3/16-inch.
2. Steel exposed to weather but accessible for painting: ¼-inch.
3. Steel partly exposed to weather and not accessible for painting: 5/16-inch.

B. All steel shall be furnished with one shop applied coat of red oxide primer. Field welds and connections shall be painted after erection. The shop paint shall be Non-Lead or another rust inhibitive steel primer.

2.10 PLASTIC DECKING

A. Plastic Lumber, General: Products acceptable to authorities having jurisdiction with current model code evaluation reports that show compliance with building code in effect for Project for indicated type of construction.
1. Allowable loads and spans, as documented in evaluation reports or in information referenced in evaluation reports, shall not be less than design loads and spans indicated.

B. Composite Plastic Lumber: Solid shapes made from a mixture of cellulose fiber and polyethylene or polypropylene.
1. Basis-of-Design Product: Subject to compliance with requirements, provide Trex Company, Inc., Transcend or comparable product by one of the following:
a. CertainTeed Corporation.
b. DuraLife™ Decking & Railing Systems (Integrity Composites)
2. Decking Standard: ICC-ES AC174.
3. Surface Texture: Woodgrain.

PART 3 - EXECUTION

3.01 GENERAL WOOD INSTALLATION

A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. All lumber to be grade marked and surfaced 4 sides. Minimum grading of lumber shall be as set forth in this section. Minimum grade for exterior wall and partition framing shall be stud grade or better. Size shall be 2-inch x 4-inch, spacing shall be 16-inch on

center, unless larger members are required by code. All toe plates shall be factory pressure treated. For three-story buildings, studs in the first story shall be not less than 2-inch x 6-inch nominal sizes. All rough and framing lumber in contact with concrete will be termite resistant pressure treated lumber. All wood structural members shall be of sufficient size to carry the dead and require live loads without exceeding the allowable working stresses.

C. Anchorage of wood framing shall be in accordance with Manufactures' Specifications and all other applicable codes.

D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative- treated lumber and plywood.

E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
   1. CABO NER-272 for power-driven fasteners.
   2. Published requirements of metal framing anchor manufacturer.
   3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2).

F. Use finishing nails for exposed work, unless otherwise indicated. Countersink nail heads and fill holes with wood filler.

G. Fastening Methods:
   1. Combination Subfloor-Underlayment: Glue and nail to wood framing.
   2. Subflooring: Glue and nail to wood framing.
   3. Sheathing: Nail or staple to wood framing.
   4. Underlayment: Nail or staple to subflooring.
   5. Plywood Backing Panels: Nail or screw to supports.

H. Apply building paper horizontally with 2-inch (50-mm) overlap and 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails. Cover upstanding flashing with 4-inch (102-mm) overlap.

3.02 INSTALLATION OF WOOD FRAMING

A. Exterior Wood Support Beam
   1. Installation shall comply with the STATE and its adopted local government Ordinance amendments for inspections when installing new exterior wall wood support beams, as follows:
      a. Install a new beam;
      b. Set and shim new solid concrete piers and pads;
      c. Splice all joint;
      d. Splices shall be overlapped a minimum of 24-inch;
      e. Wood shim depth from pier to beam shall not exceed 2-inch;
      f. Beam size shall be 4-inch x 6-inch or greater;

g. New wood shall be treated lumber and when in contact with concrete or ground shall be spaced with metal or felt paper. (Work shall comply with the State Board of Windstorm Insurance Inspection)

h. Use pressure treated #2 yellow pine; concrete piers and pads from local producer; or equal

B. Interior Wood Support Beam

1. Installation shall comply with the STATE and its adopted local government Ordinance amendments for inspections when installing interior wood support beams, as follow:
   a. Remove all rotted or damaged parts of the beam at location;
   b. Remove defective or non-concrete piers;
   c. Set and shim good existing piers;
   d. Install new solid concrete piers and pads as needed;
   e. Install a new beam;
   f. Set and shim new concrete piers and pads;
   g. Splice all joints;
   h. Splices shall be overlapped a minimum of 24-inch;
   i. Wood shim depth from pier to beam shall not exceed 2-inch; beam size shall be 4-inch x6-inch or greater;
   j. New wood shall be treated lumber and when in contact with concrete or ground shall be spaced with metal or felt paper
   k. Use pressure treated #2 yellow pine; concrete piers and pads.
2. Repair shall comply with the STATE and its adopted local government Ordinance amendments for inspections when repairing interior wood support beams, as follows:
   a. Jack to remove sag, bow, or bounce; shim existing piers; splice weak areas;
   b. Beam splices shall be overlapped a minimum of 24-inch;
   c. All new wood shall be treated lumber and when in contact w/concrete or ground shall be spaced with metal or felt paper;
   d. Use Pressure Treated #2 Yellow Pine; concrete piers and pads.

C. Wood Porch Repair

1. Remove all rotted or damaged parts of the deck and foundation structural members;
2. Correct all leans, bows, and sags due to faulty support piers;
3. Materials used for repair shall match existing work;
4. Paint porch with two coats of exterior porch and deck enamel;
5. New wood shall be treated lumber and when in contact with concrete or grounds shall be spaced with metal or felt paper;
6. Use pressure treated #2 yellow pine.

D. Floor Joist

1. Install

a. Remove all rotted and damaged joist at location;
b. Install new floor joist with metal joist hangers;
c. Splice joints;
d. Install solid concrete piers with pads as needed to eliminate interior floor bounce;
e. Joist shall be placed a minimum of 16-inch O.C.;
f. Splices shall be overlapped a minimum of 24-inch;
g. Wood shim depth from top of pier to beam shall not exceed 2-inch;
h. Wood shall be treated lumber and when in contact with concrete or ground shall be spaced with galvanized metal or felt paper;
i. Use: Pressure Treated #2 Yellow Pine;
j. Solid concrete piers and pads from local producer or equal.

2. Repair
   a. Remove all rotted and damage joist;
   b. Jacking to remove sage, bow, and bounce;
   c. Shim existing piers;
   d. Splice weak areas;
   e. Anchor loose joist ends with metal joist hangers;
   f. Install cross braces to remove bow in joist;
   g. Remove doglegs and other objects that cause bulges in interior floor surfaces;
   h. Shim depth from top of pier to beam shall not exceed 2-inch;
   i. Wood shall be treated lumber and when in contact with concrete or ground shall be spaced with galvanized metal or felt paper;
   j. Use pressure treated #2 yellow pine; or equal.

E. Wood Floor Framing
1. Plywood subflooring shall be grade C-D plywood or better; minimum thickness shall be 3/4-inch where joists are spaced at 16-inch o.c. and edges shall be continuously supported. Plywood joints are to be staggered.
2. Thickness for subfloor boards supporting wood strip flooring shall be 3/4-inch; minimum width shall be 6-inch.
3. Plank subfloor shall be T & G or spliced; minimum thickness shall be 2-inch; maximum width shall be 6-inch. Thickness of underlayment for resilient flooring shall be 3/4-inch.
4. Plywood shall be underlayment grade or better with exterior glue in those areas subject to moisture penetration. Underlayment to be painted. Chipboard not allowed in kitchen and bath. Provide at least 1/2-inch clearance between subflooring and masonry or concrete walls.
5. Subfloor boards used as a base for adhesive applied resilient flooring and ceramic tile shall have a thickness of 3/4-inch.
6. Plywood subfloor patching shall match thickness of adjacent subfloor material and shall have stagger joints.

7. Exterior plywood shall be used where exposed to weather or where necessary for structural purposes and shall be painted. Finished floors, when of wood, shall be of hardwood or vertical grain kiln-dried soft wood. All surfaces of finished wood floors shall be properly sanded, filled, sealed and varnished with two coats of polyurethane varnish.
8. Floor Finish specifications can be found in Division 9.

F. Sills
1. Termite shields are to be metal and extend 2-inch over each side of foundation wall. Shields are to separate all exterior sill plates from masonry.
2. Sill sealer is to be of fiberglass with a nominal dimension of 1-inch x 4-inch, and is to be placed over termite shield and under exterior sill plate.
3. Sill plates are to be weather treated with a nominal thickness of 2-inch and a nominal width of 8-inch.

G. Floors Subfloor
1. Install
   a. Remove damaged or rotted subfloor (where existing is single floor, replace as subfloor).
   b. Replace any Rotted or damaged floor frame members; install subfloor to match existing; install 15-lb roofing entire floor area.
2. Repair
   a. Remove damaged or rotted subfloor (where existing is a single floor, repair as subfloor). Subfloor in solid good condition shall remain and be prepped to receive scheduled floor finish.
   b. Replace any rotted or damaged floor frame members.
   c. At location: Install new wood to complete subfloor; install 15-lb asphalt felt to entire area.
   d. Use One side sanded BC Plywood or equal.
   e. Leveling and patching compound suitable for plywood substrate and as formulated to meet floor finish manufacturer's requirements shall be used in those locations where patching has occurred to create a smooth and level subsurface for floor finish installation.

H. Floor Underlayment
1. Over top of floor joist, install new 3/4-inch C-D or better plywood across joists for subfloor; install 15-lb roofing felt to entire floor area; stagger all plywood joints; nail down plywood ring shank nails at 4-inch o.c. at edges and 8-inch in rows at middle; set all nail heads; fill all depressions and joints with hardrock putty; sand all rough areas for smooth surface finish. Paint with exterior grade paint.
2. Use one sided sanded CD and BC plywood or equal.
3. Wood floor framing including joists, columns girders and headers shall be constructed to support IRC minimum design loads. Joists and beams shall be set with crown up.

4. Splices shall occur only over bearing points.

I. Wood Columns
1. Shall bear on concrete or solid masonry base. In basements, top of base shall be at least 3-inch above finished floor.
2. Columns shall be continuous without splices. Columns shall be squared at both ends for level bearing. Top of column shall be fastened to girder with metal clip angles, with leg screws, spiked or bolted.

J. Wood Joists
1. Joists are laid 16-inch o.c. with a nominal thickness of 2-inch and the same width as existing joists or as specified. All nails and other metals are to be galvanized.
2. Joists shall be doubled under all partitions, around stair wells, chimneys and other openings where unusual loading conditions.

K. Cross Bridging
1. Bridging shall be placed approximately 8-foot apart with 2 rows of 1-inch x 3-inch boards or compression type metal bridging double nailed and driven up tight.

L. Joist Framing at Masonry
1. Joists shall be “fire cut” sawed. The minimum bearing for joist shall be 3-inch.

M. Joist Framing at Side of Wood Beam
1. Steel joist hangers shall be 1-inch strap iron or as specified under Accessories.
2. Steel angle shall be 3-inch x 2-inch 18 gauge 6-inch long applied to both sides of joists or as specified under accessories.
3. Wood bearing strap shall be at least 2-inch x 2-inch. Joist shall not be notched more than 1/4 of joist depth. Toenail joist to girder.

N. Plywood Deck Sheathing
1. Plywood sheathing to match existing in thickness with tight joints at all edges. New decks over 16-inch o.c. joist shall have 5/8-inch T & G plywood glued and nailed perpendicular to joists. 24-inch o.c. joist shall use 3/4-inch T&G plywood. All nails and other metals are to be galvanized. Rows of plywood sheathing are to be staggered a minimum of 24-inch per row with recommended stagger of 48-inch.

O. Interior Partition Framing
1. Framing Studs in one and two-story buildings shall be not less than nominal 2-inch x 4-inch with the wide face perpendicular to the partitions. In three-story buildings studs in the first story shall be no less than nominal 3-inch x 4-inch or 2- inch x 6-inch. Studs supporting floors ceilings and roofs shall be spaced not more than 16-inch o.c. Double studs shall be provided on each side of openings exceeding 3-foot in width, and triple studs shall be provide on each side of openings exceeding 6-foot in width.

2. Headers shall be provided over each opening in bearing partitions. Headers shall not exceed the spans recommended by the American Wood Products Association. They may be of solid lumber or equivalent cross-section. In all cases excessive flexures at load shall not be permitted where the opening does not 3-foot and each end of the header shall be supported on a stud or framing anchor. Where the opening exceeds 3-foot in width, each end of the header shall be supported on one stud and where the opening exceeds 6-foot each end shall be supported by two studs.
3. Studs shall be capped with double top plates installed to provide overlapping at corners and at intersections with exterior walls. End joints in double top plates shall be offset at least 24-inch. For platform frame construction, studs shall rest on a single bottom plate.
4. Wall Structure Repair
    a. Expose the noted area by removing carefully interior or exterior wall covering (salvage as much as possible);
    b. Remove rotted or damaged parts of wall framing members;
    c. Replace parts with new framing members parts;
    d. Replace interior or exterior wall covering (additional pieces as needed);
    e. Repair is to match adjacent area as closely as possible;
    f. Submit flashing details for review where repairs are adjacent to/or include windows and doors;
    g. Use #2 Yellow Pine.
5. Wall Structure Install
    a. Expose the noted wall area form ceiling to floor by removing carefully the interior or exterior wall covering (salvage as much as possible);
    b. Remove all of the wall framing members from floor to ceiling;
    c. Reconstruct the wall area complete with all new materials;
    d. Replace interior or exterior wall covering (add additional pieces as needed) to match adjacent areas;
    e. Use #2 Yellow Pine or treated.
6. 2 Hour Rated Fire Walls
    a. Structural wood members in firewall are to be fire treated, with any plates in contact with concrete or masonry to be weather treated as well. Two layers of 5/8-inch fire code water resistant sheetrock is to be applied with nails and glue to the exterior side of the firewall. The first layer is to be installed vertically, the second layer horizon tally staggering every other row with a recommended stagger of 48-inch. Two layers of 5/8-inch fire code sheetrock is to be applied on the interior of the wall in the same manner.
7. Bath Wet Walls
    a. 2-inch x 6-inch studs in partition of bathroom shall be used to form passage of bathroom pipes;

b. Unless reinforced, studs shall not be notched more than l in. of their depth or drilled through the wide face more than 1-1/4-inch in a 4-inch stud, or 2- inch in a 6-inch stud.

P. Exterior Wall Framing

1. Studs in one-and-two story buildings shall be not less than nominal 2-inch x4-inch with the wide face perpendicular to wall. Studs supporting ceilings and roofs shall be spaced not more than 16-inch o.c.
2. All plates are to be 2 x 4's. Top plate is to be doubled and interlocking at corners and wall sections. Bottom plate is to be moisture treated if resting on or beside concrete or masonry. Bottom sill plates are to be secured by 1/2-inch x 8-inch anchor bolts or 1/2-inch x 6-inch compression anchor bolts at 8-foot x 0-inch O.C. and 1-foot x 0-inch from each corner.
3. Headers to be made up of 2 – 2 x 6's for spans up to 5-foot, 2 – 2 x 8's for spans up to 6-feet. Use 2 – 2 x 10's for spans up to 8-feet and 2 – 2 x l0's for spans up to 10-feet. Secure beams together so that load is distributed evenly for load bearing walls. For non-load bearing walls use 2 – 2 x 4's for spans up to 5-foot x 0-inch.
4. Bracing of Exterior Stud Walls
   a. Not less than three (3) studs shall be installed at every corner of an exterior wall.
   b. Stud walls shall be braced by one of the following methods:
      1) Nominal 1-inch x 4-inch continuous diagonal strip set into the face of the studs and top and bottom places at each corner of the building or approved metal corner bracing. Wood boards of 5/8-inch (net) minimum thickness applied diagonally.
      2) Wood sheathing panels 4-foot by 8-foot of 5/8-inch minimum thickness applied horizontally.
      3) Plywood sheathing panels not less than 48-inch wide and 96-inch long applied vertically.
   c. Sheathing, where required for exterior walls, shall be applied solidly over the wall surface and shall be one or more of the following materials:
      1) Wood boards and sheathing panes shall be minimum 5/8-inch plywood;
      2) Plywood not less than 5/16-inch thick for 16-inch stucco spacing.
   d. Sheathing may be omitted over plywood except where exterior wall stucco finish, brick veneer and exterior wall coverings are used which permit the passage of water.
   e. Studs shall be capped with double top plates installed to provide overlapping at corners and intersections with bearing partitions.
   f. End joints in double top plates shall be offset at least 24-inch.
   g. In lieu of double top plate, a continuous header may be used.
   h. For Platform Frame Construction, studs shall rest on a single bottom plate.
   i. Galvanized straping as required by code.

5. Opening in Exterior Walls
   a. Double studs shall be provided on each side of openings exceeding 3-inch in width, and triple studs shall be provided on each side of openings exceeding 6-foot in width.
   b. Work shall comply with State Board Windstorm Inspection.
   c. Double headers shall be provided over each opening in exterior bearing walls. Built up construction of double headers may be of solid lumber or equivalent cross-section. Where the opening does not exceed 3-inch, each end of the header shall be supported on a stud or framing anchor. Where the openings exceed 3-inch in width, each end of the double header shall be supported on one stud and where the opening exceeds 6-foot, each end shall be supported on 2 studs.
   d. Plates
      1) Bottom plates are to be weather treated if they rest on or beside concrete or masonry;
      2) Top plates are to be 2 x 4's doubled and interlocking at corners and wall, if larger studs are required larger plates will be required as well.
   e. Studs
      1) All studs are to be 2 x 4's, spaced 16” o.c.;
      2) 2 x 6 studs are to be used when additional min standards are in place.
   f. Headers
      1) For header sizing, refer to RC-NYS Table R502.5(1)

Q. Roof Framing
1. Wood Rafters
   a. Reference IRC Chapter 8.
2. Wood Trusses
   a. Trusses should be used whenever possible and match existing roof pitches whenever possible. Truss drawings and installation instruction shall be available on site in accordance with R802.10.1 of 2010 RC-NYS.
3. Roof Sheathing
   a. Exterior glued 4-foot x 8-foot x 5/8-inch plywood, type CDX. Use “H” clips for intermediate support with spacing greater than 24-inch O.C.
   b. Install plywood perpendicular to rafters and stagger every other row 48-inch.
   c. Joints in lumber sheathing shall occur over supports unless end-matches lumber or approved clips are used in which case each piece shall bear on at least 2 rafters or joists
   d. Exterior plywood shall be used where exposed to weather or where necessary for structural purposes. Provide at least 1/2-inch clearance between decking and masonry or concrete walls

R. Roof Structure Repair
1. Jack and brace to eliminate rafter (truss) sag, release pressure stress to stop rafter bowling;
2. Splice weak or damaged rafters; anchor loose rafter tails to ceiling joist with metal plates;
3. New wood for repair shall match existing; splices shall be overlapped a minimum of 24-inch;
4. Struts or brace shall be installed to correct structural defects;
5. Use #2 Yellow Pine or treated.

S. Roof Structure Install
1. Remove all rotted or damaged rafter(s) and roof members at location;
2. Install new 2-inch x 6-inch installation rafter(s) or trusses;
3. New lumber for installation shall match existing;
4. All defective structural members found shall be replaced;
5. Studs and braces shall be installed to eliminate structural weakness;
6. Anchor rafters to joist ends with metal plates;
7. Use #2 Yellow Pine or equal.

3.03 INSTALLATION OF STRUCTURAL STEEL

A. Columns and Plates
1. Steel bearing on walls shall be as required to distribute the load, but a minimum of 4-inch bearing is required.
2. Bearing plates at least 1/4-inch thick shall be installed where beams or girders rest on concrete or brick. Plates shall be bedded in cement mortar.
3. Columns supporting wood beams or girders shall have installed a suitable column cap not less than 1/4-inch thick.
4. Columns supporting steel beams or girders, may be welded to each other or have a column cap anchored to beam.
5. Columns shall have a steel or cast iron base anchored by bolts.

B. Steel Joists
1. Open web steel joist shall be properly bridged.
2. At termination of each row of bridging, secure same to side anchors which shall be built into the wall by the masonry contractor. All steel to steel connections shall be welded.

C. Metal Columns
1. Install
   a. Removal of existing support columns;
   b. Install new metal replacement columns;
   c. All metal columns to be securely anchored;
   d. Paint with metal primer;
   e. Reference Section 09912 for paint finishes.
2. Repair shall consists mainly of anchoring and painting

END OF SECTION

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SECTION 062000 - FINISH CARPENTRY

PART 1 - GENERAL

1.01 SUMMARY

A. Finish carpentry includes carpentry work which is exposed to view, is non-structural, and which is not specified as part of other sections.

B. All work related to the repairs of historically eligible properties as deemed by the New York State Office of Parks, Recreation and Historic Preservation shall involve the repair and replacement of exterior wood architectural details and finish wood elements as listed in this section to match existing is size, shape, profile and installation method of the existing unless such installation method conflicts with governing codes at locations that are on the exterior and visible. It is the responsibility of the CONTRACTOR to verify size, shape, material and assembly of historic exterior woodwork and costs associated with the repair and replacement of said. Field measurement and inspection maybe required.

C. Standards: Comply with provisions of the following standards.
1. FEMA P-550, Second Edition/ December 2009, “Recommended Residential Construction for Coastal Areas”

2. FEMA Technical Bulletin 2, “Flood Damage – Resistant Materials Requirements”

3. Composite wood products must be certified compliant with California 93120. If using composite wood product that does not comply with California 93120, all exposed edges and sides must be sealed with low VOC sealants.

D. This Section includes the following:
1. Standing and running trim.
2. Stairs and railings.
3. Misc. Metal related to Finish Carpentry.
4. Historic Hand and Guard Rails
5. Historic Standing and Running Trim
6. Soffits
7. Fascia
8. Cornices
9. Porch Repair
10. Historic Wood Skirting

E. See Section 064000 "Interior Architectural Woodwork" for interior woodwork not specified in this Section including cabinetry and laminate countertops.

F. See Section 074600 “Siding” for wood siding.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

B. Samples: For each type of paneling.

C. Samples: For each type of product involving selection of colors, profiles, or textures.

PART 2 - PRODUCTS

2.01 MATERIALS - GENERAL

A. Comply with the applicable provisions for grading and workmanship of the ARCHITECTURAL WOODWORK QUALITY STANDARDS ILLUSTRATED of the American Woodwork Institute (AWI).

B. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," for lumber and with applicable grading rules of inspection agencies certified by the American Lumber Standards Committee Board of Review.

C. Softwood Plywood: Comply with DOC PS 1, "U.S. Product Standard for Construction and Industrial Plywood."

D. Hardwood Plywood: Comply with HPVA HP-1, "Interim Voluntary Standard for Hardwood and Decorative Plywood."

E. Preservative Treatment: Comply with NWWDA I.S. 4 for exterior finish carpentry to receive water-repellent preservative treatment.

F. Fire-Retardant Treatment: Where indicated, use materials impregnated with fire-retardant chemicals per AWPA C20; exterior type or interior Type A as required.

G. Woodwork for Paint Finish
   1. Grade: AWI Section 300, Standard Grade.
   2. Species of wood: Any closed grain softwood or any closed grain hardwood species.

H. Woodwork for Transparent Finish
   1. Species: Match existing.
   2. Grade: AWI Section 300, Standard Grade.

I. Exceptions to Previous Quality Requirements for Interior Woodwork
   1. Ornamental woodwork: Comply with AWI Section 700, Custom Grade

2.02 STANDING AND RUNNING TRIM

A. Exterior Standing and Running Trim: Finished lumber and moldings
   1. Species and Grade: Smooth-textured, B & B, southern yellow pine; SPIB.

B. Exterior Historic Standing and Running Trim: Finished lumber and moldings
   1. Species and Grade: Smooth-textured, B & B, southern yellow pine; SPIB.

2. Profiles and Size: Matching existing profile and size. Contractor is responsible for measuring size and profile and quantity requiring replacement for Historically Eligible properties.

C. Primed Hardboard Trim: Fabricated from high-temperature-cured, high-resin, wood fiber composite; factory primed on face and two edges; and recommended by manufacturer for exterior use.

D. Interior Standing and Running Trim: Finished lumber and moldings.
1. Species and Grade or Cut: C Select, eastern white pine; NELMA or B & Btr. Select or Supreme, Idaho white, lodge pole, ponderosa, or sugar pine; WWPA.

E. Wood Molding Patterns: Stock moldings made to patterns included in WMMPA WM 7 and graded under WMMPA WM 4.
1. Base: BASE STANDARD WM 713 (ranch base) 3-1/4-inch high.
2. Shoe Mold: Clear, kiln-dried red oak; WM 126, 1/2-by-3/4-inch (13-by-19-mm) quarter-round shoe.
3. Casings: 2-1/4-inch eased edge.
4. Moldings for Transparent Finish: N-Grade.
5. Moldings for Painted Finish: P-Grade.

F. Shelving: 3/4-inch (19-mm) solid wood shelving with radiused and filled front edge.

2.03 STAIRS AND RAILINGS

A. Interior Stair Treads except attic and basement: 1-1/16-inch (27-mm), clear, kiln-dried, edge-glued, rift-sawn red oak stepping with half-round nosing.

B. Interior Stair Treads at attic and basement: 1-1/16-inch (27-mm), clear, kiln-dried, edge-glued, Douglas Fir, D Select, edge grain, or Southern Pine, Grade D, stepping with half-round nosing.

C. Exterior Stair Treads: 1-1/4-inch (32-mm), kiln-dried, pressure-preservative-treated, southern yellow pine, B & B stepping with half-round nosing.

D. Interior Railings except at basement and attic stairs: Clear, kiln-dried, Natural Birch A quality. Beech, Hard Maple, or Pecan, select grade.

E. Exterior Railings: Clear, kiln-dried, pressure-preservative-treated, southern yellow pine railing stock of pattern indicated.

2.04 STRIP PORCH FLOORING

A. Where replacement exceeds 50%, use #2 or better 2 x 6 treated pine.

B. Fabricate from Southern Yellow Pine or edge grain Western Red Fir.

C. Replacement at Historically Eligible homes use #2 or better 2x6 tongue and groove pine

2.05 SIDING

A. Refer to Section 07460 for siding.

2.06 MISCELLANEOUS MATERIALS

A. Fasteners for Exterior Finish Carpentry: Provide nails of hot-dip galvanized steel.

B. Adhesives for Exterior Millwork and Woodwork.
   1. Helamine, phenol-resin, or resorcinol-resin waterproof adhesive, conforming to FS-MMM-a-181, type, grade, and class best suited for the purpose.

2.07 INSECT SCREENING

A. Insect Screening at Porches: 16 x 18 mesh to match existing.

2.08 HISTORIC SOFFIT

A. Patch and repair soffit at the homes deemed historically eligible. Soffits are to match pattern and size, shape and profile of the existing.
   1. Materials should match existing and should be exterior grade and moisture resistant.

B. Replace damaged soffit at the homes deemed historically eligible. Soffits are to match pattern and size, shape and profile of the existing
   1. Material should be exterior grade and moisture resistant.

2.09 HISTORIC FASCIA

A. Patch and repair fascia at the homes deemed historically eligible. Fascias are to match pattern and size, shape and profile of the existing.
   1. Materials should match existing and should be exterior grade and moisture resistant.

B. Replace damaged fascia at the homes deemed historically eligible fascias are to match pattern and size, shape and profile of the existing.
   1. Material should be exterior grade and moisture resistant.

2.10 HISTORIC HAND AND GUARDRAILS

A. Patch and repair existing handrails at the homes deemed historically eligible. Handrails are to match pattern and size, shape and profile of the existing.

B. Replacement of handrails at those locations where non-historic handrails are to be replaced or additional handrails are required on historically eligible homes, the handrails are to be as follows:
   1. Clear kiln dried pressure preservative treated, south yellow pine railing of ADA compliant height with top and bottom rails with in line pickets at a minimum of four (4) inches on center.

2. Sizing is to be as follows:
   a. Top Rail: 2 ¼”
   b. Bottom Rail: 3 ¾”
   c. Pickets: 1 1/1/4” Square Pickets
   d. Top Cap: Water Shedding double beveled 4 ½” minimum width x 1” nominal Height at top of Bevel.

2.11 HISTORIC SKIRTING

A. Skirting is to be provided for historically eligible homes with existing skirting and for historically eligible homes which are being raised.
   1. Existing Historic Home Skirting
      a. Patch and repair existing skirting to match existing.
   2. Historic Skirting for Homes raised less than four (4) feet:
      a. Framed pressure treated wood lattice
      b. Located between masonry piers
      c. Prime and paint as specified in the paint section.
   3. Historic Skirting for homes raised more than four (4) feet.
      a. Fiber Cement siding with applied batten at thirteen (13) inches on Center. Batten size is to be 1 ¼” minimum x ¾” thick.
      b. Locate skirting so it is contiguous and covers the masonry piers.
      c. Prime and paint as specified in the paint section.

PART 3 - EXECUTION

3.01 PREPARATION

A. Condition finish carpentry to average prevailing humidity conditions in installation areas before installation, for a minimum of 24 hours.

B. Prime and back-prime lumber for painted finish exposed on the exterior. Comply with requirements for surface preparation and application in Section 099112"Paint."

3.02 INSTALLATION

A. Install finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where required for alignment. Scribe and cut finish carpentry to fit adjoining work. Refinish and seal cuts.

B. Standing and Running Trim: Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Stagger joints in adjacent and related trim. Cope at returns and miter at corners.

C. Repair damaged or defective finish carpentry where possible to eliminate functional or visual defects. Where not possible to repair, replace finish carpentry. Adjust joinery for uniform appearance.

3.03 INSTALLATION OF EXTERIOR FINISH CARPENTRY

A. General Exterior Finish Carpentry
   1. Provide designs, sizes and materials to match existing whenever possible.
   2. Joints in millwork and trim shall be tight, concealing shrinkage and excluding water.
   3. In addition to nailing, glue joints of built-up items as necessary for weather resistant construction.
   4. Cope molded work at returns and interior angles and miter it at external corners.
   5. Furnish exterior door and window trim in single lengths.
   6. Furnish cornices and other exterior trim in maximum practicable lengths.
   7. Fasten woodwork with galvanized finish nails suitable for setting.
   8. Provide blind nailing as far as practicable.
   9. Set face nails for putty stopping.

B. Wood Steps Repair
   1. Remove rotted or damaged parts of the wood steps by nailing loose parts;
   2. Replace rotted or damaged parts.
   3. Install new pieces where missing parts are found.
   4. Anchor steps securely to house.
   5. Prime new wood with acrylic primer and paint steps with two coats of exterior porch and deck enamel.
   6. New wood shall be treated lumber and when in contact with concrete or ground shall be spaced with galvanized metal or felt paper.
   7. Use pressure treated #2 yellow pine.

C. Wood Steps Install
   1. Remove the existing steps.
   2. Prepare site for new site built steps.
   3. Minimum size shall be 44-inch wide maximum.
   4. Riser height maximum 7-1/2-inch.
   5. Minimum run 10-inch.
   6. Install as to required to height, depth and width;
   7. Use pressure treated # 2 yellow pine.
   8. Reference Section 09912 for paint finish.

D. Wood Fascia Repair
   1. Remove and replace rotted or damaged area.
   2. Nail down all loose fascias.
   3. Replace any missing pieces.
   4. Remove all loose, cracked, and peeling pain.
   5. Prime all new wood with an acrylic primer.
   6. Caulk all seams.
   7. Apply two coats of exterior latex paint to all fascias.
   8. Reference Section 09912 for paint finishes.

E. Wood Fascia Install

1. Remove and replace wood fascia as specified above (See Wood Facial Repair);
2. Fully prime all new wood with primer.
3. Caulk all seams.
4. Paint with two coats of exterior latex.
5. Reference Section 09912 for paint finishes.

F. Soffit Repair: Apply 3/8-inch Grade B-C Exterior Plywood with Medium Density Overlay, or match existing materials.
1. Repair damaged areas by nailing down al loose soffits.
2. Replace missing pieces of soffits.
3. Remove all loose, cracked, and peeling paint.
4. Uniformly space joints.
5. Nail at 12-inches on center on all supports.
6. Prime all new wood with prime.
7. Caulk all seams.
8. Apply two coats of exterior latex paint to all soffits.
9. Reference Section 09912 for paint finishes.

G. Soffit Install: Apply 3/8-inch Grade B-C Exterior Plywood with Medium Density Overlay, or match existing materials.
1. Remove and replace soffit areas as specified in the above soffit repair description (See, Soffit repair).
2. Fully prime all new wood with primer.
3. Caulk all seams.
4. Paint with two coats of exterior latex.
5. Reference Section 09912 for paint finishes.

H. Exterior Stair Repair
1. Remove all rotted or damaged parts of the exterior stairway.
2. Replace necessary parts; all work, dimensions and materials shall match existing.
3. All metal is to be primed to prevent rust.
4. Reference Section 09912 for paint finishes.

I. Exterior Stair Install
1. Remove existing stairway and replace with new stairway using procedures as indicated in the above repair description.
2. All work, dimensions and materials shall match existing.
3. All work shall be treated lumber and be painted with exterior porch and deck enamel.
4. All metal is to be primed to prevent rust.
5. Reference Section 099112 for paint finishes.

J. Cornice
1. Assemble with necessary blocking to form protection for vertical joints. Fabricate lookouts for cornices of not less than 2-inch stock to provide nailing at all points of cornice.

K. Wood Porch Repair
1. Remove all rotted or damaged parts of the deck and foundation structural members.
2. Correct all leans, bows, and sags due to faulty support piers.
3. Materials used for repair shall match existing work.
4. Paint porch with two coats of exterior porch and deck enamel.
5. New wood shall be treated lumber and when in contact with concrete or grounds shall be spaced with metal or felt paper.
6. Use pressure treated #2 yellow pine.

L. Porch Ceilings
1. Cover with 9/16-inch x 3-1/4-inch, dressed and matched, V-grooved ceiling, or 3/8-inch, exterior type plywood, grade A-C or medium density overlay, or match existing.
2. Provide solid bearing at joints, ends, and edges of plywood. Joints shall be V-grooved or batten covered.
3. Secure plywood with zinc coated sixpenny common nails spaced 10-inches apart along intermediate supports and 5-inches apart along ends and bearing edges.
4. Cut end joints of V-Grooved ceiling square and locate joints over centerline of bearings. Blind and face nail each piece at each end and at each bearing with two sixpenny finish nails with heads set for putty stopping.
5. Install a bed mold at perimeter.

M. Porch Overhang/Canopy/Repair
1. Repair rotted or damaged parts of the porch overhang/canopy (include roof cover, porch ceiling cover, structural bracing) by removing rot.
2. Re-nail loose pieces and add new parts where missing parts are found.
3. Prime and paint canopy with two coats of exterior Latex.
4. Use Wood products to match existing.
5. Reference Section 09912 for paint.

N. Porch Overhang/Canopy Install
1. Remove the existing overhang/canopy.
2. Install a new overhang/canopy.
3. New overhang/canopy shall be constructed of 2-inch x 6-inch framing members;
4. One half (1/2-inch) CDX plywood decking, 15 lbs. roofing felt, Number 3 tab fiberglass/asphaltic shingles.
5. Install metal drip edging: Minimum size shall be 3-inch x 5-inch.
6. Overhang/canopy shall be installed above the doorway and anchored and braced securely.
7. Metal roof flashing shall be installed between overhang/canopy and house.
8. Sealed with a water proof adhesive sealer; new wood shall be primed with latex primer and painted with two coats of exterior latex.
9. Caution: Overhang/canopy must not hinder the normal operation of exit doors.
10. Use #2 yellow pine lumber or equal.

O. Strip flooring for Porches
   1. Place strip flooring across supports, with close joints, driven tightly.
   2. Blind nail each strip with 8 penny screw type or cement coated cut steel nails.
   3. Stagger joints so that there will be at least two boards between joints.

P. Railings
   1. Construct of not less than 2-inch stock.
   2. Horizontal surfaces shall have an ample wash.
   3. Upper rails shall be grooved to receive balusters.
   4. Balusters shall be 1-5/16-inches square, fitted to bottom rail and toe-nailed in place.

Q. Wood Overhang Support Column Repair
   1. Make columns secure by anchoring with metal “L” brackets at top and bottom;
   2. Reset leans and strengthen base for proper bearing.
   3. New wood shall be treated lumber and when in contact with concrete or ground it shall be spaced with metal or felt paper.
   4. Reference Section 099112 for paint.

R. Wood Overhang Support Column Install
   1. Remove existing support column(s), install new wood column(s) at location.
   2. New column(s) shall be no less than 4-inch x 4-inch treated post.
   3. Wood columns shall be securely anchored with metal “L” brackets bolted at top and bottom.
   4. Prime wood columns with one coat acrylic primer and two coats of exterior Latex.
   5. New columns shall be treated lumber and when in contact with concrete it shall be spaced with metal or felt paper.
   6. Use: Pressure Treated Columns; designed or square post.
   7. Reference Section 099112 for paint.

S. Wood Skirting Repair
   1. Remove and replace rotted or damaged parts of the skirt.
   2. Nail down all loose parts; remove loose, cracked, and peeling paint;
   3. Soft prime all new and bare wood; paint with two coats of exterior latex; and backfill.
   4. All wood used for skirt frame shall be treated lumber.
   5. Backfill shall be placed around skirt and compacted to prevent soil erosion.
   6. Foundation vents shall be 8-inch x 10-inch galvanized metal.
   7. Reference Section 099112 for paint.

T. Wood Skirting Install
   1. Remove existing skirting in the designated area; install new 18 gauge metal “L” channel 4-inch below surface.

2. Install new 7/8-inch x 4-foot x 8-foot T-111, 105 1/2-inch x 10-inch tap siding; or 1/2-inch x 8-inch Masonite lap siding with metal foundation vents; prime all new wood with acrylic primer; paint skirt with 2 coats of exterior latex paint.
3. Attach new skirt to a 2-inch x 4-inch frame; wood used for skirt frame shall be treated lumber.
4. Backfill shall be placed around skirt and compacted to prevent soil erosion.
5. Foundation vents shall be 8-inch x 10-inch galvanized metal.
6. See Section 099112 for paint.

3.04 INSTALLATION OF INTERIOR FINISH CARPENTRY

A. Base Boards, Window and Door Casing, Crown and other Moldings Base

1. General installation:
   a. Whenever possible, new baseboard, moldings and casings are to be matched in size and shape to existing trim. All joints are to be cut to fit and be tight. Fasten trim work with the appropriate nails, fasteners, or adhesives. All nails are to be countersunk and filled. No new materials that are split or otherwise defective will be accepted. All joints in continuous rows of trim will be scarfed and break on a stud. Material used should be mill finished, and sanded, white pine free from scars. Sand wood before painting. Use stain grade trim where specified and stain and match existing.
2. Base and Ceiling Trim Repair
   a. Repair all fixtures and attach surface items.
   b. Fill all holes, joints and damaged areas with Latex filler compound.
   c. Sand all rough areas smooth.
   d. Paint all trim with two coats of interior Latex Semi-Gloss Enamel.
   e. Items not removed shall be protected from paint work.
   f. Work and materials shall match existing.
   g. Reference Section 09912 for paint.
3. Base and Ceiling Trim Install
   a. Remove the trim at location.
   b. Install new trim at the designated locations as well as missing locations.
   c. Remove all fixtures and attached surface items.
   d. Fill all holes, joints and damaged areas with Latex filler compound.
   e. Sand all rough areas smooth.
   f. Paint all trim with two coats of interior Latex Semi-Gloss Enamel.
   g. Items not removed shall be protected from paint work.
   h. All work and materials shall match existing.
   i. Reference Section 099112 for paint.

B. Thresholds
1. Cut to fit jambs. Secure with casing nails set for putty stopping on wood framing and with double headed screws and expansion shields on concrete or masonry.

C. Chair Rails
   1. Match existing, shall have mitered corners, set back 3/8-inch from the face of jambs, and nailed to finish and rough jambs and grounds.

D. Casings
   1. Match existing, shall have mitered corners, set back 3/8-inch from the face of jambs, and nailed to finish and rough jambs and grounds.

E. Plinth Blocks
   1. Conform to profile of casings.

F. Wood Wainscot
   1. Prefinished wood paneling 4-foot x 8-foot x 1/4-inch sheets, as selected by the owners within the cost allowance given in the work write-up.
   2. Panel adhesives.
   3. Nails with matching color heads.
   4. Prefinished wood molding.
   5. Matching color putty sticks.

G. Ceiling Scuttles (Attic Access)
   1. Attic space shall be provided with an interior access opening not less than 22-inch x 36-inch. Access opening shall be readily accessible and provided with lid or device that may be easily removed or operated, or with the installation of pull down stairs as per write-up.
   2. Attic Access Repair
      a. Repair frame, trim, and opening door cover.
      b. All repair parts shall match existing.
      c. Reference Section 099112 for paint finishes.
      d. Access shall not allow insulation or dust infiltration.
      3. Attic Access Install
      a. Install new access door at location specified.
      b. Size shall be a minimum 22-inch x 30-inch.
      c. Install new access, complete with all framing, trim and hardware or install pull down-stairs as per write up. (See Attic Disappearing Stair in Paragraph H.3.)
      d. See Section 09912 for paint finishes
      e. At final, access shall not allow insulation or dust infiltration.
      f. 3/8-inch thick interior type A-D Grade plywood closures supported on continuous wood cleats.
      g. Access stairs to be fire rated, 350-lb weight limit stairs, sealed from conditioned space.
      h. Finish wood trim around framed opening.

H. Interior Stair

1. General

a. Interior stairs shall have a minimum, continuous headroom of 6-foot, 8-inch measured vertically. Minimum width clear of handrail shall be 2-foot, 10- inch for main stairs. Stringers shall have solid bearing top and bottom. Top of stringer shall have not less than 4-inch end bearing or be adequately anchored to header. Exterior stairs shall bear upon top of slab or on bottom stop constructed of concrete. Minimum effective stringer depth shall be 3-1/2-inch. When the distance between stringers exceeds 2-foot, 8-inch a center stringer shall be installed, except that 2-inch treads may span 3-foot between stringers. Treads and risers of required stairs shall be so proportioned that the sum of 2 risers and a tread exclusive of projection of nosing, is 25-inch. The height of the riser shall not exceed 7-3/4-inch and treads, exclusive of nosing, shall not be less than 10-inch wide. Every tread less than 10-inch wide shall have a nosing, or effective projection, of approximately 1-inch over the level immediately below that tread.

b. Treads shall be of uniform width and risers of uniform height in any one flight of stairs. A flight of stairs shall not have a vertical rise of more than 12-foot between floors or landings. The length and width of landings shall be not less than the width of stairways in which they occur. All stairs shall have handrails, or well secured handrails or guards on both sides of stairs of not less than 30-inch and nor more than 34-foot high. Stairs of less than 44- inch in width may have handrails on one side only. Horizontal runs of rails around open walls shall be not less than 36-foot high. All exterior stairways shall be constructed of treated lumber and painted with two coats exterior enamel. Wood stairs shall be of hardwood or vertical grain kiln-dried, soft wood.

c. Finish treads shall match existing.

d. Stair work shall be fitted, nailed, screwed, or bolted, and glued together forming a strong and rigid structure without squeaks or vibration.

e. Treads and risers shall comply with 2010 RC-NYS and with the STATE and its adopted local government Ordinance amendments.

f. Handrail shall comply with 2010 RC-NYC and with the STATE and its adopted local government Ordinance amendments.

2. Attic and Basement Stair

a. Stair and rails to comply with General Interior Stair Guidelines.

3. Attic Disappearing Stair

a. Replace damaged or missing parts, and adjust operation for safe usage.

b. Remove entire existing unit and replace with unit equivalent to Section 062000.

c. Provide unit if mechanical equipment or insulation is located in attic.

3.5 INSTALLATION OF MISCELLANEOUS ITEM

A. Vent Screening
   1. Provide new screen cloth to match existing;
   2. Install vents securely anchored in place and insect proof.

B. Metal Handrail Repair
   1. Anchoring and painting: All handrails shall be securely anchored, metal "L" brackets bolted at top and bottom.
   2. Paint with metal primer.
   3. See Section 099112 for paint.

END OF SECTION

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SECTION 064000 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. This Section includes the following:
1. Wood cabinets: Match existing where applicable.
2. Plastic-laminate countertops: Match existing where applicable.
3. Closet and utility shelving: Match existing where applicable.
4. Shop finishing of interior woodwork: Match existing where applicable.

B. Related Sections include the following:
1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
2. Section 062000 "Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.

1.03 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.

1.04 SUBMITTALS

A. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

B. Scale: 1/4-inch per foot.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program or Shop is a licensee of WI's Certified Compliance Program.

B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence- matched wood veneers and wood doors with face veneers that are sequence matched with woodwork and transparent-finished wood doors that are required to be of same species as woodwork.

C. 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. Provide AWI Quality Certification Program labels or certificates indicating that woodwork, including installation, complies with requirements of grades specified.

D. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

E. Standards: Comply with provisions of the following standards.
   1. FEMA P-550, Second Edition/ December 2009, “Recommended Residential Construction for Coastal Areas”

   2. FEMA Technical Bulletin 2, “Flood Damage – Resistant Materials Requirements”

1.06 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.

1.07 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 and relative humidity at occupancy levels 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

2.01 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 and Cut for Transparent Finish: Birch, plain sawn or sliced.

C. Wood Products: Comply with the following:
   1. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
   1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
      a. Formica Corporation.
      b. Nevamar Company, LLC; Decorative Products Div.
      c. Wilsonart International; Div. of Premark International, Inc.

E. Solid-Surfacing Material: See specifications for “Simulated Stone Countertops”.

2.02 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.
   1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
   2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
   3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

2.03 HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 8.

B. Butt Hinges: 2-3/4-inch (70-mm), 5-knuckle steel hinges made from 0.095-inch (2.4-mm) thick metal, and as follows:
   1. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521.

C. Back-Mounted Pulls: BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal 5-inches (127-mm) long, 2-1/2-inches (63.5-mm) deep, and 5/16-inch (8-mm) in diameter.

E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

F. Shelf Rests: BHMA A156.9, B04013; metal.

G. Drawer Slides: BHMA A156.9, B05091.
   1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted and extending under bottom edge of drawer type; zinc-plated steel with polymer rollers.

H. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
   1. Satin Brass, Blackened, Bright Relieved, Clear Coated: BHMA 610 for brass base; BHMA 636 for steel base.
   2. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.

I. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.04 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Adhesive for Bonding Plastic Laminate: Un-pigmented contact cement.
   1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.05 FABRICATION, GENERAL

A. Interior Woodwork Grade: Unless otherwise indicated, provide Economy-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. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
   1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4-inch (19-mm) Thick or Less: 1/16-inch (1.5-mm).
   2. Edges of Rails and Similar Members More Than 3/4-inch (19-mm) Thick: 1/8-inch (3-mm).

E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.06 WOOD CABINETS FOR TRANSPARENT FINISH

A. Grade: Standard.

B. AWI Type of Cabinet Construction: Flush overlay.

C. Wood Species and Cut for Exposed Surfaces: White birch, plain sawn or sliced.

D. Species for Exposed Lumber Surfaces: Any closed-grain hardwood.

E. Semi-exposed Surfaces: Provide surface materials indicated below:
1. Surfaces Other Than Drawer Bodies: Match materials indicated for exposed surfaces.
2. Drawer Sides and Backs: Solid-hardwood lumber.
3. Drawer Bottoms: Hardwood plywood.

2.07 PLASTIC-LAMINATE COUNTERTOPS

A. Grade: Standard.

B. High-Pressure Decorative Laminate Grade: HGS. (Horizontal Grade) for Flat Laid installation.

C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
1. As selected by Owner from manufacturer's full range in the following categories:
a. Solid colors, matte finish.
b. Patterns, matte finish.

D. Edge Treatment: Same as laminate cladding on horizontal surfaces.

E. Core Material: Exterior-grade plywood.

F. Core Material at Sinks: Exterior-grade plywood.

2.08 CLOSET AND UTILITY SHELVING

A. Grade: Economy.

B. Shelf Material: 3/4-inch (19-mm) x 12-inch solid lumber, painted.

C. Cleats: 3/4-inch (19-mm) solid lumber.

2.09 SHOP FINISHING

A. Grade: Provide finishes of same grades as items to be finished.

B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. . Refer to Section 09912 Paint for finishing opaque-finished architectural woodwork.

D. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to Section 09912 for finishing architectural woodwork not indicated to be shop finished.

E. Finishing Materials: Products shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. Shop Priming: Shop apply the prime coat including back-priming, if any, for transparent-finished items specified to be field finished. Refer to Section 09912 Paint for material and application requirements.

G. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
   1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

H. Transparent Finish:
   1. Grade: Standard.
   2. AWI Finish System: Acrylic lacquer.
   3. Staining: None required.
   4. Wash Coat for Stained Finish: Apply wash-coat sealer to woodwork made from closed-grain wood before staining and finishing.
   5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
   6. Filled Finish for Open-Grain Woods: After staining (if any), apply paste wood filler to open-grain woods and wipe off excess. Tint filler to match stained wood.
   7. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D523.

PART 3 - EXECUTION

3.01 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.

3.02 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 (3-mm in 2400-mm).

D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
   1. Install cabinets with no more than 1/8-inch in 96-inch (3-mm in 2400-mm) sag, bow, or other variation from a straight line.
   2. Maintain veneer sequence matching of cabinets with transparent finish.
   3. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16-inches (400-mm) o.c. with No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips.

F. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
   1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
   2. Install countertops with no more than 1/8-inch in 96-inch (3-mm in 2400-mm) sag, bow, or other variation from a straight line.
   3. Secure backsplashes to walls with adhesive.
   4. Caulk space between backsplash and wall.

G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.03 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, lubricate, and adjust hardware.

C. Clean woodwork on exposed and semi-exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 071400 - FLUID APPLIED WATERPROOFING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Residential applied waterproofing.

1.02 REFERENCES

A. American Standards for Testing and Materials (ASTM)

1. ASTM C 719 - Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
2. ASTM C 836 - Standard Specification for High Solids Content, Cold Liquid- Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
3. ASTM C 898 - Standard Guide for Use of High Solids Content, Cold Liquid- Applied Elastomeric Waterproofing Membrane With Separate Wearing Course.
4. ASTM D 412 - Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers-Tension.
5. ASTM D 466 - Standard Test Method for Films Deposited from Bituminous Emulsions.
6. ASTM D 2196 - Standard Test Method for Rheological Properties of Non- Newtonian Materials by Rotational (Brookfield type) Viscometer.
7. ASTM D 2939 - Standard Test Methods for Emulsified Bitumens Used as Protective Coatings.
8. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
9. ASTM D 3274 Standard Test Method for Evaluating Degrees of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation.
10. ASTM D 3409 - Standard Test Method for Adhesion of Asphalt-Roof Cement to Damp, Wet, or Underwater Surfaces.
11. ASTM D 4258 - Standard Practice for Surface Cleaning Concrete for Coating.
12. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
13. ASTM E 96 - Standard Test Method for Water Vapor Transmission of Materials.
14. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

B. Installation of water resistive barriers should be in compliance with Section R703.2 of the Residential Code of New York State

1.03 QUALITY ASSURANCE

A. Utilize an applicator trained and approved by the waterproofing manufacturer.

1.04 DELIVERY, STORAGE AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Mar-flex Waterproofing and Building Products, Mar-flex 5000

B. Carlisle Coatings & Waterproofing Inc; Barricoat™-R

C. EPRO Waterproofing Systems Inc.; Ecoline-R

D. Or Pre-Approved equal.

2.02 WATERPROOFING SYSTEMS

A. Provide waterproofing systems that prevent the passage of liquid water under hydrostatic pressure and that comply with specified physical requirements as demonstrated by testing performed by independent testing agency on manufacturer's current waterproofing formulations and system design; use materials specified below.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions under which waterproofing systems will be applied, with Installer present, for compliance with requirements. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean and prepare substrate according to manufacturer's recommendations. Provide clean, dust-free, and dry substrate for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage or over spray affecting other construction. Coordinate final grade elevation prior to masking.

C. Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.

D. Remove grease, oil, form release agents, paints, and other penetrating contaminants from concrete.

E. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, grout joints, metal ties/ tie holes, and other voids with joint detailing mastic, hydraulic cement, or rapid- set grout.

F. Prepare and treat vertical and horizontal 90 degree terminations, edge terminations, penetrations through waterproofing material, expansion joints, cracks, drains, and sleeves according to ASTM C 898 and manufacturer's recommendations.

G. At each area to be treated, apply two coats of joint detailing mastic; embed joint reinforcing strip in first coat and apply second coat entirely covering the embedded joint reinforcing strip ensuring complete saturation.
   1. 90 Degree Terminations, Vertical and Horizontal: 6 inches (150 mm) on each side.
   2. Penetrations, Drains, Sleeves: 6 inches (150 mm) radius around penetration and 3 inches (75 mm) onto penetrating object.
   3. and Cracks: 6 inches (150 mm) wide on each side of joint/crack.

H. Secure and protect plumbing, electrical, mechanical and structural items to be under or passing through waterproof membrane prior to membrane application.

I. When it is not possible to install waterproofing before placement of reinforcing steel, exposed reinforcing steel shall be masked by General Contractor prior to membrane application.

3.03 BELOW GRADE INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. For vertical application apply a uniform coat of waterproofing to entire wall area. Obtain a seamless membrane free of entrapped gasses, with a minimum dry film thickness of 60 mil (1.5 mm) below-grade wall application.
   1. Apply fluid membrane onto footing area a minimum of 4 inches (102 mm) to prevent water pooling.
   2. Allow membrane to cure for 24 hours before placing any backfill against the wall.
   3. Apply drainage board.

3.04 FIELD QUALITY CONTROL

A. Verify thickness of membrane using a lightly oiled, needle nose depth gauge, taking four (4) readings over a one square inch area in every 100 square feet (25 mm square area in every meter square area). Record the minimum reading. Mark test areas for repair if minimum reading is below minimum specified thickness

B. Patch deficient test areas with additional waterproofing to achieve specified minimum dry thickness, extending minimum of 1 inch (25 mm) beyond the test perimeter.

C. Cure waterproofing according to manufacturer's recommendations, taking care to prevent contamination and damage during application stages and curing.

D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

E. Where indicated, install protection course over completed-and-cured waterproofing. Comply with waterproofing-material and protection-course manufacturer’s written instructions for attaching protection course.

END OF SECTION

SECTION 072100 - BUILDING INSULATION

PART 1 - GENERAL

1.01 SUMMARY

A. Scope:

1. Provide all labor, materials, equipment, services, and perform all operations required for complete installation and related work as follows:
   a. Insulations of attics, crawl spaces, and basements;
   b. Insulation of subfloors and crawl spaces;
   c. Insulation under slabs-on-grade;
   d. Foundation wall insulation (supporting backfill);
   e. Cavity wall insulation;
   f. Concealed building insulation;
   g. Exposed building insulation;
   h. Loose-fill building insulation;
   i. Provisions of vapor retarders;
   j. Creation of adequate ventilation.

1.02 RELATED SECTIONS:

A. 072500 Weather Barriers

B. 072729 Air-barrier Coatings

1.03 SUBMITTALS

A. Product Data: For each product indicated.

B. Product test reports.

C. Research/evaluation reports.

1.04 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per ASTM E84 for surface-burning characteristics and other methods indicated with product, by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.

B. Testing Regulations
   1. Provide and install all units and accessories in accordance with the provisions of the following:
      a. American Society for Testing and Material (ASTM);
      b. Federal Specification (FS HH L 5586, Form A, Class 1);

c. Underwriters Laboratories (UL).

2. Building envelope air tightness shall be demonstrated by a blower door test in accordance with the most current Energy Conservation Construction Code of New York State (ECCC) and "EPA ENERGY STAR Certified Homes" requirements. Blower door tests will be required on New Construction and substantial rehab following "EPA ENERGY STAR Certified Homes" requirements or ECCC requirements and provided by a third party, independent testing firm.
3. Fenestration air leakage shall not exceed requirements of the most current ECCC and "EPA ENERGY STAR Certified Homes" requirements.
4. Duct tightness test shall be verified by either Post-construction test or Rough-in test in accordance with the most current ECCC and "EPA ENERGY STAR Certified Homes" requirements for all new dwelling construction and all remodels where the duct system is to be replaced and is accessible for repair or replacement.
5. Repair, renovations, alterations, reconstructions of existing thermal protection shall comply with the most current ECCC and "EPA ENERGY STAR Certified Homes" requirements.

C. Insulation and Fenestration Requirements by Component

1. The building thermal envelope shall meet the requirements of Table N1102.1 based on the climate zone specified in Table N1101.4 of Section N1102 of the New York State Residential Code.

D. Insulation

1. General
   a. Thermal Conductivity
      1) Where indicated contract documents, material thicknesses are for thermal conductivity (k value at 75°F or 24°C) specified for each material. Provide adjusted thickness as directed for equivalent use of
2. Reflective Insulation
   a. Sheet metal or foil shall comply with Federal Specification HH-1-1252A.
3. Rigid Insulation
   a. Edges shall be square cut; polystyrene shall comply with Federal Specification HH-1-524B, Mineral fiber shall comply with Federal Specification HH-1-526C, Mineral Aggregate shall comply with Federal Specification HH-1-529B, Urethane shall comply with Federal Specification HH-1-530A or with ASTM C591, and Asbestos-Cement Fiberboard Panels shall comply with Federal Specification HH-1-001084 or with ASTM C551.
4. Batt Insulation
   a. Glass fiber or rock wool shall comply with Federal Specification HH-1-521E or ASTM C262 and C553.

b. In order to minimize VOC's in the home, only glass fiber insulation that qualifies as formaldehyde free shall be provided.

5. Loose Fill Insulation
   a. Mineral fibers or fire-resistant treated cellulose fibers shall comply with Federal Specifications HH-1-515B.

E. Caulks and Sealants
1. Install the caulking and sealing material in strict accordance with the sealant manufacturer's printed directions and shall result in a completely weather tight job.
2. All adhesives used in this section must comply with Rule 1168 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51, of the Bay Area Air Quality Management District.

PART 2 - PRODUCTS

2.01 INSULATING MATERIALS

A. General: Provide insulating materials that comply with requirements and with referenced standards and, for preformed units, in sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths. Provide insulation material of uniform thickness and size.
1. Reflective Insulation
   a. Approved Manufacturers
      1) Kaiser Aluminum
      2) Chemical Sales, Inc.
      3) Alcoa Building Industries
      4) Thermal Materials, Inc.
      5) Flintkote Co., Pioneer Division
      6) Or pre-approved equal
2. Rigid Insulation
   a. Approved Manufacturers
      1) Celotex Co.
      2) Flintkote Co., Building Materials Division
      3) Johns Manville Co.
      4) Pittsburgh Corning Co.
      5) Or pre-approved equal
3. Batt Insulation
   a. Approved Manufacturers:
      1) CertainTeed St. Gobain.
      2) Celotex Co., Subdivision of Jim Walter Corp.
      3) Johns Manville Co.
      4) Owens Corning Glass fiber Co., Home Building Products Division
      5) Rockwool Industries Inc.
      6) Or pre-approved equal
4. Loose Fill Insulation

a. Approved Manufacturers:
   1) Certain Teed St. Gobain.
   2) W.R. Grace.
   3) Pittsburgh Corning Corp.
   4) BASF Wyandotte Corp.
   5) Rockwool Industries, Inc.
   6) Or pre-approved equal

5. Spray-Applied Cellulosic Insulation
   a. Self-Supported, Spray-Applied Cellulosic Insulation: ASTM C 1149, Type I (materials applied with liquid adhesive; suitable for either exposed or enclosed applications), Type II (materials containing a dry adhesive activated by water during installation; intended only for enclosed or covered applications), 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
6. SPRAY POLYURETHANE FOAM INSULATION
   a. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
      1) Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
         a) BASF Corporation.
         b) Dow Chemical Company (The).
         c) ERSystems, Inc.
         d) Gaco Western Inc.
         e) Henry Company.
         f) NCFI; Division of Barnhardt Mfg. Co.
         g) SWD Urethane Company.
         h) Volatile Free, Inc.

      2) Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).
   b. Open-Cell Polyurethane Foam Insulation: Spray-applied polyurethane foam using water as a blowing agent, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
      1) Manufacturers: Subject to compliance with requirements, [provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:

a) BaySystems NorthAmerica, LLC.
b) Demilec (USA) LLC.
c) Gaco Western Inc.
d) Icynene Inc.
e) SWD Urethane Company.
f) Or pre-approved equal

2) Minimum density of 0.4 lb/cu. ft. (6.4 kg/cu. m), thermal resistivity of 3.4 deg F x h x sq. ft./Btu x in. at 75 deg F (24 K x m/W at 24 deg C).

2.02 VAPOR RETARDERS

A. General: Provide insulating materials that comply with requirements and with referenced standards.

B. Approved Manufacturers:
1. Poly-America
2. Reef Industries
3. GAF Materials
4. DuPont Weatherization Systems
5. Or pre-approved equal

2.03 CAULKING AND SEALANTS

A. General: All VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 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.

B. Low-Emitting Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1. Approved Manufacturers:
a. General Electric Co.
b. Dow Corning Co.
c. W. R. Grace.
d. Pecora Chemical Co.
e. Sika Corpotation

C. Acrylic-Emulsion Sealant

1. Acrylic emulsion or latex rubber modified acrylic emulsion sealant compound, permanently flexible, non-staining and non-bleeding; recommended by manufacturer for general interior exposure.

2.04 WEATHERSTRIPPING, THRESHOLDS, HOOK STRIPS

A. Approved Manufacturers:
1. Zero Industries
2. Reese Enterprises
3. Pemko Manufacturing
4. Mackelburg-Duncan Products

B. Spring bronze weatherstripping, series no. 18, hemmed edged, 32 B and S gage, applied to jambs and heads.

C. Number 70 Aluminum Threshold

D. Hook Strips:
1. Out swinging doors, numbers 25 W Bronze.
2. In swinging doors, number 22.

E. VENTING DEVICES
1. Ridge Vents, Power Vents, and Soffit Vents
a. Approved Manufacturers:
1) HC Products Co.
2) Nutone, a Nortek Co.
3) GAF Materials
4) Panasonic USA

2. Screens for Soffit Vents
a. Wire cloth, 18 x 14 mesh of 0.013 diameter aluminum wire, complying with FS RR W 365, Type VII.

2.05 AUXILIARY INSULATING MATERIALS

A. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

B. Asphalt Coating for Cellular Glass Block Insulation: Cutback asphalt or asphalt emulsion of type recommended by cellular glass block insulation manufacturer.

C. Protection Board: Pre-molded, semi-rigid asphalt/fiber composition board, 1/4-inch (6-mm) thick, formed under heat and pressure, of standard sizes.

D. Eave Ventilation Troughs: Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

2.06 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors with Washers: Plate or Angle formed from perforated galvanized carbon-steel sheet, 0.030-inch (0.762-mm) thick by 2- inches (50-mm) square, welded to projecting steel spindle with a diameter of 0.105- inch (2.67-mm) and length capable of holding insulation of thickness indicated securely in position with 1-1/2-inch (38-mm) square or diameter self-locking washers complying with the following:
   1. Washers formed from 0.016-inch (0.41-mm) thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than in place.
   2. Where anchors are located in ceiling plenums, crawlspaces, or attic spaces provide capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap.

B. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain a minimum 1-inch (25-mm) air space between face of insulation and substrate to which anchor is attached.

C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General: Install insulation to comply with insulation manufacturer's written instructions applicable to products and application indicated. 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.

B. Preparation of Surface for Caulks and Sealants
   1. Clean and dry and rake out all joints and spaces to a depth of at least .375-inch (3/8); remove all dust by swabbing wet moistened with cleaner recommended by the caulking manufacturer.
   2. Fill deep joints and joints more than 0.25-inch (1/4) wide to within .375-inch of the surface with sealant backer, well forced in to provide a watertight seal. Fill the exposed space with caulking compound.
   3. On the exterior, prime surfaces of masonry, concrete or metal in contact with caulking, before caulking is applied.
   4. Surfaces in contact with sealing compound shall be dust-free and clean.
   5. Clean off excess compound or smears with cleaning material recommended by the manufacturer of the compound. Leave work in a condition satisfactory to the Design Professional (DP).

C. Install perimeter insulation on vertical surfaces by setting units in adhesive.

1. If not otherwise indicated, extend insulation a minimum of 24-inches (610-mm) below exterior grade line.
2. Protect below-grade insulation on vertical surfaces from damage during backfilling by applying protection board set in adhesive

D. Protect top surface of perimeter underlay insulation from damage during concrete work by applying protection board.

E. Install cavity wall and masonry cell insulations as follows:
1. Install foam plastic insulation with small pads of adhesive spaced approximately 24-inches (610-mm) o.c. both ways on inside face, as recommended by manufacturer. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
   a. Supplement adhesive attachment of insulation by securing boards with two- piece wall ties designed for this purpose and specified in Division 4.
2. Install cellular glass insulation by applying insulation with closely fitting joints using gob or serrated trowel method per cellular glass insulations written directions and as follows:
   a. Coat edges of insulation units with full bed of adhesive to seal joints between insulation and between insulation and adjoining construction.
   b. Coat exterior face (cold face) of installed cellular glass block insulation course with asphalt coating recommended by insulation manufacturer for this purpose.

F. Pour granular insulation into cavities indicated to receive insulation, taking care to fill voids completely. Maintain inspection ports to show presence of insulation at extremities of each pour area. Close ports after confirming complete coverage. Limit fall of insulation to one story in height, but not exceeding 20-feet (6-m).

G. Installation of General Building Insulation: 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.
1. Seal joints between closed-cell (non-breathing) insulation units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant.
2. Set vapor-retarder-faced units with vapor retarder to warm side of construction, unless otherwise indicated. Do not obstruct ventilation spaces, except for firestopping.
   a. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
3. Install mineral-fiber blankets in cavities formed by framing members according to the following requirements:

a. Use blanket 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.
b. Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

4. For metal-framed wall cavities where cavity heights exceed 96-inches (2438-mm) support unfaced blankets mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.
5. For wood-framed construction, install mineral-fiber blankets according to ASTM C1320 and as follows:
   a. With faced blankets having stapling flanges, secure insulation by inset, stapling flanges to sides of framing members.
   b. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to produce airtight installation after concealing finish material is in place.
6. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
   a. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions.
   b. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
   c. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation- retaining washers, taking care not to compress insulation below indicated thickness.
   d. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.
7. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.
8. Retain insulation in place by metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass. Maintain cavity width of dimension indicated between insulation and glass.
9. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.
10. Place loose-fill insulation into spaces and onto surfaces as shown, either by pouring or by machine blowing to comply with ASTM C1015. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
11. For cellulosic loose-fill insulation, comply with the Cellulose Insulation Manufacturers Association's "Special Report #3, "Standard Practice for Installing Cellulose Insulation."
12. Apply self-supported, spray-applied, cellulosic insulation according to manufacturer's written instructions. Do not apply insulation until installation of

pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. Do not cover items before local inspections are approved (as required.) After insulation is applied, make it even with studs by using method recommended by insulation manufacturer.

13. Install glass-fiber, loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
14. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

H. Installation of Vapor Retarders: Extend vapor retarder to extremities of areas to be protected from vapor transmission. Secure in place with adhesives or other anchorage system as indicated by manufacturer. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.

1. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16-inches (406-mm) o.c.
2. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
3. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.
4. 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.
5. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.

I. Attic Insulation

1. The contractor shall install sufficient insulation to provide an R-value that is complaint with the ECCC and “EPA ENERGY STAR Certified Homes”, but no less than shown in the NYS building code.
2. Install blown cellulosic insulation as per manufacturer’s direction. Blowing or pouring type insulation shall not be installed in attic space if roof slope is less than 3 to 12. A minimum density of 3.5 lbs. per cubic foot is required for all cellulosic insulation installation by NYS building code.

3. Ceiling insulation shall be cellulose, glass fiber, or mineral wool non-asbestos material, not readily able to absorb or retain moisture, non-combustible, and shall not attract insects or vermin.
4. Furnish and install cellulose or glass fiber insulation over entire attic area above conditional crawl space to provide a temperature resistance as specified in the work write-up.
5. Seal any penetrations or holes with approved sealant or blocking.
6. Furnish and install glass fiber or mineral wool batt insulation (R-13) with paper backing in exterior wall stud space as indicated in the work write-up.
7. If a vapor barrier does not already exist, install polyethylene strips between joists or trusses.

J. Contractor shall add cellulosic as per manufacturer's direction.
1. Use: Owens Corning or equal.

K. Outer Attic Rafter
1. The contractor shall install glass fiber batts backed with kraft paper between roof rafters, with an R-value that is compliant with the ECCC and "EPA ENERGY STAR Certified Homes", by stapling batt facing flange to the edge of the rafter every 12-inches, with backed side facing inside or toward heated space. The R-value should not be less than what is required by NYS Building Code.
2. In the event that flooring does not exist in the attic, work will be performed off of plywood sheets or boards so as not to damage the ceiling below.

L. Floor/Subfloor Insulation
1. Subfloor insulation system is comprised of batt insulation that has an R-value that is compliant with the ECCC and "EPA ENERGY STAR Certified Homes", 1/2-inch plywood, mold- resistant primer and 2 coats of exterior grade latex paint. OR if directed on the design documents, the contractor shall install glass fiber batt insulation that has an R-value that is compliant with the ECCC and "EPA ENERGY STAR Certified Homes", with kraft paper or open face faced on one side, between floor joists with wire mesh, chicken wire or spring wire stays.
3. Wire mesh shall be stapled to the bottom of floor joists at right angles to joists.
4. Slide bats, kraft paper or open face facing upward) on top of wire.
5. Fold batt at ends of header so as to cover the full depth of joist.
6. Do not block combustion air openings for furnace.

M. Stud Wall Blown Insulation
1. The contractor shall install sufficient cellulose fiber insulation to provide an R-value that is compliant with the ECCC and "EPA ENERGY STAR Certified Homes".
2. All spaces above and below blocking within the wall are to be completely filled.
3. All holes in interior wall finish are to be repaired to match existing.

N. Stud Wall Batt Insulation

1. The contractor shall install kraft paper or open face batt insulation that has an R-value that is compliant with the ECCC and "EPA ENERGY STAR Certified Homes", between wall studs by stapling batt facing flange to the edge of studs every 12-inches, with kraft paper or open face facing toward heated area.
2. Any cracks around door and window framing shall be packed with loose insulation.

O. Insulation Behind Vinyl or Alum Siding
1. Install thermax foil faced sheathing (or pre-approved equal product) per manufacturer's recommendations, at a thickness that is compliant with the ECCC and "EPA ENERGY STAR Certified Homes".

P. Interior and Exterior Caulking
1. Prepare surface and then seal all cracks between plaster and wood door trim, window trim and cabinets or wood items attached to wall.
2. Seal at joints of plaster and ceramic tile.
3. Remove old caulking and caulk all joints between brick and window frames.
4. Seal any and all cracks in interior or exterior wood that may provide insect harbor use after prime coat of paint but prior to finish coat.
5. Use architectural grade low VOC latex caulk.
6. Cracks of 1/4-inch wide shall be first packed solid with insulation or other inorganic vermin-proof non-deteriorating material.
7. All caulking beads shall be smooth and neat and clean.

Q. Weatherstripping
1. General: Install in accordance with manufacturer's installation instructions to ensure proper seal.
2. Doors: Contractor shall install weatherstrip to doors as follows:
   a. Install new aluminum/vinyl weatherstrip at all edges to form a tight seal.
   b. Install threshold the full width of the opening and cut to fit the door frame between jambs.
3. Thresholds
   a. Install threshold the full width of the opening and cut to fit the door frame between jambs.
   b. Slot thresholds in place with matching countersunk screws in lead shields.
   c. Set thresholds in a full bed of caulking compound.
   d. Final work shall result in a properly sealed door.
4. Windows: Contractor shall install weatherstrip to windows as follows:
   a. Install foam weather-stripping at sash dividers and all edges.
   b. Final work shall result in a properly sealed window.
5. Gable End Vent Repair
   a. Clean debris from between louvers. Install aluminum screen to interior side of vent to provide tight seal. Replace any broken louvers.

R. Vapor Retarder

1. 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.
2. Install 6-mil polyethylene plastic vapor barrier over dirt area in crawl space, overlap approximately 6-inch at each width.
3. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor retarders to framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16-inches (406 mm) o.c.
4. Seal overlapping joints in vapor retarders with adhesives or vapor-retarder tape according to vapor-retarder manufacturer's instructions. Seal butt joints and fastener penetrations with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
5. Firmly attach vapor retarders to substrates with mechanical fasteners or adhesives as recommended by vapor-retarder manufacturer.
6. Repair any tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarder.
7. Plastic to be held down with either bricks, rocks or other non-wood material (if wood is used, it must be pressure treated).

END OF SECTION

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Building paper.
2. Building wrap.
3. Flexible flashing.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.

B. Building Paper: Water-vapor-permeable, asphalt-saturated kraft building paper that complies with ICC-ES AC38, Grade D; except with water-resistance rating not less than 1 hour.

C. 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. Products: Subject to compliance with requirements, provide one of the following or preapproved equal:

a. Dow Chemical Company (The); Styrofoam Weathermate Plus Brand Housewrap.
b. DuPont (E. I. du Pont de Nemours and Company); Tyvek [StuccoWrap] [HomeWrap] [HomeWrap and HeaderWrap].
c. Ludlow Coated Products; Air Stop Housewrap
d. Pactiv, Inc.; GreenGuard Ultra Wrap .
e. Raven Industries Inc.; Fortress Pro Weather Protective Barrier.
f. Reemay, Inc.; Typar HouseWrap.

2. Water-Vapor Permeance: Not less than **50** g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).

D. 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: Self-adhesive butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

1. Products: Subject to compliance with requirements, provide one of the following, or preapproved equal:

a. DuPont (E. I. du Pont de Nemours and Company); DuPont Flashing Tape.
b. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; Vycor Butyl Self Adhered Flashing.
c. Protecto Wrap Company; BT-25 XL.
d. Raven Industries Inc.; Fortress Flashshield.
e. Advanced Building Products Inc.; Wind-o-wrap.
f. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
g. Fiberweb, Clark Hammerbeam Corp.; Aquaflash 500.
h. Fortifiber Building Systems Group; [Fortiflash 25] [Fortiflash 40].
i. Grace Construction Products, a unit of W. R. Grace & Co. - Conn.; [Vycor Plus Self-Adhered Flashing] [Vycor V40 Self-Adhered Flashing].
j. MFM Building Products Corp.; Window Wrap.
k. Polyguard Products, Inc.; [Polyguard JT-20 Tape] [Polyguard JT-30 Tape].
l. Sandell Manufacturing Co., Inc.; Presto-Seal.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. 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.

B. Building Paper: Apply horizontally with a 2-inch overlap and a 6-inch end lap; fasten to sheathing with galvanized staples or roofing nails.

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. 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.
2. Lap flashing over water-resistive barrier at bottom and sides of openings.
3. Lap water-resistive barrier over flashing at heads of openings.

END OF SECTION 072500

SECTION 072729 - AIR-BARRIER COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes vapor-retarding and vapor-permeable air-barrier coatings.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For air-barrier assemblies.

1. Include details for substrate joints and cracks, counterflashing, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.

1.4 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.

B. Low-Emitting Materials: Air barriers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-[**retarding**] [**permeable**] air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.3 VAPOR-RETARDING, AIR-BARRIER COATING

A. Vapor-Retarding, Air-Barrier Coating: Synthetic polymer membrane.

1. Products: Subject to compliance with requirements, provide one of the following, or preapproved equal:

   a. Protective Coatings Technology, Inc.; Poly-Wall Airloc Flex.
   b. Sto Corp.; VaporSeal in two-component assembly.

2. Physical and Performance Properties:

   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
   b. Vapor Permeance: Maximum 0.1 perm; ASTM E 96/E 96M.
   c. Ultimate Elongation: Minimum 140 percent; ASTM D 412, Die C.

2.4 VAPOR-PERMEABLE, AIR-BARRIER COATING

A. Vapor-Permeable, Air-Barrier Coating: Synthetic polymer membrane.

1. Products: Subject to compliance with requirements, provide one of the following, or preapproved equal.

   a. Prosoco, Inc.; [R-Guard Spray Wrap in two-component, System II] [R-Guard Spray Wrap in three-component, System I] [R-Guard MVP in two-component, System II] [R-Guard MVP in three-component, System I] assembly.
   b. Protective Coatings Technology, Inc.; Poly-Wall Airloc Flex VP.
   c. Sto Corp.; [Emerald Coat] [or] [Gold Coat] in two-component assembly.

2. Physical and Performance Properties:

   a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.

b. Vapor Permeance: Minimum 5.7 perms; ASTM E 96/E 96M.
c. Ultimate Elongation: Minimum 500 percent; ASTM D 412, Die C.

2.5 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

C. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

B. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

C. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

D. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

3.2 INSTALLATION

A. General: Install air-barrier coating and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install air-barrier assembly on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier coating material on same day. Reprime areas exposed for more than 24 hours.

1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

C. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

D. At end of each working day, seal top edge of air barrier to substrate with termination mastic.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, and doors. Apply transitions and flashing so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal air-barrier assembly around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

I. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Extend patches 6 inches beyond repaired areas in strip direction.

J. Air-Barrier Coating Material: Apply continuous unbroken air-barrier coating to substrates according to the following thickness. Apply an increased thickness of air-barrier coating in full contact around protrusions such as masonry ties.

1. Vapor-Retarding, Air-Barrier Coating: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, applied in one or more equal coats.
2. Vapor-Permeable, Air-Barrier Coating: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, applied in one or more equal coats.
3. Apply additional coats as needed to achieve void- and pinhole-free surface.

K. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

L. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests: As determined by Owner's testing agency from among the following tests:

1. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 30 lbf/sq. in. according to ASTM D 4541 for each of installed air barrier or part thereof.

C. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

D. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

E. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 60 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

F. Remove masking materials after installation.

END OF SECTION 072729

SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.01 SUMMARY

A. Comply with applicable requirements of other sections. Provide all labor, materials and equipment necessary to complete work specified herein.

B. Furnish all labor and materials to complete work in this section which consists but is not limited to all roofing, sheet metal, and related items necessary to complete the work indicated on the drawings and in the Specifications. Repair or replacement as designated on the work order. Surfaces to which roofing and sheet metal are applied shall be even, smooth, thoroughly clean, sound and dry and free from all defects that might affect the application. Materials furnished under this section which are to be built-in by other trades shall be delivered to the site in time to avoid delays in construction progress.

C. All replacement material shall match as close as possible and shall be installed per manufacturer’s direction and applicable codes.

D. All accessories or other items essential to the completion of the sheet metal installation though not specifically shown or specified shall be provided.

E. Nails, screws and bolts shall be of a composition that is compatible with the metal with which it will be in contact. All roofing materials shall be applied in accordance with manufacturer's approved directions.

F. Repair, renovations, alterations, reconstructions of existing roofing shall comply with RC-NYS 2010 and with the STATE as well as its adopted local government Ordinance amendments, and all other applicable codes.

G. This Section includes the following:
1. Asphalt shingles;
2. Felt underlayment;
3. Self-adhering sheet underlayment;
4. Ridge vents.

H. Related sections
1. Section 061000 Rough Carpentry for wood sheathing and framing;

I. Nails screws and bolts shall be of a composition that is compatible with any pressure treated wood in place or being installed under this project. Any new fasteners used in new pressure treated wood should be approved by preservative manufacturer.

J. Shingle products are required to be ENERGY STAR rated, and if economically feasible use radiant barrier material.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and blend specified.

1.03 INFORMATIONAL SUBMITTALS

A. Product test reports, including fastening pattern for wind uplift.

B. Research/evaluation reports.

C. Warranties: Sample of special warranties.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.05 QUALITY ASSURANCE

A. Source Limitations: Obtain ridge and hip cap shingles, ridge vents, felt underlayment through one source from a single asphalt shingle manufacturer.

B. Each bundle of asphalt shingles, when used, shall be delivered to job site with seals unbroken and labels intact. Labeling shall indicate compliance with Underwriters Laboratories, Inc., Class C label or equivalent standards. In high wind zone, the asphalt shingles shall be selected per RC-NYS 2010. Bundles will be protected from weather and UV exposure in conformance with manufacture.

1.06 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials within specified warranty period.
   1. Material Warranty Period: 30 years from date of Substantial Completion.
   2. Installation Warranty Period: 1 year written warranty on workmanship and material other than shingles.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 GLASS-FIBER -REINFORCED ASPHALT SHINGLES

A. For houses within Historic Districts or with Historic Designation: Laminated-Strip Asphalt Shingles: ASTM D225, laminated, multi-ply overlay construction, organic- felt reinforced, mineral-granule surfaced, and self-sealing; passing ASTM D3161 for wind resistance.

A. Laminated-Strip Asphalt Shingles: ASTM D 3462, laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following, or pre-approved equal:
      a. CertainTeed Corporation;
      b. GAF Materials Corporation;
      c. IKO;
      d. Malarkey Roofing Company;
      e. Owens Corning.
   2. Algae Resistance: Granules treated to resist algae discoloration.
   3. Tab Arrangement: Architectural style, regularly spaced according to manufacturer's specifications and local code.

B. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

2.03 UNDERLAYMENT MATERIALS

A. Felts: 2 Layers of ASTM D226 Type I, No. 15, asphalt-saturated organic felts perforated;

B. Felt: 1 layer of ASTM D226 Type II No. 30, asphalt-saturated organic felts perforated.

C. Self-Adhering Sheet Underlayment, Granular Surfaced: ASTM D 1970, minimum of 55-mil- (1.4-mm-) thick sheet; glass-fiber-mat-reinforced, SBS-modified asphalt; mineral-granule surfaced; with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

D. Self-Adhering Sheet Underlayment, High Temperature: Minimum of 30- to 40-mil- (0.76- to 1.0-mm-) thick, slip-resisting, polyethylene-film-reinforced top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.

   1. Thermal Stability: Stable after testing at 240 deg F; ASTM D 1970.
   2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D 1970.

2.04 RIDGE VENTS

A. Rigid Ridge Vent: Manufacturer's standard rigid section high-density polypropylene or other UV-stabilized plastic ridge vent for use under ridge shingles.
   1. Products:
      a. Air Vent Inc., a CertainTeed Company; Shingle Vent II.
      b. Cor-A-Vent, Inc.; V-Series.
      c. GAF Materials Corporation; Cobra Rigid Vent II.
      d. Lomanco, Inc.; OR-4.
      e. Mid-America Building Products; RidgeMaster Plus.
      f. Obdyke, Benjamin Incorporated; Xtractor Vent X18.

g. Owens Corning; VentSure Ridge Vent.
h. Ridglass Manufacturing Company, Inc.; Coolvent.

2.05 ACCESSORIES

A. Asphalt Roofing Cement: ASTM D4586, Type II, asbestos free.

B. Roofing Nails: ASTM F1667; aluminum, stainless-steel, copper, or 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.

C. Felt Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized steel wire with low profile capped heads or disc caps, 1-inch (25-mm) minimum diameter.

2.06 METAL FLASHING AND TRIM

A. Sheet Metal Flashing and Trim:
1. Sheet Metal: Zinc-coated (galvanized) steel or Copper;
2. For Patch and repair, Sheet Metal: Match existing.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.

C. Metal flashing (where required per IRC) shall be galvanized steel and where exposed shall be painted to match adjacent surfaces.

PART 3 - EXECUTION

3.01 GENERAL

A. Examine roof sheathing, cornice and eave edges prior to starting work. Notify Design Professional (DP) of any defects not previously identified, and do not proceed until such have been corrected. When sheathing is bad, DP for inspections unless otherwise stated in Bid Documents. The term “RE-ROOF” shall include all porches, additions, and structures attached to the main structure (house) unless otherwise stated. Vents shall be installed as stated in Division 7.

3.02 UNDERLAYMENT INSTALLATION

A. 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.

B. Double-Layer Felt Underlayment: Install on roof deck parallel with and starting at the eaves. Install a 19-inch- wide starter course at eaves and completely cover with full-width second course. Install succeeding courses lapping previous courses 19 inches in shingle fashion. Lap ends a minimum of 6 inches. Stagger end laps between succeeding courses at least 72 inches . Fasten with roofing nails.
1. Install felt underlayment on roof sheathing not covered by self-adhering sheet underlayment. Lap edges over self-adhering sheet underlayment not less than 3 inches in direction to shed water.
2. Terminate felt underlayment extended up not less than 4 inches against sidewalls, curbs, chimneys, and other roof projections.
3. Install fasteners at no more than 36 inch o.c.

C. Self-Adhering Sheet Underlayment: Install, wrinkle free, on roof deck. Comply with low-temperature installation restrictions of underlayment manufacturer if applicable. Install at locations indicated below, 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.
1. At all critical leak areas, per manufacturer’s recommendations:
   a. Penetrations, 20-inches minimum from the penetration.
   b. Hip and Ridge, 18-inches on either side of the ridge.
   c. Sidewall, a full 36-inch roll, 5-inches up the wall.
   d. Valley. 18-inches on either side of the valley.
   e. Dormer.
   f. Eave, 24-inches inside the warm wall.
   g. Rake Edge.

3.03 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Division 7.
1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Flashing shall be placed around all openings and extensions of mechanical appliances or equipment through the roof and otherwise as necessary to provide adequate drainage. Flashing on chimneys shall extend at least 4” upon wall and shall be counter-flashed and shall extend under roofing at least 12”.

C. Heads and sills of new openings shall be suitable flashed and caulked. Pipes projecting through the roof shall be flashed. All flashing shall be 29 Ga. galvanized sheet metal or 02. inch copper.

D. Joints and seams in all metal work shall be neatly formed and have suitable watertight hot-solder joints. All exposed galvanized metal shall be primed with red-lead. All exposed nails in flashing shall be capped with lead.

3.04 ASPHALT SHINGLE INSTALLATION

A. At locations where total roof replacement is occurring:
1. Strip existing roof, removing all shingles and felt.
2. Make repairs to the existing roof rafters where required to provide adequate strength and a true and level surface.
3. Remove all warped and deteriorated decking and replace with like kind.
4. Fill in all spaces between boards with securely nailed wood strips of the same thickness as the old deck, OR, if necessary, re-sheath over existing roof boards with plywood, 5/8-inch minimum. Plywood is to be installed with outer plies at right angle to rafters and staggered so that end joints in adjacent panels break over different supports.
5. Sink all protruding nails and re-nail sheathing securely at all locations. All large cracks, slivers, knot holes, loose knots, pitchy knots and excessively resinous areas are to be covered with 26 gauge sheet-metal securely nailed to sheathing.
6. Before shingling, sweep roof thoroughly to remove all debris.
7. Remove all roofing materials, debris, etc., from premises and leave in a clean condition.

B. At locations where repair/patching is occurring:
1. Repair existing roof. All replacement materials shall match existing as closely as possible, and shall be installed according to manufacturer’s directions and all applicable codes.
2. Repair any broken, damaged, missing, or rotted sheathing, fascia, rake, cornice, soffit flashing, etc., as specified in the Bid Document. Sheathing shall be replaced with full pieces/sheets only.

C. 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." Shingles will be fastened to minimally comply with NYS Building codes, and local wind uplift ratings.

D. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7-inches wide with self-sealing strip face up at roof edge.
1. Extend asphalt shingles 3/4-inch .

E. 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.

F. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.

G. Ridge Vents: Install continuous ridge vents over asphalt shingles according to manufacturer's written instructions. Fasten with roofing nails of sufficient length to penetrate sheathing.

H. Ridge and Hip Cap Shingles: Maintain same exposure of cap shingles as roofing shingle exposure. Lap cap shingles at ridges to shed water away from direction of prevailing winds. Fasten with roofing nails of sufficient length to penetrate sheathing.

END OF SECTION

SECTION 074600 - SIDING

PART 1 - GENERAL

1.01 SUMMARY

A. Exterior siding for new construction and historic and non-historic repair or partial replacement: Match existing siding in gauge, pattern, style, size, texture, and color.
   1. Repair shall mean to realign and re-secure existing siding to provide a weather-tight and secure surface that matches adjacent surfaces.
   2. Replacement shall mean complete removal of siding to existing end joints of all deteriorated wood siding, and the installation of new matching materials.
   3. Repair and replacement work shall be installed in such a manner as to match existing finish work.
   4. Repairs and replacements for historically eligible homes as designated by the New York State Office of Parks, Recreation and Historic Preservation (SHPO) shall match existing siding in material, size and installation.
   5. Minimum thickness of weather coverings shall comply with Section 1405 of Building Code of New York State and Section R703 of Residential Code of New York State.

B. Section Includes:
   1. Wood Siding
   2. Wood Board Siding Repair;
   3. Beveled Wood Siding Repair;
   4. Vinyl Siding Repair;
   5. Fiber-cement siding;
   6. Skirting Replacement, See Finish Carpentry Section for historic board and batten skirting and wood lattice skirting.

C. Related Sections:
   1. Section 061000 "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
   2. Section 062000 "Finish Carpentry" for exterior trim.
   3. Section 040501 "Masonry Restoration and Cleaning"

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.
   1. For vinyl siding, include VSI's official certification logo printed on product data.

B. Samples: For siding including related accessories.

1.03 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified vinyl siding Installer.

B. Product certificates.

C. Product test reports.

D. Research/evaluation reports.

E. Warranty: Sample of special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.05 QUALITY ASSURANCE

A. Fiber Cement Siding: Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C1186 by a qualified testing agency acceptable to authorities having jurisdiction.

B. Vinyl Siding Installer Qualifications: A qualified installer who employs a VSI- Certified Installer on Project.

C. Wood Siding Installer Qualifications: A qualified installer with not less than three years of experience.

D. Store materials in a dry, well-ventilated, weather-tight place, in original packaging.

1.06 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

PART 2 - PRODUCTS

2.01 WOOD SIDING

A. Wood siding shall be redwood or cedar of a standard pattern to match existing or as specified in the Bid Document. Wood Siding designated for Historically Eligible properties as designated by the SHPO shall have siding matching the material, profile, sizing and installation method of the exiting material of the home.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Stimson Lumber Company
      b. Thompson River Lumber
      c. United Forest Products, Inc.

B. Siding Patterns for historically eligible homes shall match the pattern of the existing historic siding be the following patterns:
   1. Clapboard
   2. Dolly Varden
   3. Bevel

4. Tongue and Groove
5. Ship Lap
6. Channel Rustic
7. Rustic Vee
8. Board and Batten

C. Sizing of siding for historically eligible homes may vary from property to property. Siding is to match the size of existing siding and it is the responsibility of the contractor to measure and size siding according to match existing. Sizing may range from 2” to 8”in width for horizontal material for patterns listed, items 1 through 7.The thickness is to be a minimum of 5/16” . Sizing for vertical Board and Batten may range from 8” to 12” wide planks with 1 ¼” +/- battens.

2.02 FIBER-CEMENT SIDING

A. General: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E136; with a flame-spread index of 25 or less when tested according to ASTM E84.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Cemplank;
   b. CertainTeed Corp.;
   c. GAF Materials Corporation;
   d. James Hardie;
   e. MaxiTile, Inc; a California corporation;
   f. Nichiha Fiber Cement.
2. Horizontal Pattern: Boards 5-1/4-inch (133-mm) or 6-1/4-inch to 6-1/2-inch (159 to 165-mm) or 7-1/4-inch to 7-1/2-inch (184 to 190-mm) or 8-1/4-inch to 8-1/2-inch (210 to 216-mm) or 9-1/4-inch to 9-1/2-inch (235 to 241-mm) wide in plain style.
   a. Texture: Smooth
3. Factory Priming: Manufacturer's standard acrylic primer.

2.03 VINYL SIDING

A. General: Integrally colored vinyl siding complying with ASTM D3679.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Alside;
   b. CertainTeed Corp.;
   c. Gentek Building Products, Inc.;
   d. Kaycan Ltd.;
   e. Mitten Inc.;
   f. Owens Corning;

g. Royal Building Products;

h. Variform, Inc.

B. Width and pattern to match existing.

C. Nominal Thickness to match existing.

D. Minimum Profile Depth (Butt Thickness): Match existing.

E. Nailing Hem: Double thickness.

F. Finish: Wood-grain print with clear protective coating containing not less than 70 percent PVDF.
1. Colors: Match existing

2.04 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.
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 D3679 except for wind-load resistance.
1. Texture: Match existing

C. Decorative Accessories: Provide the wood, fiber-cement and vinyl decorative accessories as required to make repairs.

D. Fasteners: Match existing.

2.05 EXAMINATION

A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and soffit and related accessories.

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

PART 3 - EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

A. General: Comply with siding and soffit manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

B. Wood Siding Installation and Repair
   1. Remove all deteriorated materials and necessary trim.
   2. Repair all deteriorated sheathing materials and secure.
   3. Install new materials to match existing coursings and patterns, locating end joints on bearing members or adequate backing. Fit all members for tight joints and proper overlap. All new siding shall be installed as per manufacturer's warranties and guidelines.

C. Wood Beveled Siding installation and Repair
   1. After careful inspection and evaluation of existing wooden siding, repair and/or replace all damaged or deteriorated siding.
   2. Repair of siding using a premium quality wood filler to rebuild minor holes and nail holes, and re-nailing of all loose siding with galvanized 7d nails.
   3. Replacement of siding too deteriorated to patch shall consist of, the removal and proper disposal of all deteriorated boards, and replacement with new siding of appropriate size.
   4. Replace siding to match existing on required areas of structure. Installation shall follow manufacturer's specifications and codes regarding surface preparation, nailing, lap, and joint staggering, etc.
   5. All siding to be back primed before installation.
   6. Allow for replacing and/or repair of sheathing and/or studs in areas where new sheathing and siding will be installed.

D. Vinyl Siding Repair
   1. Repair Existing
      a. Remove all damaged or unsound material as designated in the Bid Document.
      b. Replace all damaged or missing siding and associated flashing.
      c. New siding shall match with coursing of existing and shall be located with end joints on framing member.
      d. Stagger Joints at patch.
      e. Securely nail with a minimum of two nails for every member.
      f. Remove all caulking as per manufacturer's recommendations.
      g. Caulk as per manufacturer's recommendation.

E. Fiber Cement Siding Installation and Repair
   1. Remove all damaged or unsound material as designated in the Bid Document.
   2. Replace all damaged/deteriorated materials prior to installation for sound surface and sealing of exterior wall.
   3. Existing exterior wall sheathing, as shown in the 2nd and 3rd rows of the diagram below, maybe used in lieu of replacing with new 5/8" plywood. If

existing sheathing is as shown in rows 2 and 3, any deteriorated sheathing materials maybe replaced in kind.

4. Install all new prefinished manufactured siding on entire structure per manufacturers' requirements.

F. Skirting Repair and Replacement, See Finish Carpentry Section for Historic Board and Batten Shirting and Historic Wood Lattice Skirting.
   1. Repair Existing;
   2. Replacement with Cement Board in board and batten pattern;
   3. Replacement with vinyl lattice and frame.

3.03 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

SECTION 075113 - BUILT-UP ASPHALT ROOFING

PART 1 - GENERAL

1.01 GENERAL

A. This Section includes built-up asphalt roofing systems.

1.02 SUMMARY

A. Comply with applicable requirements of other sections. Provide all labor, materials and equipment necessary to complete work specified herein.

B. Furnish all labor and materials to complete work in this section which consists but is not limited to all roofing, sheet metal, and related items necessary to complete the work indicated on the drawings and in the Specifications. Repair or replacement as designated on the work order. Surfaces to which roofing and sheet metal are applied shall be even, smooth, thoroughly clean, sound and dry and free from all defects that might affect the application. Slope of Built –up roof shall not exceed 2%, except for coal tar built up roofs which shall not exceed 1%. Materials furnished under this section which are to be built-in by other trades shall be delivered to the site in time to avoid delays in construction progress.

C. All replacement material shall match as close as possible and shall be installed per manufacturer’s direction and applicable codes.

D. All accessories or other items essential to the completion of the sheet metal installation though not specifically shown or specified shall be provided.

E. Nails, screws and bolts shall be of a composition that is compatible with the metal with which it will be in contact. All roofing materials shall be applied in accordance with manufacturer's approved directions.

F. Repair, renovations, alterations, reconstructions of existing roofing shall comply with RC-NYS 2010 and with the STATE as well as its adopted local government Ordinance amendments, and all other applicable codes.

G. This Section includes the following:
   1. Modified Bitumen Roofing System

H. Related sections
   1. Section 061000 Rough Carpentry for wood sheathing and framing.
   2. Division 7.

1.03 DEFINITION

A. Hot Roofing Asphalt: Roofing asphalt heated to its equiviscous temperature, the temperature at which its viscosity is 125 centipoise for mopping application and 75

centipoise for mechanical application, within a range of plus or minus 25 deg F (14 deg C), measured at the mop cart or mechanical spreader immediately before application.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For built-up roofing. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For cap sheet and flashing sheet, of color required.

1.05 INFORMATIONAL SUBMITTALS

A. Research/Evaluation Reports: For components of built-up roofing, from ICC-ES.

B. Sample Warranties: For manufacturer's special warranties.

1.06 CLOSEOUT SUBMITTALS

A. Maintenance Data: For built-up roofing to include in maintenance manuals.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer, approved by manufacturer to install manufacturer's products.

B. Source Limitations: Obtain components for roofing system approved by roofing system manufacturer.

C. Material Standards: Built-up roof covering materials shall comply with the standard in Table R905.9.2 of RC-NYC 2010.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing manufacturer. Protect stored liquid material from direct sunlight.

a. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.09 FIELD CONDITIONS

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

1.10 WARRANTY

A. Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within 10 years from date of Substantial Completion. Failure includes roof leaks.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or approved equal:

1. Built-up Asphalt Roofing:
   a. Barrett Company;
   b. CertainTeed Corporation;
   c. Ecology Roof Systems;
   d. Fields Company, LLC;
   e. Firestone Building Products Company;
   f. GAF Materials Corporation;
   g. Henry Company;
   h. Johns Manville International, Inc.;
   i. Malarkey Roofing Company;
   j. TAMKO Roofing Products, Inc.;
   k. Tremco, Inc.

2.02 BASE-SHEET MATERIALS

A. Sheathing Paper: Red-rosin type, minimum 3 lb/100 sq. ft. (0.16 kg/sq. m).

B. Base Sheet: ASTM D4601, Type I or II, non-perforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

2.03 ROOFING MEMBRANE PLIES

A. Ply Sheet: ASTM D2178, Type IV, asphalt-impregnated, glass-fiber felt.

B. Cap Sheet: ASTM D3909, asphalt-impregnated and -coated, glass-fiber cap sheet, with white coarse mineral-granule top surfacing and fine mineral surfacing on bottom surface.

2.04 FLASHING MATERIALS

A. Backer Sheet: ASTM D4601, Type I, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

2.05 ASPHALT MATERIALS

A. Asphalt Primer: ASTM D41

B. Roofing Asphalt: ASTM D 312, Type III or IV as recommended by built-up roofing manufacturer for application.

2.06 AUXILIARY ROOFING MEMBRANE MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with built-up roofing.

B. Cold-Applied Adhesive: Roofing system manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up roofing base flashings.

C. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FM 4470; designed for fastening roofing membrane components to substrate; tested by manufacturer for required pullout strength; and acceptable to roofing system manufacturer.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine roof sheathing, cornice and eave edges prior to starting work. Notify Design Professional (DP) of any defects not previously identified, and do not proceed until such have been corrected. When sheathing is bad, call DP for inspections unless otherwise stated in Bid Documents. The term “RE-ROOF” shall include all porches, additions, and structures attached to the main structure (house) unless otherwise stated. Vents shall be installed as stated in Division 7.

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

3.02 INSTALLATION, GENERAL

A. Install built-up roofing membrane system according to roofing system manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."

B. Where roof slope exceeds 1-inch per 12-inches (1:12), install sheets of built-up roofing membrane parallel with slope and backnail.

C. Coordinate installing roofing system components so insulation and roofing membrane sheets are not exposed to precipitation or left exposed at the end of the workday or when rain is forecast.

D. Asphalt Heating: Heat asphalt to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application. Circulate asphalt during heating. Do not raise asphalt temperature above equiviscous temperature range more than one hour before time of application. Do not exceed asphalt manufacturer's recommended temperature limits during asphalt heating. Do not heat asphalt within 25 deg F (14 deg C) of flash point. Discard asphalt maintained at a temperature exceeding finished blowing temperature for more than 4 hours.

a. Apply hot roofing asphalt within plus or minus 25 deg F (14 deg C) of equiviscous temperature.

E. Substrate-Joint Penetrations: Prevent roofing asphalt from penetrating substrate joints, entering building, or damaging roofing system components or adjacent building construction.

3.03 ROOFING MEMBRANE INSTALLATION

A. Loosely lay one course of sheathing paper, lapping edges and ends a minimum of 2-inches (50-mm) and 6-inches (150-mm), respectively.
1. Mechanically fasten to substrate.

B. Install two-ply sheets starting at low point of roofing system. Align ply sheets without stretching. Shingle side laps of ply sheets uniformly to achieve required number of plies throughout thickness of roofing membrane. Shingle in direction to shed water. Extend ply sheets over and terminate beyond cants.
1. Embed each ply sheet in a solid mopping of hot roofing asphalt.

C. Cap Sheet: Install lapped granulated cap sheet starting at low point of roofing system. Offset laps from laps of preceding ply sheets and align cap sheet without stretching. Lap in direction to shed water. Extend cap sheet over and terminate beyond cants.
1. Embed cap sheet in a solid mopping of hot roofing asphalt.

D. Roof Repair:
1. Prepare existing roof for overlayment by nailing loose roofing and remove obstruction which will hinder new overlayment installations.
2. Repair existing roof with Torch or Mop Down material surfaced rolled; overlap seams 4-inches.
3. New roof cover shall be installed per roofing material manufacturer’s directions and comply with State Board of Insurance Windstorm Inspection.

3.04 FLASHING AND STRIPPING INSTALLATION

A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof, and secure to substrates according to roofing system manufacturer's written instructions.

B. Extend base flashing up walls or parapets a minimum of 8-inches (200-mm) above roofing membrane and 4-inches (100-mm) onto field of roofing membrane.

C. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.

D. Install stripping, according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.

3.05 COATING INSTALLATION

A. Apply coating to built-up roofing and base flashing according to manufacturer’s written instructions by spray, roller or other suitable application method to provide a dry film thickness of not less than 20 mils (0.5 mm).

END OF SECTION

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SECTION 075323 - ETHYLENE-PROPYLENE-DIENE-MONOMER (EPDM) ROOFING

PART 1 - **GENERAL**

1.1 SUMMARY

A. Section Includes:

1. Adhered ethylene-propylene-diene-monomer (EPDM) roofing system.
2. Mechanically fastened ethylene-propylene-diene-monomer (EPDM) roofing system.

1.2 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For the following products:

1. Sheet roofing, of color required.

1.4 INFORMATIONAL SUBMITTALS

A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

B. Sample Warranties: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain components for roofing system from manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.

B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

C. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low slope roof products.

D. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 EPDM ROOFING

A. EPDM: ASTM D 4637, uniform, flexible EPDM sheet.

1. Manufacturers: Subject to compliance with requirements, provide products by the following or preapproved equal:

a. Carlisle SynTec Incorporated.
b. ERSystems.
c. Firestone Building Products.
d. GAF Materials Corporation.
e. GenFlex Roofing Systems.
f. International Diamond Systems.
g. Johns Manville.
h. Lexcan Limited.
i. Mule-Hide Products Co., Inc.
j. Roofing Products International, Inc.
k. StaFast Building Products.
l. Versico Incorporated.

2.4 AUXILIARY ROOFING MATERIALS

A. Sheet Flashing: 60-mil- (1.5-mm-) thick EPDM, partially cured or cured, according to application.

B. Bonding Adhesive: Manufacturer's standard.

C. Seaming Material: Manufacturer's standard

D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.

E. Miscellaneous Accessories: Provide lap sealant, water cutoff mastic, metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, molded pipe boot flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.5 SUBSTRATE BOARDS

A. Comply with requirements in Division 7 & 9

2.6 ROOF INSULATION

A. Comply with requirements in Division 7

PART 3 - EXECUTION

3.1 ROOFING INSTALLATION, GENERAL

A. Examine roof sheathing, cornice and eave edges prior to starting work. Notify Design Professional (DP) of any defects not previously identified, and do not proceed until such have been corrected. When sheathing is bad, call DP for inspections unless otherwise stated in Bid Documents. The term “RE-ROOF” shall include all porches, additions, and structures attached to the main structure (house) unless otherwise stated.

B. Install roofing system according to roofing system manufacturer's written instructions.

C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

D. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.

3.2 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Basis of Design.
   1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

3.3 ADHERED MEMBRANE ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

D. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeters.

E. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

   1. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.

F. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

G. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal membrane roofing in place with clamping ring.

3.4 MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION

A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll membrane roofing and allow to relax before installing.

B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Mechanically fasten or adhere e roofing securely at terminations, penetrations, and perimeter of roofing.

D. Adhesive Seam Installation: Clean both faces of splice areas, apply splicing cement, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

1. Apply a continuous bead of in-seam sealant before closing splice if required by roofing system manufacturer.

E. Tape Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing according to manufacturer's written instructions to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of roofing terminations.

F. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

G. Spread sealant or mastic bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

H. In-Splice Attachment: Secure one edge of roofing using fastening plates or metal battens centered within splice, and mechanically fasten roofing to roof deck. Field splice seam.

I. Through-Membrane Attachment: Secure roofing using fastening plates or metal battens, and mechanically fasten roofing to roof deck. Cover battens and fasteners with a continuous cover strip.

3.5 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.

E. Terminate and seal top of sheet flashings.

END OF SECTION 075323

SECTION 075552 - MODIFIED BITUMINOUS MEMBRANE ROOFING (ROLL ROOFING)

PART 1 - GENERAL

1.01 SUMMARY

A. Comply with applicable requirements of other sections. Provide all labor, materials and equipment necessary to complete work specified herein.

B. Furnish all labor and materials to complete work in this section which consists but is not limited to all roofing, sheet metal, and related items necessary to complete the work indicated on the drawings and in the Specifications. Repair or replacement as designated on the work order. Surfaces to which roofing and sheet metal are applied shall be even, smooth, thoroughly clean, sound and dry and free from all defects that might affect the application. Slope of roof shall not exceed 2%. Materials furnished under this section which are to be built-in by other trades shall be delivered to the site in time to avoid delays in construction progress.

C. All replacement material shall match as close as possible and shall be installed per manufacturer’s direction and applicable codes.

D. All accessories or other items essential to the completion of the sheet metal installation though not specifically shown or specified shall be provided.

E. Nails, screws and bolts shall be of a composition that is compatible with the metal with which it will be in contact. All roofing materials shall be applied in accordance with manufacturer's approved directions.

F. Repair, renovations, alterations, reconstructions of existing roofing shall comply with RC-NYS 2010 and with the STATE as well as its adopted local government Ordinance amendments, and all other applicable codes.

G. This Section includes the following:
   1. Mineral Surface Modified Bituminous Sheet
   2. Asphalt Lap Cement Adhesive

H. Related sections
   1. Section 061000 Rough Carpentry for wood sheathing and framing.
   2. Division 7

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Verification: For the following products:
   1. Cap sheet, of color required.

2. Flashing sheet, of color required.

1.03 INFORMATIONAL SUBMITTALS

A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

B. Sample Warranties: For manufacturer's special warranties.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer, approved by manufacturer to install manufacturer's products.

B. Deliver materials in manufacturers' original unopened containers and rolls with labels intact & legible. Mark and remove wet or damaged material from site. Protect material from moisture absorbance. Store rolls on end on clean raised platforms or pallets in dry location with adequate ventilation. Maintain roll materials at temperatures above 10 degrees C, 50 degrees F, for 24 hours immediately before application. Modified bituminous rolled roofing material shall comply with the standards in the RC-NYS 2010 and with the STATE as well as its adopted local government Ordinance amendments, and all other applicable codes.

1.06 FIELD CONDITIONS

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

1.07 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace roll roofing material that fail in materials within specified warranty period.
1. Installation Warranty Period: 1 year written warranty on workmanship and material other than roll roofing material.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 SBS-Modified Bituminous Roofing

A. Subject to compliance with requirements, provide one of the following or preapproved equal:

a. Flex Membranes International.
b. GAF Materials Corporation.
c. IKO.
d. Johns Manville.
e. Malarkey Roofing Company.
f. Siplast, Inc.
g. Soprema, Inc.

B. Source Limitations: Obtain components for roofing system from manufacturer approved by roofing manufacturer.

2.03 ROOFING SHEET MATERIALS

A. Base Sheet: ASTM D 4601, nonperforated, asphalt-impregnated and -coated, glass-fiber sheet, dusted with fine mineral surfacing on both sides.

B. SBS-Modified Asphalt Smooth-Surfaced Roofing Cap Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet reinforced with polyester fabric or reinforced with glass fibers; smooth surfaced; suitable for application method specified.

2.04 BASE FLASHING SHEET MATERIALS

A. Backer Sheet: ASTM D 2626, asphalt-saturated and -coated organic felt, dusted with fine mineral surfacing on both sides.

B. SBS-Modified Asphalt Smooth-Surfaced Flashing Sheet: ASTM D 6164, Grade S, Type I or II, SBS-modified asphalt sheet reinforced with polyester fabric or reinforced with glass fibers; smooth surfaced; suitable for application method specified.

2.05 AUXILIARY ROOFING MATERIALS

A. Asphalt Roofing Cement: ASTM D3019.

B. Asphalt Roofing Adhesive: ASTM D3747.

C. Asphalt Primer: ASTM D41

D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing components to substrate; tested by manufacturer for required pullout strength, and acceptable to roofing system manufacturer.

2.06 METAL FLASHING AND TRIM

A. Sheet Metal Flashing and Trim: Comply with requirements in Division 7.
1. Sheet Metal: Zinc-coated (galvanized) steel.
2. For Patch and repair, Sheet Metal: match existing.

B. Fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item.

2.07 ROOF INSULATION

A. Comply with requirements in Division 7

PART 3 - EXECUTION

3.01 GENERAL

A. Examine roof sheathing, cornice and eave edges prior to starting work. Notify Design Professional (DP) of any defects not previously identified, and do not proceed until such have been corrected. When sheathing is bad, call DP for inspections unless otherwise stated in Bid Documents. The term “RE-ROOF” shall include all porches, additions, and structures attached to the main structure (house) unless otherwise stated. Vents shall be installed as stated in Division 7.

3.02 METAL FLASHING INSTALLATION

A. General: Install metal flashings and other sheet metal to comply with requirements in Basis of Design.
   1. Install metal flashings according to recommendations in ARMA's "Residential Asphalt Roofing Manual" and asphalt shingle recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

3.03 BITUMINOUS ROLL ROOFING INSTALLATION

A. At locations where total roof replacement is occurring:
   1. Strip existing roofing, removing all rolled roofing, shingles, and felt areas.
   2. Make repairs to the existing roof framing as required to provide adequate strength and a true and level surface.
   3. Remove all warped and deteriorated decking and replace with like kind.
   4. Fill in all spaces between boards with securely nailed wood strips of the same thickness as the old deck, if necessary, resheath over existing roof boards with CDX plywood, 5/8-inch minimum.
   5. Sink all protruding nails and renail sheathing securely at all locations. All large cracks, slivers, knot holes, loose knots, pitchy knots and excessively resinous areas are to be covered with 26 gage sheet metal securely nailed to sheathing.
   6. Furnish and install new modified membrane roofing, as required, installed according to manufacturer’s directions - using either cold process adhesive or heat welded process.

B. At locations where repair/patching is occurring:

1. Repair existing roof. All replacement materials shall match existing as closely as possible, and shall be installed according to manufacturer's directions and all applicable codes.
2. Repair any broken, damaged, missing, or rotted sheathing, fascia, rake, cornice, soffit flashing, etc., as specified in the Bid Document. Sheathing shall be replaced with full pieces/sheets only.
3. Small Breaks - Nail holes and small breaks, if limited in number, should be repaired by applying asphalt plastic cement that meets with Federal Specifications SS-C-153, Type I, Class A (Summer Grade) or Class B (Winter grade).
4. Large Breaks – Open horizontal seam below the break and insert through it a strip of roofing of the same type. Extend the strip at least 6-inch below the edge of break, with the lower edge flush with the horizontal exposed edge of the covering sheet. Coat strip liberally with lap cement, where it will come in contact with the covering sheet before inserting it. After inserting the strip, press down the edges of the roofing firmly and nail securely with nails 3/4-inches from the edge spaced 2-inches. Apply lap cement to the horizontal seam, press down firmly and re-nail if original seam was nailed.
5. Large Damaged Areas – Remove the roofing from the damaged area and apply new roofing of the same type, using full width sheets applied in the same manner as the original roof.

C. Install roll roofing 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."

END OF SECTION

SECTION 077120 - GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.01 SUMMARY

A. Comply with applicable requirements of other sections. Provide all labor, materials and equipment necessary to complete work specified herein.

B. Furnish all labor and materials to complete work in this section which consists but is not limited to all roofing, sheet metal, and related items necessary to complete the work indicated on the drawings and in the Specifications. Repair or replacement as designated on the work order. Slope of gutters shall be in accordance with the manufacturer's recommendations. Materials furnished under this section which are to be built-in by other trades shall be delivered to the site in time to avoid delays in construction progress.

1.02 RELATED SECTIONS

A. Section 073113 Asphalt shingles

B. Section 074600 Siding

C. Section 075113 Built up asphalt roofing

D. Section 075552 Modified roofing (Rolled roofing)

1.03 REFERENCES

A. Conform to the most current Residential Code of NYS, and local code compliance for water drainage and discharge.

B. American Architectural Manufacturers Association (AAMA) 1405.1 – Specification for Aluminum rain carrying systems.

1.04 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory indicated.

B. Shop Drawings: For roof accessories.

C. Samples: For each exposed product and for each color and texture specified.

1.05 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.06 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.07 DELIVERY, STORAGE AND HANDLING

A. Store product in a manner where as to not be twisted, bent or damaged.

B. Keep product unopened until time of installation.

C. During time of storage prevent materials from discoloring, staining product.

1.08 WARRANTY

A. Provide the manufacturer's warranty for all materials.

PART 2 - PRODUCTS

2.01 APPROVED MANUFACTURERS

A. Englert

B. Garrety

C. Genova Products

D. Leaf Pro

2.02 Components:

A. Gutters: Aluminum, continuous and seamless sheet metal, rolled formed
   1. Thickness
      a. .027 inch
      b. .032 inch

B. Downspouts: Aluminum, continuous and seamless sheet metal, rolled formed
   1. Thickness
      a. .027 inch
      b. .032 inch
   2. Size:
      a. 3 inch by 4 inch

C. Endcaps: Aluminum, continuous and seamless sheet metal, rolled formed
   1. Thickness
      a. .027 inch

D. Elbows: Aluminum, continuous and seamless sheet metal, rolled formed. Minimum tensile strength 26,000 psi, minimum yield strength 25,000 psi or equivalent.
   1. Thickness
      a. .027 inch
      b. .032 inch
   2. Size:
      a. To match downspouts

E. Gutter guards: Aluminum mesh, 5 inch (127 mm) by 3 foot (914 mm).

F. Color: Full spectrum of manufacturer's colors

PART 3 - EXAMINATION

3.01 FABRICATION

A. Continuously form seamless gutters to the profiles and sizes specified.

B. Form downspouts of profiles and sizes specified.

C. Hem exposed edges of metal.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Clean and repair if necessary any adjoining work on which this work is in any way dependent for its proper installation.

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

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install gutters using appropriate hangers to allow normal expansion and contraction.

C. Install gutter hangers using two 1-1/4 inch (32 mm) screw shank nails and fastened into solid lumber.

D. All gutters shall be in continuous length for each elevation (run). No end laps are allowed.

E. Exercise care in placing aluminum in contact with other dissimilar metals or materials that are not compatible with aluminum.

F. Providing adequate insulation/separation where ever necessary, such as by painting or otherwise protecting when they are in contact with aluminum or when drainage from them passes over aluminum surfaces.

G. Install sealants where indicated to clean dry surfaces only without skips or void.

END OF SECTION

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SECTION 082110 - DOORS

PART 1 - GENERAL

1.01 SUMMARY

A. Scope: Provide all Labor, Materials, Equipment, and Services and perform all operations required for complete installation of and repairs:
   1. Doors: Exterior entrance doors, interior door, sliding glass door, door repair.
   2. Exterior Historic Door Replacements: Replacement of door for houses/buildings listed in the National and/or State Registers of Historic Places (N/SR) or deemed eligible for listing in the N/SR by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) State Historic Preservation Office (SHPO). Historic door replacement will require field measurement for size and may be non-standard in height and width. Sidelites and Transoms may be required and are covered in Section 085500.

B. This Section includes solid, hollow-core wood doors and metal doors as follows:
   1. Wood Doors with wood-veneer faces;
   2. Wood Doors with Panels;
   3. Metal Doors;
   4. Slider Doors;
   5. Garage Doors;
   6. Access Doors;
   7. Hardware;
   8. Glazing.
   9. Wood Doors for Historic Replacements.

C. Related Section
   1. Section 085500 “Windows” contains fixed transoms and fixed side lites.

D. Repair, renovations, alterations, reconstruction of existing windows, doors, and hardware shall comply with the Residential Code of New York State (current version).

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and other pertinent data.

C. Samples: Represent typical range of color and grain for each species of veneer and solid lumber required. Finish Sample with same materials proposed for factory-finished doors.

D. Samples: For each exposed product and for each color and texture specified.

1.03 INFORMATIONAL SUBMITTALS

A. Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

B. Sample warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.05 QUALITY ASSURANCE

A. Quality Standard for wood Doors: Comply with AWI's "Architectural Woodwork Quality Standards Illustrated."

B. Steel Door and Frame Standard: Comply with ANSI A250.8, unless more stringent requirements are indicated.

C. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

PART 2 - PRODUCTS

2.01 DOOR MANUFACTURERS

A. Available Manufacturers for Wood Doors: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Algoma Hardwoods Inc.;
2. Ampco Products, Inc.;
3. Case Group LLC;*
4. Chappell Door Co.;
5. Eggers Industries; Architectural Door Division;
6. GRAHAM Manufacturing Corp.;
7. Haley Brothers, Inc.;
8. Heartwood Fine Windows and Doors*
9. IPIK Door Company;
10. Kolbe Windows & Doors*
11. Lambton Doors;
12. Marlite;
13. Mohawk Flush Doors, Inc.;
14. Oshkosh Architectural Door Co.;
15. Poncraft Door Co.;
16. Vancouver Door Company, Inc.;
17. VT Industries Inc.;

*Possible source supplier for historically eligible homes, other manufacturers may be a source supplier.

B. Available Manufacturers for Steel Doors: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Benchmark Commercial Doors; a division of General Products Co., Inc.;
2. Ceco Door Products; a United Dominion Company;
3. Curries Company;
4. Deansteel Manufacturing, Inc.;
5. Mesker Door, Inc.;
6. Pioneer Industries Inc.;
7. Republic Builders Products;
8. Steelcraft; a division of Ingersoll-Rand;

C. Available manufacturers for Patio Sliding Doors
1. Acadia, Northrop Architectural Systems;
2. Bell-View, Inc.;
3. Feather-Lite Mfg. Co.;
4. Howmet Corp. - Arch. Products Div.;
5. International Window Corp.;
6. Keller Aluminum Prod. of Va.;
7. Permabilt Mfg., Inc.;
8. Reynolds Metals Co.;
9. Rollmaster Corp.

2.02 DOOR CONSTRUCTION

A. Exterior Wood Doors for Historic Replacements. Field measurement of existing opening required. Size of door must match existing.
1. Residential Grade Recessed Panel Door:
   a. Two panel
   b. Four Panel
   c. Five Panel
2. Frame: Constructed of kiln-dried pine, with mull casings on mulled units, water repellent preservative treated in accordance with WDMA I.S. 4-07'A.
   a. Wood frames may have 3-1/2 inch (89mm) profiled brick mould at brick wall assemblies. Exact depths may very due to existing conditions and must be verified by Contractor.
   b. Wood frames 3-1/2 inch (89mm) flat casing at wood siding wall assemblies. Exact depths may very due to existing conditions and must be verified by Contractor.
   c. At locations with Transom head drip cap to be field applied to frame.

3. Jamb thickness: 3/4 inch (19mm) interior; 1-5/16 inch (33mm) exterior. One-piece sash set transom jamb for wood units is 3/4 inch (19mm) at the head, side, and sill.
   a. Basic jamb width: 4 9/16 9116MM).
   b. Sill Height:. Standard Sill 1-27/32 inch (47mm) Heights may very due to existing conditions
4. Panels: Constructed of kiln dried pine, water repellent, preservative treated in accordance with WDMA I.S. 4-07'A.
   a. Thickness: 1-23/32 inch (117mm).
   b. Top rail: Face dimension is 4-17/32 inch (115mm).
   c. Stiles: Face dimension is 4-17/32 inch (115mm). Bottom rail: Face dimension is 7-9/16 inch (192mm).
   d. Corner construction: joined by wood dowels and glue.
5. Surface Finish:
   a. Exterior Finish - Wood:

B. Interior Wood Doors for Opaque Finish:
   1. Faces Panels for Interior Doors: Hardboard, Six Panel Colonial Style.
   2. 1/8-inch hardboard, complying with PS-58 requirements for treated hardboard and any species of wood for exposed edges and other solid wood components.
   3. WIC has no Economy grade for doors.

C. Interior Hollow-Core Wood Doors:
   1. Core: Standard hollow core.
   2. Blocking: For mineral core doors, provide blocking as needed to eliminate through-bolting hardware. For mineral-core doors use composite blocking with improved screw-holding capability.

D. Exterior Insulated Steel Entrance Door
   1. 1-3/4-inch thick both sides 23 gauge galvanized steel. Doors filled with polyurethane foam. Core to be foamed in place to form a monolithic unit. Door edges to be formed and locked into wood stiles and rails.
   2. Six Panel Face.

E. Exterior Insulated Steel Entrance Door
   1. 1-3/4-inch thick both sides 23 gauge galvanized steel. Doors filled with polyurethane foam. Core to be foamed in place to form a monolithic unit. Door edges to be formed and locked into wood stiles and rails.
   2. Flush Face.

F. Exterior Wood Doors:
   1. Core: Either glued block or structural composite lumber.
   2. Construction: Five plies with stiles and rails bonded to core, then entire unit abrasive planed before veneering.

G. Exterior Wood Screen Door

1. Wooden screen doors shall be of select preservative treated pine with dowel joint construction and furnished with 18/16 mesh aluminum screen wire. Minimum thickness 1-1/8-inch.

H. Sliding Glass/Patio Door
1. Provide only AAMA "Quality Certified: Vinyl with attached label, of thermal break construction with ½-inch air space and insect screen.

2.03 DOOR FABRICATION

A. Fabricate doors in sizes indicated for Project-site fitting.

B. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements in NFPA 80 for fire-rated doors.

C. Factory machine doors for hardware that is not surface applied.
1. Metal Astragals: Pre-machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

D. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
1. Light Openings: Trim openings with moldings of material and profile indicated.
2. Louvers: Factory installed louvers in prepared openings.

E. Exterior Doors: Flash top of out swinging doors (with manufacturer's standard metal flashing).

2.04 DOOR SHOP PRIMING

A. Doors for Opaque Finish: Shop prime faces and edges of doors, including cutouts, with one coat of wood primer specified in Section 099112 - Paint.

2.05 HARDWARE MANUFACTURERS

A. Manufacturer: Obtain each kind of hardware (latch and lock sets, hinges, closers, etc.) from only one manufacturer, although several may be indicated as offering products complying with requirements ANSI A156.2.

B. Provide products by one of the following:
1. Schlage;
2. Quickset;
3. Dexter;
4. Weiser.

C. All hardware shall be standard brands, suitable for intended purpose, fit snugly, uniform in color, and free from imperfections. In existing structures, new hardware should match existing. Locks shall be installed on each exterior door. Exterior hinged doors shall be

equipped with three butt hinges. Doors shall be provided for each opening to as bedroom, bathroom and toilet compartment and each door shall be provided with suitable privacy lock. Window units shall have suitable means of locking. Final installation of finish hardware shall occur after complete drying of the painting or surface finishing. Provide stops, hinge or baseboard type, for all doors where hardware or door will strike a finished wall or fixed wall or fixed equipment. "Builders' Hardware" includes items known commercially as builders' hardware which are required for swing and sliding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frame. Types of items in this section include (but are not necessarily limited to):

1. Lock cylinders and keys;
2. Lock and latch sets;
3. Sliding door equipment;
4. Miscellaneous door devices.

D. Provide two keys for each lock.

E. See end of Section for Hardware Schedule for Interior and Exterior Doors.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General Door Installation

1. All doors used to separate one dwelling from another within the same building shall be of the solid core fire rated type not less than 1-3/8-inch. Exterior doors, and garage passage door shall be 1-3/4-inch insulated metal doors. Wood frames shall have concealed metal reinforcement at latch/lock point. Exterior doors shall be made weatherproof and watertight and a suitable watertight threshold shall be installed. Each interior door shall be 1-3/8-inch flush panel hollow core with paint grade mahogany veneer faces. Each door will be hung in a wood frame with wood trim and one pair of butts and latch or locked hardware as scheduled. All wood doors and frames shall be primed and given two coats of enamel. Doors not used to separate dwellings shall be not less than 1-3/8-inch thickness and may be hollow core, good grade, rotary cut and have a face veneer of 1/28-inch. All interior doors shall be removable, stops shall be provided for all interior doors. Patio doors shall be 6-foot double insulated safety glazed glass.
2. Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated.
3. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
4. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
5. Comply with NFPA 80 for fire-rated doors.
6. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

7. Plane door to provide uniform space between door and jamb and to allow smooth operation of door. Adjust striker plate to allow door to close tightly without excessive movement. Touch up with paint to match existing.
8. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

B. Installation of Steel Entrance Door
1. Provide threshold with weather-strip seal.

3.02 INSTALLATION OF EXTERIOR DOOR

A. Glass Sliding Door Repair
1. Remove and replace damaged or missing jamb, trim parts or screens;
2. Set door plumb to close and lock properly;
3. Replace all defective hardware (striker plates, locks, hangers, slides);
4. Replace any broken glass with tempered glass;
5. Paint trim inside and out;
6. Use door parts which are compatible with existing (All exterior doors shall be air tight and lockable).

B. Glass Sliding Door Install
1. All units shall contain tempered glass;
2. Remove existing door and replace damaged jamb, or trim parts;
3. Set new door plumb to close and lock properly;
4. Unit shall come complete with screen and hardware (striker plates, lock, hangers, slides);
5. Re-install and paint trim both inside and out;
6. Install as per manufacturer's recommendation all exterior doors shall be air tight, lockable and in a workmanlike manner.

C. Exterior Door Repair
1. Repair damaged jamb, or trim parts by nailing loose parts;
2. Install new parts where damage is too severe or missing parts are found;
3. Reset existing door plumb to close and lock properly;
4. Replace all defective hardware, (striker plates, locks, thresholds);
5. Install new aluminum vinyl weather-strip, peephole doorstop and threshold;
6. Re-install and paint door and trim both inside and out;
7. Trim shall match adjacent areas;
8. Locks shall be keyed alike for two units or more;
9. Use: Krestmark door or other approved Manufacturer; Yale lock or other approved Manufacturer; M-D door parts; Sherwin Williams paint; or equal. (All exterior door(s) shall be air tight and lockable at final.).

D. Exterior Wood Door Replacement
1. Door is to be made of clear, kiln dried ponderosa pine with faces machine sanded. Door shall be four-panel type with solid core. Door is to be 1-3/4-inch in

thickness and primed before installation and painted after installation. When specified, use stain grade door and trim. Finish selection by owner. Style to be selected by owner. Replace jamb, caulk, and prime. Install aluminum and vinyl threshold and bronze tension-type weather-stripping. Pre-hung units are to be used whenever possible with an aluminum and vinyl threshold and sweep.

E. Exterior Metal Door Install

1. Door is to be 1-3/4-inch thick metal with foam insulation and magnetic weather-stripping. Door design shall be selected by homeowner. Plastic trim shall not be used on face of door. Threshold shall be aluminum with factory installed vinyl sweep with aluminum sill or aluminum sill with vinyl bubble. Jamb shall be wood, caulked, and primed. Pre-hung units are to be used whenever possible.
   a. Remove door and jamb from existing frame.
   b. Rework frame as necessary to install new pre-hung metal clad exterior door, type to be same or similar as door being replaced complete with exterior lock, keyless deadbolt, aluminum vinyl weather-strip, peephole, doorstop and threshold.
   c. Re-install and paint door and trim both inside and out (trim shall match adjacent areas; locks shall be keyed alike for two units or more).

F. Wood Screen Door Repair

1. Repair any damaged frame members;
2. Replace screen;
3. Replace defective hardware;
4. Paint unit.

G. Wood Screen Door Install

1. Remove existing units and replace with new wood frame screen door complete with necessary hardware (closer, latch);
2. Prime and paint.

3.03 INSTALLATION OF INTERIOR DOORS

A. General Installation Information

1. All interior doors are to be pre hung jamb units, if possible. Jambs and casings are to be of clear pine material. Doors are to be 1-3/8-inch thick hollow core hardboard when door is to be painted (Sherwin Williams or equal) or luan mahogany when door is to be natural finish. Install two hinges and pre-bored for passage locks. All units are to be hung plumb, true, and square with equal margins. Doors are to fit tightly against stop and have no play in strike plate/lock assembly Install passage lock and door stop (wall or hinge type).
2. Interior Doors Repair
   a. Repair damaged frame, jamb or trim parts by nailing loose pieces;
   b. Installing new parts where missing parts are found;
   c. Reset door plumb to close and latch properly;
   d. Replace defective hardware (striker plates/latches);

e. Paint or stain door unit on both sides, top and bottom (Sherwin Williams or equal);
f. Use: Banner latches.

3. Interior Doors Install
   a. Remove existing door from existing jamb;
   b. Remove all rotted or damaged jamb or trim parts;
   c. Install new hollow core Lauan Mahogany flush faced wood door with passage latch or bath lock at bathroom to set and close properly;
   d. If six panel door exists, replace with a six panel door
   e. Paint or stain door unit on both sides;
   f. Use: Banner latches; Sherwin Williams enamel paint or stain; or equal.
4. Interior Doors Double Repair
   a. Repair all damaged frame, jamb or trim parts by nailing loose pieces;
   b. Install new parts where missing parts are found;
   c. Reset door plumb to close and latch properly;
   d. Replace defective hardware (hinges, latches, slides, hangers);
   e. Paint door and trim on both sides;
   f. Use: Banner latches; Sherwin Williams paint or equal.

3.04 INSTALLATION OF GARAGE DOOR

A. Garage Door: Installation of garage doors in home with attached garages.
   1. Install a 3/4-inch insulated steel garage door, flush finish (exterior) (Color as selected by owner from manufacturers standard factory finishes), tongue and groove section joints, 1-3/4-inch integral reinforcing struts, smooth interior finish with baked on two coat polyester finish and primer. Provide 10 year warranty on skin and delamination. Manufactured by Wayne Daulton Door System, or approved equal.
   2. Door Frame Installation:
      a. Door frame is to be made of 5/4-inch clear, treated, ponderosa pine, oak, or birch with faces machine sanded. No finger joints will be accepted when work write-up specifies stain finish. Frame is to be set square, level, and plumb. Anchor frame with 2-1/2-inch wood screws above and below each hinge and strike plate. Secure bottom of jamb and header in the same manner. Use shims where needed. Prime or seal before installation and paint after installation.
      b. Framing shall include 2 x 6 members for railing to screw into for TDI approved rating. The 2 x 6 are to be attached to wall studs that have been hurricane clipped and strapped.
   3. Plane or Adjust Door:
      a. Plane door to provide uniform space between door and jamb and to allow smooth operation of door. Adjust striker plate to allow door to close tightly without excessive movement. Touch up with paint to match existing.

B. Garage Door Repair
   1. Repair all defective parts of the door, frame, and hardware;
   2. Remove cracked or peeling paint;
   3. Paint with two coats of exterior Latex.

C. Garage Door Install
   1. Remove and replace the door unit;
   2. Repair any defective frame or hardware prior to installing new unit;
   3. Paint with two coats of exterior Latex;
   4. Use: Centurion, Sears or equal.

3.05 INSTALLATION OF ACCESS DOORS

A. Install Milcor style "M", 24-inch x 30-inch, metal access panel. Installation shall be performed according to manufacturer's instructions.

3.06 INSTALLATION OF HARDWARE

A. Existing Hardware
   1. Reinstall all existing door hardware including locksets, dead bolts, mail slots, peep holes, automatic closers, and security devices in accordance with UL 235.

B. Lockset with Deadbolt
   1. Exterior keyed locksets are to be installed as per manufacturer's directions.Lockset is to include deadbolt within basic assembly. Use bright brass or nickel finish. Furnish key in knob lockset for all entrance doors and a deadbolt secondary locking (brass or nickel finish) device keyed on one side only. Key all locksets alike.

C. Exterior Lockset
   1. Contractor shall install a keyed exterior lockset with turn knob or push button interior lock control. Lockset shall be installed as per manufacturer's directions. Finish and design shall be selected by the homeowner.

D. Exterior Deadbolt
   1. Contractor shall install a keyed deadbolt above the lockset. Deadbolt shall be keyed on one side on solid doors with at least 5/8-inch minimum throw with single cylinder. Note: No deadbolt keyed on both sides is allowed in the dwelling. Finish shall be satin or polished brass. Deadbolt shall be installed as per manufacturer's directions. All exit doors shall be openable from the interior without the use of a key or special knowledge or effort.

E. Exterior Door Threshold
   1. Exterior Door Threshold: Contractor shall install new threshold. Unit shall be aluminum sill with a vinyl bulb, metal on metal carpet strip, or vinyl sweep under door with an aluminum sill. Sill shall be attached to floor with screws and caulked to form a tight seal.

F. Exterior Door Weather-stripping

1. Contractor to install new weather-stripping at sides and top of door jamb to form a tight seal with door closed. Material shall be new bronze tension-type weather-stripping.

3.7 HARDWARE SCHEDULE

A. Exterior Door

1. Deadlock: Yale No. 197;
2. Lockset: Schlage No. A53WD PLY x 605;
3. Butts: 3 hinges;
4. Loxam door chain No. 1860;
5. Viewer.

B. Interior Door

1. Butts: 2 Hinges;
2. Privacy lock.

C. Bathroom Door

1. Butts: 2 Hinges;
2. Privacy lock.

END OF SECTION

SECTION 085500 - WINDOWS

PART 1 - GENERAL

1.01 SUMMARY

A. Scope: Provide all Labor, Materials, Equipment, and Services and perform all operations required for complete installation of:

1. Windows:

a. Including replacement sash, window repairs, aluminum, wood, vinyl, vinyl replacement window units. Window units shall be constructed of type “S” or “T” stiles, check rail or plain rail. Material shall be minimum thickness of 1-3/8-inch. Repair of a window unit shall include but not be limited to putting the unit into working order, replacing rotten or broken sashes, re- glazing, installing latches and re-roped. Windows shall be low-E with a fenestration u-factor of .65 maximum and SHGC of .30 maximum to comply with applicable New York State and local codes.

b. Alteration or renovation to an existing building or structure that does not qualify as a historic building shall have to comply with the requirements by components prescribed under Section 1102 of the New York State Residential Code.

B. This Section includes the following unfinished, aluminum-clad, vinyl-clad wood- framed window product types:

1. Wood windows Double-hung;
2. Casement or Sliding Windows;
3. Aluminum Clad Window;
4. Vinyl Clad Window Double-hung.
5. Hurricane Window Templates
6. Fixed Side Lites and Transoms

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

C. Samples: For each exposed product and for each color specified, 2 by 4 inches (50 by 100 mm) in size.

D. Product Schedule: For wood windows. Use same designations indicated on Drawings.

1.03 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Sample warranties.

1.04 PERFORMANCE REQUIREMENTS

A. General: Provide windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified and that are of minimum test size required by AAMA/NWWDA 101/I.S.2.

1.05 QUALITY ASSURANCE

A. Installer: A qualified installer, approved by manufacturer to install manufacturer's products.

B. Fenestration Standard: Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

C. Glazing Publications: Comply with published recommendations of glass manufacturers and GANA's "Glazing Manual" unless more stringent requirements are indicated.

D. When replacing windows, install geographically appropriate ENERGY STAR rated windows.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace wood windows which fail in materials and workmanship within two years from date of Substantial Completion.

B. Warranty Period for Metal Finishes: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 VINYL CLAD AND ALUMINUM CLAD WINDOWS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:
1. Andersen Windows Inc.; Andersen Corp.;
2. BiltBest Products, Inc.;
3. JELD-WEN, Inc.;
4. Crestline Windows and Doors; SNE Enterprises, Inc.;
5. EAGLE Windows & Doors, Inc.; an Andersen Window & Door Company;
6. Hurd Windows and Doors, Inc.
7. Marvin Windows and Doors;
8. Kolbe & Kolbe Millwork Co., Inc
9. Peachtree Doors and Windows;

10. Pella Corporation;
11. Vetter;
12. Weather Shield Mfg., Inc.

B. Aluminum Extrusions and Rolled Aluminum for Cladding, Baked-Enamel Finish: Manufacturer's standard baked enamel complying with AAMA 2603.
   1. Color: Color as selected from manufacturer's standard color range.

C. Vinyl for Cladding: Permanent, integral color, manufacturer's standard color finish.

2.02 WOOD DOUBLE HUNG WINDOWS

A. Provide double hung wood windows at houses/buildings listed in the National and/or State Registers of Historic Places (N/SR) or deemed eligible for listing in the N/SR by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) State Historic Preservation Office (SHPO) . Windows shall be low-E with a fenestration u-factor of .65 maximum and SHGC of .30 maximum to comply with applicable local codes and shall meet the requirements required by code. Windows shall match existing in style, profile, shape and mullion pattern of existing.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following or equal:
   1. Kole & Kolbe Millwork Co., Inc
   2. Pella Corporation,
   3. Marvin Windows and Doors;

C. Frame: Constructed of Kiln Dried pine with Mull casings on mulled units, water repellant preservative in accordance with WDMA I.S. 4-07'A. Wood frame is to have a flat casing for wood clad homes and is to have a profiled brick mold for brick clad homes.

D. Jamb thickness may vary at the interior and require jamb extensions. Field verification shall be required. Exterior jamb thickness shall be 1 5/16"

E. Basic jamb width is 4 9/16".

F. Sill height: Sill height may vary in historic homes and field measurement will be required.

G. Sill: Sill widths to match jamb width.

H. Mullion Pattern: True divided lites with pattern to match existing windows to be replace.

2.03 FIXED TRANSOMS

A. Provide fixed transom panels and frames at historically eligible homes as deemed by the NYS Office of Parks, Recreation and Historic Preservation. Transoms shall be low-E with a fenestration u-factor of .65 maximum and SHGC of .30 maximum to comply with applicable local codes and shall meet the requirements required by the NYS Office of

Parks, Recreation and Historic Preservation. Transoms shall match existing in style, profile, shape and mullion pattern of existing.

B. Transom panel frame is to be constructed of kiln dried vertical grain fur or pine, water repellant preservative treated in accordance with WDMA I.S. 4-07”A.

C. Thickness: 1 23/32 inch

D. Top Rail: Sash set transom rail face dimension of 2 7/16.

E. Stiles: All locking stiles constructed of laminated veneer lumber with solid wood edge band or solid wood. Sash set transom rail face dimension of 2 7/16”.

F. Bottom rail: Sash set transom rail face dimension of 2 7/16”. G. Corner construction: Wood doweled and screwed.

H. Interior Glazed.

I. Exterior Finish: Exterior wood is to be treated wood, primed and painted.

J. Interior Finish: Interior wood is to be treated, primed and painted.

2.04 FIXED SIDE-LITES

A. Provide fixed side-lite panels and frames at historically eligible homes as deemed by the NYS Office of Parks, Recreation and Historic Preservation. Side-lites shall be low-E with a fenestration u-factor of .65 maximum and SHGC of .30 maximum to comply with applicable local codes and shall meet the requirements required by the NYS Office of Parks, Recreation and Historic Preservation. Side-lites shall match existing in style, profile, shape and mullion pattern of existing.

B. Side-lite panel frames is to be constructed of kiln dried vertical grain fur or pine, water repellant preservative treated in accordance with WDMA I.S. 4-07”A.

C. Thickness: 1 23/32 inch

D. Top Rail: Sash set side-lite rail face to match adjacent door.

E. Stiles: All locking stiles constructed of laminated veneer lumber with solid wood edge band or solid wood. Sash set side-lite rail face dimension of 2 7/16”.

F. Bottom rail: Sash set side-lite rail face to match adjacent door.

G. Corner construction: Wood doweled and screwed.

H. Interior Glazed.

I. Exterior Finish: Exterior wood is to be treated wood, primed and painted.

J. Interior Finish: Interior wood is to be treated, primed and painted.

2.05 GLAZING

A. Glass at Aluminum and Aluminum Vinyl Clad Windows: Clear, insulating-glass with low-e coating or film.

B. Glazing System: Manufacturer's standard factory-glazing system that produces weather-tight seal. Low-E with a fenestration u-factor of .65 maximum and SHGC of .30 maximum to comply with applicable local codes and shall meet the requirements required by State.

C. Glass at Wood window replacement: Clear float glass, Double strength, Grade B.

D. Glass at Hazardous locations: Tempered glass per IRC Section R308.4.

2.06 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. Locate screens on inside 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.

2.07 ACCESSORIES

A. Grilles (False Muntins) at Insulated Window Units: Provide grilles in designs indicated, for removable application to inside of each sash lite.
   1. Material: Extruded, rigid PVC.
   2. Design: Rectangular.
   3. Color: Match Unit.

2.08 FABRICATION

A. General: Fabricate wood windows, in sizes indicated, that comply with AAMA/NWWDA 101/I.S.2 for performance class and performance grade indicated. Include a complete system for assembling components and anchoring windows.

B. Fabricate wood windows that are re-glazable 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 machine windows for openings and hardware that is not surface applied.

E. Mullions: Provide mullions and cover plates as shown, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design loads of window units.

F. Glazing Stops: Provide nailed or snap-on glazing stops. Provide glazing stops to match sash and ventilator frames.

2.09 WOOD FINISHES

A. Factory-Primed Windows: Provide manufacturer's standard factory-prime coat on exposed exterior wood surfaces.

PART 3 - EXECUTION

3.01 INSTALLATION

A. 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.

B. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.

C. Metal Protection: Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in Appendix B in AAMA/NWWDA 101/I.S.2.

D. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weather-tight closure. Lubricate hardware and moving parts.

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.

F. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

G. 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.

H. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.

3.02 INSTALLATION OF WINDOWS

A. Wood Window Replacement with Aluminum Clad Window

1. Remove existing units;
2. Remove and replace all rotted or damaged frame or wood trim;
3. Install new single-hung aluminum unit into repaired frame (unit shall come complete with hardware and screen);
4. Reinstall exterior and interior trim;
5. Size of units shall match existing unless specified and approved;
6. In replacement of frames, sills and trim, all items shall match existing;
7. All windows shall be cleaned prior to final;
8. Wood panels to be cut to size for each window and ply locks installed.

B. Wood Window Repair with Aluminum Track

1. Remove paint from aluminum track to allow upper and lower window sash to operate smoothly and close to form tight seal.
2. Repair or replace locks to make operable.
3. Tracks should be firmly attached to window frame at top and bottom.
4. If fasteners are necessary, they should in no way impede the vertical motion of the window units. Tension of spring assembly should be adjusted to allow proper window movement.

C. Wood Window Repair and Reglaze

1. Remove paint from tracks to allow upper and lower window sash to operate smoothly and close to form tight seal. Repair or replace locks to make operable. Replace sash cords where necessary. Remove all loose or cracked glazing scrape down to wood. Replace broken or cracked glass and install new Latex base glazing compound and paint to match existing for finished appearance. In replacements of frames, sills, and sash, trim and hardware shall match existing work in design and dimensions unless otherwise specified in the work write-up. Chain shall be used in all sash cord replacement. Two window lifts and one locking device shall be installed on all sash replacements.
2. When new sashes are installed into existing frame, the contractor shall check all window parting stops. Stops that are missing, broken, or rotted or impaired, proper window operation shall be replaced by the contractor.

D. Wood and Aluminum Window Repair

1. Free lower sash so that it opens properly;
2. Replace broken glass;
3. Reset loose glass;
4. Remove bad glazing;
5. Apply new glazing to units to make air tight seal;
6. Replace all rotted sills, casings, framing member, screens and trim both inside and out;
7. Install new lock and sash stop if existing is not present or cannot be repaired to operate;
8. Paint unit and trim both inside and out;

9. All items such as replacement frames, sills sash hardware and screens shall match existing;
10. Use: Part from local supplier or equal;
11. All windows shall be cleaned prior to final.

E. Vinyl Window Install

1. Furnish vinyl single hung-double glazed windows with insulated/laminated impact glass and screens. Windows to be of type and location specified in work write-up.
2. Window units shall be furnished with necessary anchors and clips to provide a complete installation.
3. Each unit shall be equipped with a cam lock and keeper.
4. Each sash shall be equipped with two (2) concealed sash balances in jambs, or equivalent, which permit removal of one (or both) sash to the interior of the structure for washing or maintenance without dismantling any frame members or use of special tools.

F. Window Opening Closure

1. Removal of window unit(s);
2. Replace rotted or damaged framing prior to closing opening;
3. Install R-11 batt insulation in cavity;
4. Install new wall covering inside and out to match adjacent areas;
5. Use: Local supplier or equal;
6. All closed openings shall blend as closely as possible to existing adjacent areas.

3.03 INSTALLATION OF WINDOW SCREENS

A. General:

1. Contractor shall replace or repair all screens as specified in the work write-up. Screens shall be mounted in a removable aluminum frame. If the frame is over four feet high, an aluminum cross member shall be used. Screen shall be aluminum; fiberglass screening is not acceptable. Screens shall not be patched; a minimum repair is replacing the screen in an existing frame. If wood screen bead is replaced, the wood shall be primed and painted to match existing.

B. Window Screen Install

1. Remove existing unit;
2. Install new aluminum frame screen to opening;
3. Use: A local supplier.

C. Window Screen Repair

1. Repair any damaged frame members;
2. Replace torn wire screen;
3. Paint units if wood;
4. Use: A local supplier.

3.04 INSTALLATION OF HURRICANE WINDOW TEMPLATES

A. Brick
   1. 5/8-inch plywood with number for each window;
   2. Plywood measured and cut for each window with a 1/8-inch – 1/4-inch clearance around;
   3. Plylox hurricane clips or equal to be provided, minimum of 4 per window or at every 24-inch or equal.

B. Cementious Board (Hardie Board or equal) or Wood Siding
   1. 5/8-inch plywood with number for each window; with a maximum span of 8’-0”.
   2. Plywood measured and cut for each window with a 1/8-inch – 1/4-inch clearance around;
   3. 1/4-inch x 3-1/2-inch SS stud with 2-inch tapered wood screws, 1-1/2-inch standard SAE threads set 16-inch centered. Provided 1/4-inch washer and wing nut. Screws to be centered in exterior trim.

END OF SECTION

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SECTION 089543 - FLOOD VENTS

PART 1 - GENERAL

1.01 SUMMARY

A. Scope: Provide all Labor, Materials, Equipment, and Services and perform all operations required for complete installation of and repairs:
   1. Flood Vents: Located in Foundation Walls, Wood Walls, and Garage Doors.

B. This Section includes flood vents as follows:
   1. Dual Function Smart Vent;
   2. Insulated Flood Vent;
   3. Wood Wall Insulated Flood Vent;
   4. Overhead Garage Door Flood Vent;
   5. Dual Function Combination Models;
   6. Insulated Combination Models;
   7. Accessories.

C. Related Section
   1. Section 033205: Concrete
   2. Section 035119: Insulating Concrete Forms
   3. Section 040501: Unit Masonry, Restoration and Cleaning
   4. Section 061000: Rough Carpentry (If applicable)
   5. Section 062000: Finish Carpentry (If applicable)

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each flood vents. Indicate location, size, and hand of each flood vent; elevation of each kind of flood vent; construction details not covered in Product Data; and other pertinent data.

C. Samples: Represent typical range of color for each flood vent.

D. Samples: For each exposed product and for each color and texture specified.

1.03 INFORMATIONAL SUBMITTALS

A. Testing Data: Pertinent data from the NES Testing Service showing the vents are Certified.

B. Sample warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.05 REFERENCES

A. American Society of Civil Engineers (ASCE)
   1. ASCE/SEI 24-98, Flood Resistant Design and Construction, Latest
   2. ASCE/SEI 24-05, Flood Resistant Design and Construction, Latest

B. Federal Emergency Management Agency (FEMA)
   1. FEMA, 44-CFR, Part 59-60 and 60.3 National Flood Insurance Program (NFIP), Latest

C. Federal Emergency Management Agency, Federal Insurance Administration (FEMA/FIA)
   1. FEMA/FIA-TB 1-2008, Openings in Foundation Walls and Walls of Enclosures for Buildings Located in Special Flood Hazard Areas, Latest

D. International Code Council National Evaluation Service (NES)
   1. NER-624, National Evaluation Report No. NER-624. July 2007

E. International Code Council National Evaluation Service (NES)
   1. ESR-2074, National Evaluation Report No. ESR-2074. February 2008

F. International Code Council ICC-ES Acceptance Criteria for Automatic Foundation Flood Vents (AC-364). October 2007

G. Federal Emergency Management Association's MEMO W-08-001. January 2008

H. International Building Code, Latest

I. BOCA National Code, Latest

J. Residential Code of New York State (RCNYS) and the Building Code of New York State (BCNYS)

K. International Residential Code, Latest

L. National Fire Protection Association (NFPA)
   1. Standard No. 101, "Life Safety Code", Latest

M. Governing Codes:
   1. Where conflict occurs between above codes and standards, the most stringent requirement governs.

N. Underwriter's Laboratories:
   1. Test for Fire Dampers in conjunction with flood vents.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. Products listed are manufactured by the following as the basis of design:
   1. Smart Vent Products, Inc.
      430 Andbro Drive, Unit 1
      Pitman, NJ 08071
      PH: 1-877-441-8368 / Fax: 1-856-269-4465

B. Available Manufacturers:
   1. Flood Solutions LLC, 1 Industrial Park Drive, Bldg. 27, Pelham, NH 03076

2.02 GENERAL

A. Basis-of-Design Product: The design for each vent type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.03 MATERIALS

A. General:
   1. Vents shall be constructed of Stainless Steel formed and smooth-welded construction. The frame shall be rigid and designed to be installed in masonry or framed walls, stud walls or garage doors that range in thickness from 2” to 16”. 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” clear opening. One Single unit shall be used to relieve 200 square feet of enclosed area. The Double or “Stacking Model” shall be used to relieve 400 square feet of enclosed area per unit.

B. Flood Vent Types:
   1. Ventilated with Louvered Blades and Screen. The louvered blades are temperature controlled with a bimetal coil and the screen is vermin resistant:
      Smart VENT Model # 1540-510
   2. Double or “Stacking Model” of above:
      Smart VENT Model # 1540-511
   3. Flush or Solid Insulated Door:
      Flood VENT Model # 1540-520
   4. Double or “Stacking Model” of above:
      Flood VENT Model # 1540-521
   5. Ventilated Overhead Garage Door Model:

Smart VENT Model # 1540-514

6. Flush or Solid Insulated Garage Door Model:
   Flood VENT Model # 1540-524

7. Fire-Rated Damper Flow Thru Vent Model:
   Smart VENT Model # 1540-530
   (use in conjunction with #1540-510 or #1540-520)

8. Quad Stacking Model – Ventilated
   Smart VENT #1540-550 (Quad Assembly #)
   (Actually 2 ea. #1540-511's with 2 ea. 511 Upper portions and 2 ea. 511 Lower portions)

9. Quad Stacking Model – Flush Door Insulated
   Flood VENT #1540-560 (Quad Assembly #)
   (Actually 2 ea. #1540-521's with 2 ea. 521 Upper portions and 2 ea. 521 Lower portions)

10. 14½" Wood Stud Wall Model:
    Flood VENT #1540-570

11. Fire-Rated Damper Flow Thru Vent Model:
    Smart VENT Model # 1540-537
    (use in conjunction with #1540-570 model)

12. 14½" Overhead Garage Door Model:
    Flood VENT #1540-574

13. Accessories:
    a. 8"-12" Adjustable Sleeve/Trim #1540-531-12
    b. 12"-15" Adjustable Sleeve/Trim #1540-531-15
    c. 8"-12" Sleeve Only #1540-532-12
    d. 12"-15" Sleeve Only #1540-532-15
    e. 16" x 16" x 6" adjustable sleeve 6" to 9" wall thickness #1540-531-Stacker
       (Note: Sleeves should be used in 'un-filled' masonry Fire Walls and where 'air-space' is required on Exterior Walls)
    f. Interior Trim Flange #1540-533
    g. Interior Trim Flange #1540-573
    h. Interior Trim Flange/Sleeve #1540-573-9
    i. Vinyl Buck(s) #1540-800 Series
       For poured concrete walls Sizes range from 5.5" to 12"
       Specify wall thickness for exact or nominal sizes.
       Use in conjunction with SV models #1540-510 or #1540-520 encased in Buck.
    j. Vinyl Buck Extension #1540-800 - 2"
    k. Powder-Coating #38/10130 – Black, White, Gray, or Wheat
       Check with Factory for availability of other colors.

C. Openings Size Requirements (RWO):
1. Single units can be installed in an 8 ¼” x 16 ¼” opening or 8 ¾” x 14 ½” opening.
2. Double units require a 16 ¼” x 16 ⅜” opening.
3. Quad Units require a 33” x 16 ⅜” opening.
4. Designed to fit openings in modular masonry construction; and can easily be adapted to framed walls or garage doors

D. Natural Ventilation:
1. Free Area (Natural Ventilation): Screen shall have ¼ inch x ¼ inch (6.35mm x 6.35mm) square perforations.
2. Single models #1540-510 and #1540- 514 each yield 51 square inches (32.903 sq. mm) of net free area to supply natural ventilation.
3. Stacking models #1540-511 yield 102 square inches (65.806 sq. mm) of natural ventilation.

E. Flood Relief:
1. There shall be a minimum of two vents on different sides of each enclosed area.
2. Single models #1540-510, #1540-514, #1540-520, #1540-524, 1540-570, and #1540-574 shall each disperse 200 sq. ft. (18.6 sq. m) of water in an enclosed area.
3. Stacking models #1540-511, and #1540-521 shall each disperse 400 sq. ft. (37.2 sq. m) of water in an enclosed area.
4. The Quad models #1540-550 (2 ea #1540-511) and #1540-560 (2 ea. #1540-521) shall each disperse 800 sq. ft. (74.4 sq. m) of water in an enclosed area.

F. Installation:
1. Stainless Steel straps, four for each vent, and masonry or concrete Urethane base adhesive.
2. Adjustable wrench for thru-bolted models and screwdriver for stud wall models.
3. NOTE: caulk may be used to seal certain areas that require extra attention; but, only Fire-Rated caulk shall be used on Fire-Rated walls or openings.

G. Maintenance Tools: Follow Smart VENT Manufacturer’s Maintenance Procedure
1. Requires thin blade to release float pins.

PART 3 - EXECUTION

3.01 EXAMINATION

A. General Contractor to verify vents are ready to receive work, and dimensions are as indicated on shop drawings or as instructed by manufacturers.

B. Beginning of installation means acceptance of existing conditions.

3.02 INSTALLATION

A. General:

1. Install each vent in accordance with manufacturer's instructions and recommendations spaced evenly around foundation perimeter, maximum 12 inches above grade to bottom of vent.
2. Install one single height flood vent for every 200 sq. ft. of enclosed space below floodplain.
3. Install one double height flood vent for every 400 sq. ft. of enclosed space below floodplain.
4. Install one quad flood vent for every 800 sq. ft. of enclosed space below floodplain.
5. Adjust flood vents for proper operation.

END OF SECTION

SECTION 092300 - GYPSUM PLASTER

PART 1 - GENERAL

1.01 SUMMARY

A. Plaster repair matching existing adjacent.

B. This Section includes the following:
1. Gypsum plastering.
2. Metal, Wire and Gypsum lath.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other work.

1.03 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Where indicated, provide assemblies identical to those tested for fire resistance per ASTM E119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.04 PROJECT CONDITIONS

A. Environmental Requirements, General: Comply with requirements of referenced plaster application standards and recommendations of plaster manufacturer for environmental conditions before, during, and after plaster application.

PART 2 - PRODUCTS

2.01 LATH

A. Expanded-Metal Lath: ASTM C847, fabricated from uncoated or zinc-coated (galvanized) steel sheet and with uncoated steel sheet coated with corrosion-resistant coating after fabrication into lath.
1. Diamond-Mesh Lath: Self-furring.

B. Wire lath: ASTM C933-09.

C. Gypsum Lath: ASTM C37 in length standard with manufacturer for thickness indicated.
1. Core: Regular.
2. Type: Plain, unless otherwise indicated; foil backed where indicated.
3. Thickness: As indicated and as required to comply with ASTM C841 for type of installation and support spacing indicated.

2.02 ACCESSORIES

A. General: Complying with ASTM C841; coordinate depth of accessories with thicknesses and number of plaster coats required.

2.03 MISCELLANEOUS MATERIALS

A. Water for Mixing and Finishing Plaster: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Bonding Compound: ASTM C631.

C. Steel Drill Screws:
1. Complying with ASTM C1002 for fastening metal or gypsum lath to wood or steel members less than 0.033-inch (0.84-mm) thick.

2.04 PLASTER MATERIALS

A. Base-Coat Plasters: ASTM C28, as follows: Match existing adjacent plaster material as close as possible.
1. Gypsum ready-mixed plaster with mill-mixed perlite aggregate.
a. Products:
1) National Gypsum Co.; Gypsolite or equal.

B. Finish-Coat Plasters:
1. Gypsum gauging plaster, ASTM C28.
2. Gypsum ready-mixed finish plaster, manufacturer's standard mill-mixed gauged interior finish.

C. Finishing Hydrated Limes: ASTM C206.

D. Aggregates for Base-Coat Plasters: ASTM C35.
1. Type: Perlite.

E. Aggregates for Finish-Coat Plaster with Floated Finish: ASTM C35; graded per ASTM C842.
1. Type: Perlite.

2.05 PLASTER MIXES AND COMPOSITIONS

A. Plaster Base-Coat Compositions: Comply with ASTM C842 and manufacturer's written instructions for plaster base-coat proportions.
1. Three-Coat Work over Metal Lath: Scratch coat, gypsum wood-fibered plaster, neat or with job-mixed sand; brown coat, gypsum ready-mixed plaster with mill-mixed perlite.
2. Two-Coat Work over Gypsum Lath: Base coat, gypsum ready-mixed plaster with mill-mixed perlite.

3. Two-Coat Work over Unit Masonry: Base coats, gypsum ready-mixed plaster with mill-mixed perlite.
4. Two-Coat Work over Concrete: Base coats of gypsum neat plaster with job-mixed sand.

B. Finishing Hydrated Limes: ASTM C206.
1. Finishing Hydrated Limes, Type N:
a. United States Gypsum Co.; Grand Prize Hydrate Finish Limes.

PART 3 - EXECUTION

3.01 INSTALLATION OF LATH AND FURRING, GENERAL

A. Interior Lathing and Furring: Comply with ASTM C841.

3.02 PLASTER REPAIR APPLICATION, GENERAL

A. Protect contiguous Work from damage and deterioration caused by plastering with temporary covering and other provisions necessary.

B. Prepare monolithic surfaces for bonded base coats and use bonding compound to comply with requirements of referenced plaster application standards for conditioning monolithic surfaces.

C. Sequence plaster application with installation and protection of other work so that neither will be damaged by installation of other.

D. On masonry walls remove all loose or dead plaster. Cut out cracks 1/4-inch wide in a V-joint. Wet existing plaster and tool in finishing lime. Using a steel trowel and water brush, finish lime flush and smooth with adjacent surfaces ready for painting. When plastering larger area, screed lime first with a wood float so that newly plastered area will be in the same plane as existing wall. No bulges or depressions will be allowed. All plaster areas should be invisible when painted.

E. On wood lath remove all loose or dead non-keyed plaster. Remove all rotten wood lath. Renail all loose wood lath. Cut and install 1/8-inch flat rib "special mesh" metal lath securely. Apply base coat plaster leaving surface not less than 1/16-inch below adjacent surfaces. Allow base coat to dry at least 24 hours. Apply not less than 1/16- inch of finish coat plaster. Apply in same manner as on masonry walls. All plaster that is not true, smooth and flush with adjacent wall surfaces will be rejected and replaced at Contractor's expense.

F. Cold weather protection - Contractor shall be responsible for protecting all plaster from freezing. Maintain a minimum temperature of 55 degrees F. All frozen plaster will be replaced.

3.03 PLASTER APPLICATION

A. Plaster Application Standard: Comply with ASTM C842.

B. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

C. Finish Coats: Match existing adjacent.

3.04 CUTTING, PATCHING, AND CLEANING

A. Cut, patch, replace, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

B. Leave plaster ready for painting.

C. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not to be plastered. Repair floors, walls, sinks, toilets, and other surfaces stained, marred, or otherwise damaged during plastering. Remove all plaster rubbish, excess material, and scaffolding from the building, leaving floors broom clean. Deposit no plastering materials in toilets, sinks or laundry trays. Wash all tools and equipment outside. Any blocked drains caused by plastering materials will be opened at Contractor's expense.

END OF SECTION

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, equipment and supplies to carry out the operations necessary to accomplish the following tasks:
1. Installation of Gypsum Board at wall and ceilings;
2. Installation of Moisture Resistant Gypsum board;
3. Repair of Gypsum Board at walls and ceilings;
4. Replacement of Gypsum Board;
5. Removal of damaged gypsum board as related to repairs;
6. Wall Covering Removal.

B. Repair, renovations, alterations, reconstructions of existing wall and ceiling finishes shall comply with the currently enforced IRC and governing codes of the local government participating.

C. This Section includes the following:
1. Interior gypsum wallboard.
2. Tile backing panels.

D. Related sections
1. Section 061000 Rough Carpentry for wood sheathing and framing.
2. Section 224100 Plumbing.
3. Section 265101 Lighting.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples:

1. Textured Finishes: Manufacturer's standard size for each textured finish indicated and on same backing indicated for Work.

1.03 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: For gypsum board assemblies with fire-resistance ratings, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

B. Obtain gypsum board products from a single manufacturer, or from manufacturers recommended by the prime manufacturer of gypsum boards.

C. Tolerances allowed are 1/8-inch offsets between planes of board faces, and 1/4-inch in 8-foot-0-inch for plumb, level, warp and bow.

1.04 PROJECT CONDITIONS

A. It shall be the responsibility of this Contractor to insure that the areas in which drywall is being installed is adequately heated. He shall maintain a temperature of not less than 55 degrees and provide adequate ventilation during and following joint treatment application. Humidity will be controlled in the work space and not exceed manufacturers recommendations.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
   1. Manufacturers: Subject to compliance with requirements, provide the named product or a comparable product by one of the following or pre-approved equal:
      a. American Gypsum
      b. CertainTeed Corp.
      c. Georgia-Pacific Gypsum LLC.
      d. Lafarge North America Inc.
      e. National Gypsum Company.
      f. PABCO Gypsum.
      g. Temple.
      h. USG Corporation.

2.02 PANEL PRODUCTS

A. Panel Size, General: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Gypsum Wallboard: ASTM C36.
   1. Regular Type: 1/2-inch and with long edges tapered or beveled.
   2. Type X: 1/2-inch indicated and with long edges tapered.

C. Moisture- and Mold-Resistant:
   1. Gypsum Board: ASTM C1396/C1396M, with moisture and mold-resistant core and paper surfaces and in thickness indicated.
      a. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

D. Glass-Mat, Water-Resistant Backing Board: ASTM C1178/C1178M, with manufacturer's standard edges.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. CertainTeed Corp.: GlasRoc Tile Backer.
      b. Georgia-Pacific Gypsum LLC: DensShield Tile Backer.
   2. Core: ½ inch (12.7 mm), regular type.

3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

E. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or 1325, with manufacturer's standard edges.
   1. Products: Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following:
      a. C-Cure; C-Cure Board 990.
      b. CertainTeed Corp.; FiberCement BackerBoard.
      c. Custom Building Products; Wonderboard.
      d. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
      e. James Hardie Building Products, Inc.; Hardiebacker
      f. National Gypsum Company; Permabase Cement Board.
      g. USG Corporation: DUROCK Cement Board.

2.03 TRIM ACCESSORIES

A. Interior Trim: Galvanized Wallboard Trim ASTM C1047.
   1. At external corners: Corner bead with smooth, rigid metal nose bonded to paper tape flanges.
   2. At exposed wallboard edges around openings: Beaded nose casing bead with exposed flange knurled for joint treatment.
   3. Where wallboard abuts dissimilar construction: Square edge semi-finishing casing bead.

2.04 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C475.

B. Joint Tape: Plain or perforated.
   1. Interior Gypsum Wallboard: Paper.
   2. Exterior Gypsum Soffit Board: Paper.
   3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
   4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

D. Joint Compound for Tile Backing Panels:
   1. Glass-Mat, Water-Resistant Backing Panel: As recommended by manufacturer.

2.05 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer. B. Texture: Medium.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Gypsum Board Wall installation: Comply with ASTM C840 and GA-216.
   1. Interior finish of all exterior walls and all interior partitions shall be sheathed with 1/2-inch thick gypsum wall board applied vertically, and with all joints taped and floated smooth.
   2. Wall board shall be attached to studs with galvanized 1-3/8-inch long nails at a maximum spacing of 8-inches.
   3. Exposed gypsum board corners shall be reinforced with #118 continuous corner bead.
   4. All exposed gypsum board will be textured and painted. Sheetrock shall be installed with all external corners protected with metal corner beads.
   5. Joints and corners on sheetrock must be taped, topped and made smooth and ready for paint.

B. Fire-Resistance Gypsum Board
   1. Where gypsum drywall systems with fire resistance ratings are indicated or are required to comply with governing regulations, provide materials and installations identical with applicable assemblies which have been tested and listed by recognized authorities, including UL.
   2. Fire wall joints must be taped. A high quality taping compound not containing asbestos shall be used. All work shall be in conformance with manufacturer's printed directions.

C. Gypsum Board Ceiling installation: Comply with ASTM C840 and GA-216.
   1. Ceiling shall be sheathed with 1/2-inch thick gypsum board panels nailed at maximum 7-inches o.c.
   2. Remove all fixtures and attached surface items not to be painted; clean all surfaces as per paint manufacturer's directions; spot fill holes, cracks, etc. with latex compound; repel loose tape work.
   3. Reinstall fixtures; items not removed from ceiling shall be protected from paint work unless replacement specified.

D. Gypsum Board Replacement
   1. 1/2-inch thick gypsum ASTM C36, with paintable paper-faced surfaces and with long edges tapered for standard joint treatment.
   2. Remove all fixtures, nails, and attached surface items not to be painted; clean all surfaces as per paint manufacturer's directions; remove the area designated for replacement from stud to stud as necessary; install new sheetrock at replacement area.
   3. Tape, bed and float joints at replacement area. For remaining wall surfaces: Fill all cracks, etc. with latex compound; rebel loose tape work; apply a coat of texture to all wall surfaces; replace all damaged or missing trim to match existing; apply two coats.

E. Gypsum Board Repair
1. Gypsum board, ASTM C36, with paintable paper-faced surface in thicknesses to match adjacent wallboard.
2. Install wallboards with edges occurring on supporting members.
3. Place boards with the long dimension vertical and each board continuous from floor to ceiling.
4. Remove existing defective wallboard to expose 1/2 of the existing supporting members on opposite sides.
5. Cut wallboard to fit snugly and fasten to supporting members.
6. Reset fastener heads and re-tape joints as required.
7. Remove all fixtures and attached surface items not to be painted; clean all surfaces as per paint manufacturer's directions; spot fill holes, cracks, etc. with latex compound; rebel loose tape work.
8. Replace all damaged or missing trim to match existing; apply two coats of interior latex paint (if bath or kitchen use latex enamel).
9. Reinstall fixtures; items not removed from wall shall be protected from paint work unless replacement specified.

F. Moisture-Resistant Gypsum board
1. Georgia-Pacific DensArmor, or Equal Water-Resistant/ Moisture resistant gypsum board treated to resist moisture to comply with ASTM C1288, C1325, C1178 or C1278 as a wall tile back up board around kitchens, shower stalls, bathtubs, and bathroom wainscots.
2. Georgia-Pacific DensArmor, or Equal Water-Resistant Backing Panel: Install with ¼-inch (6.4-mm) gap where panels abut other construction or penetrations. At laundry rooms, showers, tubs and similar "wet" areas, install water-resistant backing board. Apply with tin-cut long edge at bottom of work, and space ¼-inch above fixture lips. Seal ends, cut edges and penetrations of each piece with water-resistant sealant before installation.

G. Wall Covering Removal & Surface Prep
1. Remove all wallpaper and loose paint to bare plaster. Cut out and patch all plaster cracks.
2. Remove any and all loose plaster and re-plaster leaving a smooth true even surface.
3. Spackle all nicks, holes, wall blemishes and paint removed patches.
4. Sand and/or scrape smooth all wall and ceiling surfaces smooth ready for painting.
5. Clean all grease, grime and oils from all kitchen walls by washing with degreasing agents.
6. Roughen all previously semi-gloss or gloss painted surfaces prior to painting.
7. Remove all grease, grime, peeling paint, wallpaper and trash from walls behind radiators.
8. Remove radiators if necessary.

9. Remove all excess surface run telephone wires, staples and boxes prior to painting.
10. Remove all existing protruding nails, wires, brackets, hooks, eyes, hangers and any and all mechanical devices not required or obsolete from all wood trim and walls prior to painting.

H. Damaged Walls with Wallpaper Repair
1. Wallpaper will not be repaired as part of rehabilitation. Damaged walls with wallpaper will be repaired in the same manner as non-wallpapered walls and painted. The remaining walls in the room will be prepared and painted to match the repaired wall.

3.02 FINISHING

A. Installing Trim Accessories: 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. Finishing Gypsum Board Panels: 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.
1. Pre-fill open joints, rounded or beveled edges, and damaged surface areas.
2. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
3. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
4. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions. See "Gypsum Board Finish Levels" Article in the Evaluations for a discussion of ASTM C840 requirements.

C. Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C840, for locations indicated:
1. Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistance-rated assemblies and sound-rated assemblies.
2. Level 2: Embed tape and apply separate first coat of joint compound to tape, fasteners, and trim flanges where panels are substrate for tile.
3. Level 3: Embed tape and apply separate first and fill coats of joint compound to tape, fasteners, and trim flanges, at painted surfaces.

D. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Apply primer to surfaces that are clean, dry, and smooth.

E. Texture Finish Application: Mix and apply finish using powered spray equipment, to produce a uniform texture free of starved spots or other evidence of thin application or of application patterns.

F. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If, despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray to prevent damage according to texture finish manufacturer's written recommendations.

END OF SECTION

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SECTION 093013 - CERAMIC TILE

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, tools, equipment, incidentals, and services necessary for the flooring material:
   1. Ceramic Floor tile will be replaced with VCT unless the ceramic floor tile was damaged by Asbestos Testing. In this case, tile will replaced in kind.

B. Related Sections:
   1. Section 061000 Rough Carpentry
   2. Section 062000 Finish Carpentry

C. Guideline

   1. Per FEMA document "Flood Damage – Resistant Materials Requirements: Technical Bulletin 2" - Ceramic Tiles with organic adhesives are a Class 2 material and should not be installed below the Base Flood Elevation (BFE)

   2. Per FEMA document "Flood Damage – Resistant Materials Requirements Technical Bulletin 2" - Ceramic Tiles installed on Class 1-3 underlayment should not be installed below the Base Flood Elevation (BFE)

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples:
   1. Each type and composition of tile and for each color and finish required.
   2. Assembled samples, with grouted joints, for each type and composition of tile and for each color and finish required.
   3. Stone thresholds in 6-inch (150-mm) lengths.

1.03 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 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.

1.04 PROJECT CONDITIONS

A. Set and grout tile in portland cement mortar when ambient temperature is at least 50° F and rising.

B. Comply with minimum temperature recommendations of manufacturers for bonding and grouting materials in other than portland cement mortar.

C. Protect adjoining work surfaces before tile work begins.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply for product selection:
   1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.
   2. Products: Subject to compliance with requirements, provide one of the products specified.
   3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the manufacturers specified.
   4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
   5. Basis-of-Design Product: The design for each tile type is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other manufacturers specified.

2.02 TILE PRODUCTS

A. Available Manufacturers:
   1. American Marazzi Tile, Inc.;
   2. American Olean; Div. of Dal-Tile International Corp.;
   3. Crossville Inc.;
   4. Daltile; Div. of Dal-Tile International Inc.;
   5. Florida Tile Industries, Inc.;
   6. GranitiFiandre; c/o Trans Ceramica, Ltd.;
   7. Interceramic;
   8. Lone Star Ceramics Company;
   9. Summitville Tiles, Inc.;
   10. United States Ceramic Tile Company;
   11. Or approved equal

B. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

C. Glazed Paver Tile: Flat tile as follows:
   1. Composition: Impervious natural clay or porcelain.
   2. Facial Dimensions: 11-13/16 by 11-13/16-inches (300 by 300-mm).

3. Thickness: 3/8-inch (9.5-mm).
4. Face: Plain with square edges.
5. Basis-of-Design Product: Daltile, The Carano Ceramic Collection.
   a. Birch;
   b. C.O.F: 0.60;
   c. Grade: 1.

2.03 ACCESSORY MATERIALS

A. Thresholds: Metal Edge Band.

B. Waterproofing Membranes for Thin-Set Tile Installations: Manufacturer's standard product that complies with ANSI A118.10.
   1. Polyethylene-Sheet Product: Polyethylene faced on both sides with fleece webbing, 0.008-inch (0.203-mm) nominal thickness.

2.04 SETTING AND GROUTING MATERIALS

A. Available Manufacturers:
   1. Atlas Minerals & Chemicals, Inc.;
   2. Bonsal, W. R., Company;
   3. Bostik, Inc.;
   4. C-Cure;
   5. Custom Building Products;
   6. Jamo Inc.;
   7. LATICRETE International Inc.;
   8. MAPEI Corporation;
   9. Mer-Kote Products, Inc.;
   10. Southern Grouts & Mortars, Inc.;
   11. Summitville Tiles, Inc.;
   12. TEC, a subsidiary of H. B. Fuller Company.
   13. Or approved equal

B. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

C. Standard Sanded Cement Grout: ANSI A118.6, color: no white.

PART 3 - EXECUTION

3.01 PREPARATION

A. Remove and dispose of Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile- setting materials.

B. Fill cracks, holes, and depressions with trowelable leveling and patching compound according to tile-setting material manufacturer's written instructions.

C. Remove protrusions, bumps, and ridges by sanding or grinding.

D. Blending: For tile exhibiting color variations, use factory blended tile or blend tiles at Project site before installing.

E. Field-Applied Temporary Protective Coating: Where indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, pre-coat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.02 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. 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.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. 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.

F. Grout tile to comply with requirements of ANSI A108.10, unless otherwise indicated. G. Metal Edge Strips: Install at locations indicated or where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.

END OF SECTION

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, tools, equipment, and services necessary for and reasonably incidental to the base (standard) flooring material:
   1. Vinyl Composition Tile (VCT) in all wet areas (kitchen, entry, laundry room) and hallways. **Base Standard**

B. Repair, renovations, alterations, reconstructions of existing floor finishes comply with current version of the Residential Code-NYS.

C. This Section includes the following:
   1. Vinyl composition floor tile.
   2. Vinyl sheet flooring.

D. Related section:
   1. Section 061000 Rough Carpentry for sheathing and substrates
   2. Section 062000 Finish Carpentry for trim and transitions.

E. Guideline

   1. Per FEMA document "Flood Damage – Resistant Materials Requirements: Technical Bulletin 2" - Vinyl Sheets or Tiles with non chemical-set adhesives are a Class 1 material and should not be installed below the Base Flood Elevation (BFE)

   2. Per FEMA document "Flood Damage – Resistant Materials Requirements Technical Bulletin 2" - Vinyl Sheets or Tiles with chemical-set adhesives installed on Class 1-3 underlayment should not be utilized below the Base Flood Elevation (BFE)

   3. All adhesives used in this section must comply with Rule 1168 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51, of the Bay Area Air Quality Management District.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.

C. Samples: Full-size units of each color and pattern of floor tile required.

1.03 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.02 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.

B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

C. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.

B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 50 and 90 deg F (10 and 32 deg C).

C. Store tiles on flat surfaces.

D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

1.04 PROJECT CONDITIONS

A. Cleaning and treatment of sub-floors sweep sub-floors clean and remove spots of paint, grease, dirt, and other foreign matter. Fill all holes, cracks, joints, and indentations in sub-floors; use filler of type recommended by the flooring manufacturer of the floor covering to be used in that area. Plywood underlayment is to be sturdy and solid, or replace damaged areas with like material, or install 3/4-inch plywood subflooring before installation of new floor covering. Masonite or particle board underlayment shall not be used. Just prior to spreading adhesive and lying, sweep clean or vacuum clean sub-floors.

B. Maintain a temperature of not less than 65 deg F (18 deg C) or more than 95 deg F (35 deg C) in spaces to receive products for at least 48 hours before installation, during installation, and for at least 48 hours after installation, unless manufacturer's written recommendations specify longer time periods. After post installation period, maintain a temperature of not less than 55 deg F (13 deg C).

C. Do not install products until they are at the same temperature as the space where they are to be installed.

D. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.

E. Install tiles and accessories after other finishing operations, including painting, have been completed.

F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

G. Provide adequate ventilation to remove fumes from solvent base adhesives.

PART 2 - PRODUCTS

2.01 RESILIENT TILE

A. Vinyl Composition Floor Tile: Products complying with ASTM F 1066 and with requirements as specified herein.

B. Product: Subject to compliance with requirements, listed. Basis of design is:
1. Manufacturer: Armstrong Commercial, or Equal.
2. Color and Pattern:
   a. Arteffects, Full Range of Colors.
3. Class: Class 2 (through-pattern tile).
4. Wearing Surface: Smooth.
5. Thickness: 0.125-inch (3.2-mm).
6. Size: 12-inch by 12-inch (304.8-mm by 304.8-mm).

2.02 UNBACKED VINYL SHEET FLOORING

A. Product: Subject to compliance with requirements, listed. Basis of design is:
1. Manufacturer: Mannington Mills, Inc., or Equal.
2. Color and Pattern:
   a. Insight Plus, Full Range of Colors.
3. Product Standard: ASTM F 1303.
   a. Type 1, Grade 1, Class A.
4. Wearing Surface: Embossed.
5. Thickness: 0.080 inch (2.0 mm).
6. Sheet Width: 12 feet (3.6 m).

B Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1. Armstrong World Industries, Inc;
2. Forbo Industries, Inc;
3. Gerflor;

4. Johnsonite; A Tarkett Company;
5. Polyflor, Ltd., Distributed by Gerbert Limited.

2.03 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement- based formulation provided or approved by flooring manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions where installation of resilient products will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for resilient product installation and comply with requirements specified.

B. Inspection of sub-surfaces after cleaning sub-floor and prior to laying flooring, contractor shall inspect subfloors and walls to receive covering. The trade involved shall be notified of any defects such as low spots, high spots, uneven surfaces or damages that will prevent satisfactory installation; placement of flooring shall not proceed until such defects have been corrected. Defer installation of resilient flooring until all work that might cause damage to flooring has been completed.

C. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and
2. Subfloor finishes comply with requirements specified in Section 033205 "Concrete" for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

D. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. General: Comply with resilient product manufacturer's written installation instructions for preparing substrates indicated to receive resilient products.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, and depressions in substrates.

C. Remove coatings, including curing compounds, and other substances that are incompatible with flooring adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

D. Broom and vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.03 TILE INSTALLATION

A. General: Comply with tile manufacturer's written installation instructions.

B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
   1. Lay tiles square with room axis, unless otherwise indicated.

C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
   1. Lay tiles in pattern of colors and sizes indicated on Drawings.

D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent, non-staining marking device.

G. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
   1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

H. Hand roll tiles according to tile manufacturer's written instructions.

3.04 CLEANING AND PROTECTING

A. Perform the following operations immediately after installing resilient products:
   1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
   2. Sweep or vacuum floor thoroughly.
   3. Do not wash floor until after time period recommended by flooring manufacturer.
   4. Damp-mop floor to remove marks and soil.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
   1. Apply protective floor polish to floor surfaces that are free from soil, visible adhesive, and surface blemishes, if recommended in writing by manufacturer.
      a. Use commercially available product acceptable to flooring manufacturer.
   2. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
   3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean products according to manufacturer's written recommendations.
   1. Before cleaning, strip protective floor polish that was applied after completing installation only if required to restore polish finish and if recommended by flooring manufacturer.
   2. After cleaning, reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations. Coordinate with Owner's maintenance program.

END OF SECTION

SECTION 096816 - CARPET

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish all labor, materials, tools, equipment, and services necessary for and reasonably incidental to the base (standard) flooring material:
   1. Carpeting for all living areas (living room, bedrooms)

B. This Section includes woven carpet, carpet cushion and removal of existing material.

C. Related sections:
   1. Section 061000 Rough Carpentry for sheathing and substrates
   2. Section 062000 Finish Carpentry for trim and transitions.

D. Guideline

   1. Per FEMA document "Flood Damage – Resistant Materials Requirements: Technical Bulletin 2" - Carpet is a Class 1 material and should not be installed below the Base Flood Elevation (BFE)

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show the following:

   1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.

   2. Carpet type, color, and dye lot.

   3. Seam locations, types, and methods.

   4. Pile direction.

C. Samples: For each exposed product and for each color and texture specified.

1.03 INFORMATIONAL SUBMITTALS

A. Product test reports.

B. Warrant: Sample of special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. All carpet must be clearly marked as conforming to HUD Bulletin No: UM44D.

C. All carpet must be in compliance with testing and product requirements of CRI's "Green Label Plus"

1.06 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Carpet Installation Standards, "Storage and Handling." and "Site Conditions; Temperature and Humidity."

1.07 WARRANTY

A. Carpet Warranty: Manufacturer's standard form in which manufacturer agrees to replace carpet that does not comply with requirements or that fails within 10 years from date of Substantial Completion. Warranty does not include deterioration or failure of carpet from unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

B. Carpet Cushion Warranty: Manufacturer's standard form agreeing to replace carpet cushion that does not comply with requirements or that fails within 10 years from date of Substantial Completion. Warranty does not include deterioration or failure of carpet cushion from unusual traffic, failure of substrate, vandalism, or abuse. Failure includes, but is not limited to, permanent indentation or compression.

PART 2 - PRODUCTS

2.01 CARPET

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

B. Products: STANDARD PRODUCT - Subject to compliance with requirements, provide the following or equal:
1. Manufacturer: Shaw.
2. Style: Anna Bell III
3. Fiber: 100% Anso Nylon
4. Style Type: Twist
5. Face Weight: 53.60
6. Stain Treatment: R2x
7. Backing: Softbac Platinum
8. Number of Colors: 10

C. Products: STANDARD FOR ACCESSIBLE/HANDICAP HOMES - Subject to compliance with requirements, provide the following or equal:
   1. Manufacturer: Philadelphia.
   2. Style: Optimum, 52Q59.
   3. Fiber: 100% Continuous Filament Nylon.
   4. Face Weight 25.00
   5. Finish Pile Thickness 0.45
   6. Backing: Polypropylene.
   7. Number of Colors: 7 (Color number may vary).

2.02 CARPET CUSHION

A. Traffic Classification:
   1. Typical Installation: CCC Class I, moderate traffic.
   2. For Accessible Homes and Homes for Seniors: CCC Class III, extra-heavy traffic.

B. Carpet Cushion Standards must comply with FHA/HUD standards, ASTN D3574-91 or ASTM D3676-89.

C. Polyurethane Foam Cushion:
   1. Products: Subject to compliance with requirements, provide the following or equal:
      a. Leggett & Platt, Monterey Carpet Cushion
   2. Type: Bonded foam.
   3. Compression Force Deflection at 65 Percent: per ASTM D3574.
   4. Thickness: 0.5-inch.
   5. Density: 5.0 lb/cu. ft. (kg/cu. m).

PART 3 - EXECUTION

3.01 INSTALLATION

A. Comply with CRI Carpet Installation Standards and as recommended by manufacturer.

B. Maintain uniformity of carpet direction and lay of pile. At doorways, center seams under door in closed position. Bind or seal cut edges as recommended by carpet manufacturer.

C. Install pattern parallel to walls and borders.

D. The contractor shall install carpet as required under other articles of these specifications and as hereinafter specified. Work shall include furnishing and installing all necessary installation accessories, irrespective of whether they are mentioned herein or not, but all as necessary to meet the actual installation conditions of each location in which carpet is required so as to produce a first class workmanlike secure installation.

E. General broom cleaning of surfaces which support the carpeting will be done by General Contractor. Before starting any carpeting operations in any one location, the Carpet

Subcontractor shall remove from the surfaces supporting the carpeting all dust, dirt, debris, oil, grease, or other substances which may in any manner affect the satisfactory execution and serviceability of the carpeting. Debris resulting from the installation operations shall be promptly removed from the site and none shall be left under any carpet.

F. Carpet shall be installed only after all other work in a given location has been completed. Carpets shall be laid with the seams running in the same direction, or as directed in the field by Design Professional (DP). All seams shall be made so that pile of adjoining pieces has the same directional run, and so as to be practically invisible in the opinion of DP. Each run of carpet located between the adjoining parallel seams shall be a single piece of carpet without any piecing out.

G. All doors shall be cut off where necessary to clear the new carpet.

H. Carpet shall be carefully stretched to a uniform taughtness until perfectly smooth and even as well as free from ripples, sags, or buckles.

I. A decorative flat bar/transition strip to match adjacent flooring material shall be installed to protect carpet/vinyl intersections.

3.02 PROTECTION OF WORK

A. The contractor shall take all necessary precautions to protect the existing construction and finishes of the building against any damage due to the carpeting operations. The contractor will be responsible for the cost of such damages.

B. Vacuum carpet using commercial machine with face beater element. Remove spots and replace carpet where spots cannot be removed.

C. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.

D. After completion of carpeting operations in an area, contractor shall remove all waste and surplus items of carpeting. Salvage, except for unused rolls, shall be the property of the homeowner, if wanted.

END OF SECTION

SECTION 099112 - PAINTING

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes surface preparation and field painting of exposed exterior and interior items and surfaces throughout the project.

B. Surface preparation, priming and coats of paint specified are in addition to shop priming and surface treatment specified under other sections of work.

C. Previously coated surface Preparation. All surface contamination such as oil, grease loose paint, mill scale, dirt foreign matter, rust, mold, mildew, mortar and sealers must be removed to assure sound bonding of paint being applied. Testing of product to be used in areas previously painted should be performed prior to use of new product being application.

D. Prior to beginning work on housing older than 1978, in which children will be occupying the home, provide owners and tenants if applicable a copy of EPA's lead hazard information pamphlet “Renovate Right: Important Lead Hazard Information for Families, Child Care Providers, and Schools”. Contractors must document compliance with this requirement; EPA's pre-renovation disclosure form and/or “HUD CPD Green Building Retrofit Checklist” (located in Appendix B) may be used for this purpose.

E. Contractors are required to be certified and to use lead-safe work practices as stipulated by the EPA.

1.02 DEFINITIONS

A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. Samples: For each type of paint system and in each color and gloss of topcoat.

C. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.04 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.05 PROJECT CONDITIONS

A. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F (7 deg C). Maintain storage containers in a clean condition, free of foreign materials and residue.

B. Apply waterborne paints only when temperatures of surfaces to be painted and surrounding air are between 50 and 90 deg F (10 and 32 deg C).

C. Apply solvent-thinned paints only when temperatures of surfaces to be painted and surrounding air are between 45 and 95 deg F (7 and 35 deg C).

D. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

E. Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to Owner.

F. At completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.
   1. Benjamin Moore & Co. (Benjamin Moore).
   2. Coronado Paint Company (Coronado).
   3. ICI Dulux Paint Centers (ICI Dulux Paints).
   4. M. A. Bruder & Sons, Inc. (M. A. B. Paint).
   5. PPG Industries, Inc. (Pittsburgh Paints).
   6. Sherwin-Williams Co. (Sherwin-Williams).

B. Basis of design is Sherwin Williams, or equivalent.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, 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).
   1. Flat Paints and Coatings: 50 g/L.
   2. Nonflat Paints and Coatings: 50 g/L.
   3. Dry-Fog Coatings: 400 g/L.
   4. Primers, Sealers, and Undercoaters: 200 g/L.
   5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
   6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
   7. Pretreatment Wash Primers: 420 g/L.
   8. Floor Coatings: 100 g/L.
   9. Shellacs, Clear: 730 g/L.
   10. Shellacs, Pigmented: 550 g/L.

2.02 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

C. Colors: Provide as indicated by use* (* Within Historic District approval of color selections may require approval by the governing historic review agency, commission or group).
   1. Interior Color Scheme:

a. Field Color: SW7646-First Star
b. Trim Color: SW7005-Pure White
c. Ceiling Color: SW7007-Ceiling Bright White

2. Exterior Color Scheme:
   a. Field Color: Match existing
   b. Trim Color: Match existing

2.03 PREPARATORY COATS

A. Concrete Unit Masonry Block Filler: High-performance latex block filler of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.

B. Exterior Primer: Exterior alkyd or latex-based primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
   1. Ferrous-Metal and Aluminum Substrates: Rust-inhibitive metal primer.
   2. Zinc-Coated Metal Substrates: Galvanized metal primer.
   3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

C. Interior Primer: Interior latex-based or alkyd primer of finish coat manufacturer and recommended in writing by manufacturer for use with finish coat and on substrate indicated.
   1. Ferrous-Metal Substrates: Quick drying, rust-inhibitive metal primer.
   2. Zinc-Coated Metal Substrates: Galvanized metal primer.
   3. Where manufacturer does not recommend a separate primer formulation on substrate indicated, use paint specified for finish coat.

2.04 EXTERIOR FINISH COATS

A. Exterior Flat Acrylic Paint:
   1. Sherwin-Williams; A-100 Exterior Latex Flat House & Trim Paint A06 Series.

B. Exterior Low-Luster Acrylic Paint:
   1. Sherwin-Williams; A-100 Exterior Latex Satin House & Trim Paint A12 Series (MPI #10).
   2. Retain finish-coat materials below for a semi-gloss acrylic-enamel finish, including medium shades, over concrete, stucco, masonry, concrete masonry units, gypsum soffit boards, smooth wood, medium-shade wood trim, ferrous and zinc-coated metal, and aluminum.

C. Exterior Semi-gloss Acrylic Enamel:
   1. Sherwin-Williams; A-100 Latex Gloss A8 Series (MPI #11).
   2. Retain finish-coat materials below for a full-gloss acrylic-enamel finish over concrete, stucco, masonry, concrete masonry units, gypsum soffit boards, smooth

wood, and wood trim. Consult manufacturers if deep-tone-color full-gloss finishes are required. Some deep-tone-color products require use of a different base or a different primer.

D. Exterior Full-Gloss Acrylic Enamel for Concrete, Masonry, and Wood:
   1. Sherwin-Williams; ProMar 200 Waterbased Acrylic-Alkyd Gloss B35-8200 Series.

E. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals:
   1. Sherwin-Williams; ProMar 200 Waterbased Acrylic-Alkyd Gloss B35-8200 Series.

F. Exterior Full-Gloss Alkyd Enamel:
   1. Sherwin-Williams; Industrial Enamel B-54 Series (MPI #81).

2.05 INTERIOR FINISH COATS

A. Available Products: Subject to compliance with requirements, provide the following or equal:
   1. Interior Latex Primer: Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Primer B28W2600.
   2. Interior Flat Acrylic Paint: Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Flat Wall Paint B30-2600 Series.
   3. Interior Low-Sheen Acrylic Latex: Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Low Sheen Enamel B24-2600 Series.
   4. Interior Egg-Shell Latex: Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Egg-Shell B20-2600 Series.
   5. Interior Semi-Gloss Acrylic Latex: Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Semi-Gloss B31-2600 Series.
   6. Interior Gloss Latex: Sherwin-Williams; ProMar 200 Zero VOC Interior Latex Gloss B21-2200 Series.
   7. Interior Full-Gloss Acrylic-Alkyd for Wood: Sherwin- Williams; ProMar 200 Waterbased Acrylic-Alkyd Gloss B35-8200 Series.
   8. Interior Full-Gloss Acrylic-Alkyd for Metal Surfaces: Sherwin- Williams; ProMar 200 Waterbased Acrylic-Alkyd Gloss B35-8200 Series.

2.06 INTERIOR WOOD STAINS AND VARNISHES

A. Available Products: Subject to compliance with requirements, provide the following or equal:
   1. Open-Grain Wood Filler: Sherwin-Williams; Sher-Wood Fast-Dry Filler.
   2. Interior Wood Stain: Alkyd based. Sherwin-Williams; Wood Classics Interior Oil Stain A-49 Series.
   3. Clear Sanding Sealer: Fast-drying alkyd based. Sherwin-Williams; Wood Classics Fast Dry Sanding Sealer B26V43.

4. Interior Alkyd- or Polyurethane-Based Clear Satin Varnish: Sherwin-Williams; Wood Classics Fast Dry Oil Varnish, Satin A66 Series.
5. Interior Waterborne Clear Satin Varnish: Sherwin-Williams; Wood Classics Waterborne Polyurethane Satin.
6. Interior Waterborne Clear Gloss Varnish: Sherwin-Williams; Wood Classics Waterborne Polyurethane Gloss.

PART 3 - EXECUTION

3.01 APPLICATION

A. Comply with procedures specified in PDCA P4 for inspection and acceptance of surfaces to be painted.

B. 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.

C. Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

D. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
1. Provide barrier coats over incompatible primers or remove and re-prime.
2. Cementitious Materials: Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
   a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   b. Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
   c. If transparent finish is required, backprime with spar varnish.
   d. Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on back side.

e. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.

4. Ferrous Metals: Clean un-galvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC's recommendations.
   a. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

E. Material Preparation:
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.

F. Exposed Surfaces: Include areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
1. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
2. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
3. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
4. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
5. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.

G. Sand lightly between each succeeding enamel or varnish coat.

H. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. Omit primer over metal surfaces that have been shop primed and touchup painted.
2. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance.

I. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

J. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide total dry film thickness of the entire system as recommended by manufacturer.

K. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

L. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

M. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn- through or other defects due to insufficient sealing.

N. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

O. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.

P. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

Q. Unless otherwise noted within document all paint shall include additional coats beyond coat number specified to achieve good cover and hide.

3.02 CLEANING AND PROTECTING

A. At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.

B. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Design Professional (DP).

C. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.

1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.03 EXTERIOR PAINT SCHEDULE

A. Concrete, Stucco, and Masonry (Other Than Concrete Unit Masonry):
   1. Acrylic Finish: Two finish coats over a primer.
      a. Primer: Exterior concrete and masonry primer.
      b. Finish Coats: Exterior low-luster acrylic paint.

B. Concrete Unit Masonry:
   1. Acrylic Finish: Two finish coats over a block filler.
      a. Block Filler: Concrete unit masonry block filler.
      b. Finish Coats: Exterior low-luster acrylic paint.

C. Mineral-Fiber-Reinforced Cement Panels:
   1. Acrylic Finish: Two finish coats over a primer.
      a. Primer: Exterior concrete and masonry primer.
      b. Finish Coats: Exterior flat acrylic paint.

D. Smooth Wood:
   1. Acrylic Finish: Two finish coats over a primer.
      a. Primer: Exterior wood primer for acrylic enamels.
      b. Finish Coats: Exterior semi-gloss acrylic enamel.
   2. Alkyd-Enamel Finish: Two finish coats over a primer.
      a. Primer: Exterior wood primer for alkyd enamels.
      b. Finish Coats: Exterior full-gloss alkyd enamel.

E. Wood Trim:
   1. Acrylic-Enamel Finish: Two finish coats over a primer.
      a. Primer: Exterior wood primer for acrylic enamels.
      b. Finish Coats: Exterior semi-gloss acrylic enamel.
   2. Alkyd-Enamel Finish: Two finish coats over a primer.
      a. Primer: Exterior wood trim primer for full-gloss alkyd enamels.
      b. Finish Coats: Exterior full-gloss alkyd enamel.

F. Plywood (Exterior plywood floor underlayment):
   1. Acrylic Finish: Two finish coats over a primer.
      a. Primer: Exterior wood primer for acrylic enamels.
      b. Finish Coats: Exterior low-luster acrylic paint.

G. Ferrous Metal:
   1. Acrylic Finish: Two finish coats over a rust-inhibitive primer.
      a. Primer: Exterior ferrous-metal primer (not required on shop-primed items).
      b. Finish Coats: Exterior semi-gloss acrylic enamel.

2. Alkyd-Enamel Finish: Two finish coats over a rust-inhibitive primer.
   a. Primer: Exterior ferrous-metal primer (not required on shop-primed items).
   b. Finish Coats: Exterior full-gloss alkyd enamel.

H. Zinc-Coated Metal:
1. Acrylic Finish: Two finish coats over a galvanized metal primer.
   a. Primer: Exterior galvanized metal primer.
   b. Finish Coats: Exterior semi-gloss acrylic enamel.
2. Alkyd-Enamel Finish: Two finish coats over a galvanized metal primer.
   a. Primer: Exterior galvanized metal primer.
   b. Finish Coats: Exterior full-gloss alkyd enamel.

I. Aluminum:
1. Acrylic-Enamel Finish: Two finish coats over a primer.
   a. Primer: Exterior aluminum primer under acrylic finishes.
   b. Finish Coats: Exterior semi-gloss acrylic enamel.
2. Alkyd-Enamel Finish: Two finish coats over a primer.
   a. Primer: Exterior aluminum primer under alkyd finishes.
   b. Finish Coats: Exterior full-gloss alkyd enamel.

3.04 INTERIOR PAINT SCHEDULE

A. Concrete and Masonry (Other Than Concrete Unit Masonry):
1. Acrylic Finish: Two finish coats over a primer.
   a. Primer: Interior concrete and masonry primer.
   b. Finish Coats: Interior semi-gloss acrylic enamel.
2. Alkyd-Enamel Finish: Two finish coats over a primer.
   a. Primer: Interior concrete and masonry primer.
   b. Finish Coats: Interior semi-gloss alkyd enamel.

B. Concrete Unit Masonry:
1. Acrylic Finish: Two finish coats over a block filler.
   a. Block Filler: Concrete unit masonry block filler.
   b. Finish Coats: Interior low-luster acrylic enamel.
2. Alkyd-Enamel Finish: Two finish coats over a filled surface.
   a. Block Filler: Concrete unit masonry block filler.
   b. Finish Coat: Interior semi-gloss alkyd enamel.

C. Mineral-Fiber-Reinforced Cement Panels:
1. Flat Acrylic Finish: Two finish coats.
   a. Finish Coats: Interior flat acrylic paint.

D. Gypsum Board:
1. Acrylic Finish: Two finish coats over a primer.
   a. Primer: Interior gypsum board primer.

b. Finish Coats: Interior low-luster acrylic enamel.

2. Alkyd-Enamel Finish: Two finish coats over a primer.
   a. Primer: Interior gypsum board primer.
   b. Finish Coats: Interior semi-gloss alkyd enamel.

E. Plaster:
1. Acrylic Finish: Two finish coats over a primer.
   a. Primer: Interior plaster primer.
   b. Finish Coats: Interior flat acrylic paint.
2. Alkyd-Enamel Finish: Two finish coats over a primer.
   a. Primer: Interior plaster primer.
   b. Finish Coats: Interior semi-gloss alkyd enamel.

F. Wood and Hardboard:
1. Acrylic-Enamel Finish: Two finish coats over a primer.
   a. Primer: Interior wood primer for acrylic-enamel and semi-gloss alkyd-enamel finishes.
   b. Finish Coats: Interior low-luster acrylic enamel.
2. Alkyd-Enamel Finish: Two finish coats over a primer.
   a. Primer: Interior wood primer for acrylic-enamel and semi-gloss alkyd-enamel finishes.
   b. Finish Coats: Interior semi-gloss alkyd enamel.

G. Ferrous Metal:
1. Acrylic Finish: Two finish coats over a primer.
   a. Primer: Interior ferrous-metal primer.
   b. Finish Coats: Interior semi-gloss acrylic enamel.
2. Alkyd-Enamel Finish: Two finish coats over a primer.
   a. Primer: Interior ferrous-metal primer.
   b. Finish Coats: Interior semi-gloss alkyd enamel and full-gloss alkyd enamel for wood and metal surfaces.

H. Zinc-Coated Metal:
1. Acrylic Finish: Two finish coats over a primer.
   a. Primer: Interior zinc-coated metal primer.
   b. Finish Coats: Interior semi-gloss acrylic enamel.
2. Alkyd-Enamel Finish: Two finish coats over a primer.
   a. Primer: Interior zinc-coated metal primer.
   b. Finish Coats: Interior semi-gloss alkyd enamel.

I. All-Service Jacket over Insulation:
1. Acrylic Finish: Two finish coats. Add fungicidal agent to render fabric mildew proof.
   a. Finish Coats: Interior flat latex-emulsion size.

3.05 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

A. Stain-Varnish Finish: Two finish coats of varnish over a sealer coat and interior wood stain. Wipe wood filler before applying stain.
   1. Filler Coat: Open-grain wood filler.
   2. Stain Coat: Interior wood stain.
   3. Sealer Coat: Clear sanding sealer.
   4. Finish Coats: Interior alkyd or polyurethane-based clear satin varnish.

B. Natural-Varnish Finish: Two finish coats of varnish over a sealer coat and a filler coat.
   1. Filler Coat: Open-grain wood filler.
   2. Sealer Coat: Clear sanding sealer.
   3. Finish Coats: Interior alkyd- or polyurethane-based clear satin varnish.

END OF SECTION

SECTION 102800 - BATH ACCESSORIES

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following:
1. Toilet and bath accessories;
2. Medicine Cabinet;
3. Tub Surround.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
1. Identify products using designations indicated.

1.03 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.04 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.05 WARRANTY

A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace if defects in material.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Basis-of-Design Products: The design for toilet and bath accessories, and specific items, are described in Part 2 and are based on products indicated. Subject to compliance with requirements, manufacturers and products of equal quality are acceptable.

2.02 MATERIALS

A. Accessories shall conform to Federal Specifications WW-P 54 lb.
1. Accessories shall be chrome finish brass or zinc die cast metal with concealed mounting brackets.

B. Stainless Steel: ASTM A666, Type 304, No. 4 finish (satin), 0.0312-inch (0.8-mm) minimum nominal thickness, unless otherwise indicated.

C. Brass: ASTM B19, ASTM B16 (ASTM B16M), or ASTM B30 castings.

D. Steel Sheet: ASTM A366/A366M, 0.0359-inch (0.9-mm) minimum nominal thickness.

E. Galvanized Steel Sheet: ASTM A653/A653M, G60 (Z180).

F. Chromium Plating: ASTM B456, Service Condition Number SC2 (moderate service).

G. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.

H. Mirror Glass: ASTM C1036, Type I, Class 1, Quality q2, nominal 6.0-mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.

2.03 TOILET AND BATH ACCESSORIES

A. Towel Bar: Install 1 at Lavatory and 1 at tub/shower
1. Basis-of-Design Product: Nutone;
2. Model: HM 896;
3. Mounting: Recessed;
4. Towel Type and Capacity: 24-inch;
5. Material: Chrome plated.

B. Toilet Tissue Dispenser: 1 at toilet
1. Basis-of-Design Product: Nutone;
2. Model: HM 770;
3. Type: Single-roll dispenser;
4. Mounting: Surface mounted with concealed anchorage;
5. Material: Chrome plated.

C. Shower Curtain Rod: 1 at shower/tub
1. Basis-of-Design: Nutone;
2. Model: HM 610;
3. Stainless-steel shower curtain rod with 3-inch (75-mm) stainless-steel flanges designed for exposed fasteners, in length required for shower opening indicated;
4. Type: Normal-duty, 1-inch (25.4-mm) OD;
5. Size: 5-foot – 0-inch.

D. Medicine Cabinet: 1 at lavatory
1. Basis-of-Design Product: Broan Metro Collection Bath cabinets;
2. Type: Surface Mount with surface mount kit;
3. Size: 15-inch x 35-inch;
4. Construction: Corrosion-resistant steel or wood cabinet;
5. Door: Framed mirror door concealing storage cabinet equipped and with continuous hinge and spring-buffered, rod-type stop and magnetic door catch;
6. Shelves: Five.

E. ADA Compliant Grab-Bar: 1 at toilet
1. Basis-of-Design Product: Bobrick or Equal

2. 36-inch Minimum length;
3. 1-1/2-inch to 1-1/4-inch diameter;
4. Stainless Steel;
5. Install 33-inch to 36-inch above finished floor.

F. ADA Compliant Grab-Bar: 1 at shower/tub
1. Basis-of-Design Product: Bobrick or Equal
2. 42-inch Minimum length;
3. 1-1/2-inch to 1-1/4-inch diameter;
4. Stainless Steel;
5. Install 33-inch to 36-inch above finished floor.

G. Tub Surround
1. Basis of Design: American Standard Acrylux
2. Model: 6032Y1.BWT
3. Type: Acrylic Tile Bath Wall Set
4. Size: 60-inch
5. Meets or exceeds Standards:
   a. ANSI Z124.1 for Plastic Bathtubs
   b. ASTM E162 for Flammability
   c. NFPA 258 for Smoke Density

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install accessories using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
1. Install grab bars to withstand a downward load of at least 250 lbf (1112 N), when tested according to method in ASTM F446.

B. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. Replace damaged or defective items. Remove temporary labels and protective coatings.

END OF SECTION

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SECTION 107470 - WINDOW WELLS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Window wells for below-grade egress

B. Covers for window wells
   1. Dome
   2. Metal grate
   3. Polycarbonate

1.02 ACTION SUBMITTALS

A. Product Data: For each type of window well.

B. Shop Drawings: For window well work. Include plans, elevations, sections, details, and connections to supporting structure and other adjoining work.

C. Samples: For each type of window well.

D. Product Schedule: For projects with multiple window well types.[Use same designations indicated on Drawings.]

1.02 REFERENCES

A. Current Version: Residential Code-New York State (RC)

B. Current Version: Building Code-New York State (BC)

1.03 QUALITY ASSURANCE

A. Certificates: Submit certificate that applicator complies with requirements of this section.

B. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

C. Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns.

D. Installer shall be responsible for complying with local codes and regulations.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in manufacturer's original, unopened packaging, with labels clearly identifying product name and manufacturer.

B. Store products in manufacturer's unopened packaging until ready for installation.

C. Protect materials during handling and installation to prevent damage

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Wellcraft Egress Systems

B. Bilco

C. Marflex

D. Boman Kemp

2.02 PHYSICAL PROPERTIES

A. Materials should be made to resist impacts, abrasion, rusting, cracking and fading.

B. Materials should be superior in weather resistance

2.03 DESIGN REQUIREMENTS

A. Dimensions of window wells shall be in accordance with Section 1026.5.1 of the BC and Section R310.2 of the RC.

B. Ladders or steps shall be provided in accordance with Section 1026.5.2 of the BC and Section R310.2.1 of the RC.

C. Ladder rungs shall be designed for a minimum load of 300 pounds (136 kg) applied on a maximum 4-inches (102 mm) wide section located at the center of the ladder rung and the edge of the ladder rung. The ladder rungs need not be designed for both loads occurring simultaneously.

D. Window wells shall be provided with an opening cover. The cover shall be designed in accordance with the applicable code to support a minimum live load of 40 pounds per square foot (195 kg/m2). The cover shall be operable from within the window well without the use of tools or special knowledge, and shall require no more than 30 pounds (13.6 kg) of force to fully open.

E. All components and materials from which the window well is constructed shall be corrosion-resistant.

PART 3 - PRODUCTS

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Design Professional (DP) of unsatisfactory preparation before proceeding.

3.02 PREPARATON

A. Clean surfaces thoroughly prior to installation.

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

C. Dig out and remove existing window well if present.

3.03 INSTALLATION – GENERAL

A. Install in accordance with manufacturer's instructions.

B. Window Wells should be mounted flush against the foundation wall. Apply a thick bead of quality polyurethane silicone around the face flange of the well and set against the wall.

C. Determine height needed.

D. Center the window well and level to desired depth.

E. Install by working from top of each flange to bottom of flange.

3.04 BACKFILLING

A. Follow manufacturer's specific requirements for each well.

B. Use pea gravel or 3/4 inch (19 mm) or smaller free-draining rock to create a backfill barrier around the outer perimeter of the window well and approximately 1 foot (305 mm) down from the top of the window well.

C. The top 6 inches (152 mm) of the window well perimeter can be backfilled with topsoil to final grade. Slope final grade away from well in all directions.

D. Drainage is required. Connect to existing drainage or if there is no existing drainage system exits make provisions to direct drainage away from the well to well drained soil.

E. Gutter downspouts should be a minimum of 8 to 10 feet (2.4 m to 3 m) from the window well or at least 10 feet from the foundation wall and should be directed away from the window well with rigid or flexible pipe.

END OF SECTION

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SECTION 113100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Furnish materials, accessories, fittings, fixtures, and equipment; perform work required to place the appliances in a complete, proper and legal operating condition.

B. Repair, renovations, alterations, reconstructions of existing electrical shall comply with the current version of the Residential Code of New York State and its local government Ordinance Amendments.

C. Where possible appliances are to be Energy Star Qualified.

D. This section includes Base appliances:
1. Cooking appliances.
2. Kitchen exhaust ventilation.
3. Refrigeration appliances.
4. Cleaning appliances.

1.03 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples: For each exposed product and for each color and texture.

1.04 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Field quality-control reports.

C. Warranties: Sample of special warranties.

1.05 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. Source Limitations: Obtain residential appliances from single source.

C. Regulatory Requirements: Comply with the following:
   1. NFPA: Provide electrical appliances listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   2. ANSI: Provide gas-burning appliances that comply with ANSI Z21 Series standards.

1.07 WARRANTY

A. Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 RANGES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
   1. Amana; a division of Whirlpool Corporation.
   2. Electrolux Home Products (Frigidaire).
   3. Fisher & Paykel.
   4. General Electric Company (GE).
   5. General Electric Company (Hotpoint).
   6. KitchenAid; a division of Whirlpool Corporation.
   7. LG Appliances.
   8. Maytag; a division of Whirlpool Corporation.
   9. Samsung.
   10. Sears Brands LLC (Kenmore).
   11. Whirlpool Corporation.

B. Electric Range Freestanding range with one oven and complying with AHAM ER-1. Basis-of-Design Product:
   1. GE JBS60DFWW (White)

C. Gas Range Freestanding range with one oven. Basis-of-Design Product:
   1. GE JGB630DEFWW (White)

2.02 KITCHEN EXHAUST VENTILATION

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
   1. Electrolux Home Products (Frigidaire).
   2. Fisher & Paykel.
   3. General Electric Company (GE).
   4. General Electric Company (Hotpoint).
   5. KitchenAid; a division of Whirlpool Corporation.

6. Maytag; a division of Whirlpool Corporation.
7. Sears Brands LLC (Kenmore).
8. Sharp Electronics Corp.
9. Whirlpool Corporation.

B. Overhead Exhaust Hood: Basis-of-Design Product:
1. GE JV338H; Color to match range unit. White add suffix WW. Black add suffix BB.
   a. Type: Wall-mounted exhaust-hood system.
   b. Width: 30-inches (762-mm).
   c. Exhaust Fan: Two-speed fan built into hood.
   d. Venting: Vented to outside through roof with weatherproof roof cap, backdraft damper, and rodent-proof screening or Vented to outside through wall with weatherproof wall cap, backdraft damper, and rodent-proof screening.
   e. Where venting is not possible provide a Non-vented, re-circulating type with charcoal filter.
   f. Color: Color to match range unit.

2.03 REFRIGERATOR/FREEZERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide an ENERGY STAR labeled product indicated or comparable product by one of the following:
1. Amana; a division of Whirlpool Corporation.
2. Dacor, Inc.
3. Fisher & Paykel.
4. General Electric Company (GE).
5. General Electric Company (Hotpoint).
6. KitchenAid; a division of Whirlpool Corporation.
7. LG Appliances.
8. Maytag; a division of Whirlpool Corporation.
9. Samsung.
10. Sears Brands LLC (Kenmore).
11. Whirlpool Corporation.

B. Refrigerator/Freezer: Two-door refrigerator/freezer; 14-18 c.f., with freezer on top and complying with AHAM HRF-1. Basis-of-Design Product:
1. GE GTH18IBDWW (White)
   a. Type: Freestanding
   b. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

2.04 DISHWASHERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide an ENERGY STAR labeled product indicated or comparable product by one of the following:
   1. Amana; a division of Whirlpool Corporation.
   2. Fisher & Paykel.
   3. General Electric Company (GE).
   4. General Electric Company (Hotpoint).
   5. KitchenAid; a division of Whirlpool Corporation.
   6. LG Appliances.
   7. Maytag; a division of Whirlpool Corporation.
   8. Sears Brands LLC (Kenmore).
   9. Whirlpool Corporation.

B. Dishwasher: Complying with AHAM DW-1 and ASSE 1006. Basis-of-Design Product:
   1. Base: GE GDF510PMDSA (Clean Steel) and dedicated circuit
      a. Type: Built-in under counter
      b. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

2.05 CLOTHES WASHERS AND DRYERS

A. Clothes Washer will comply with ASSE 1007.

Basis-of-Design Product: Subject to compliance with requirements, provide an ENERGY STAR labeled product indicated or comparable product by one of the following:

1. Amana; a division of Whirlpool Corporation.
2. Fisher & Paykel.
3. General Electric Company (GE).
4. General Electric Company (Hotpoint).
5. KitchenAid; a division of Whirlpool Corporation.
6. LG Appliances.
7. Maytag; a division of Whirlpool Corporation.
8. Sears Brands LLC (Kenmore).
9. Whirlpool Corporation.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

3.02 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

C. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

D. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

E. Utilities: Comply with plumbing and electrical requirements.

END OF SECTION

SECTION 144210 - LIFTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

B. This section includes:
1. Lift
2. Concrete Pad

C. Related Sections:
1. Section 261000 “Electrical”.
2. Section 033205 “Concrete”.
3. Section 062000 “Finish Carpentry” for exterior woodwork for handicap-accessible ramp with handrail.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each lift.
1. Include plans, elevations, sections, details, attachments to other work, and required clearances.
2. Indicate dimensions, weights, loads, and points of load to building structure.
3. Include diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.03 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Sample warranty.

1.04 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

B. Inspection and acceptance certificates and operating permits.

1.05 SUMMARY

A. Homes that shall be elevated may require one ramp or lift entrance in place of stairs. Ramps shall be both Uniform Federal Accessibility Standards (UFAS) and the most current version of the Residential Code of New York State (RC) compliant with a slope

of 1 to 12. Ramps shall also incorporate a set of stairs in the ramp design at the home entrance.

B. Where a lift is required, they shall be residential vertical platform lift, including electrical installation in accordance with local code, maintenance-free operation and 24V DC battery backup with reference to the UFAS Section 4.11. The lift installation shall also incorporate a set of stairs in the lift design. Per RC Section R323.2, where provided, platform lifts shall comply with ASME A18.1.

C. Elevators or platform lifts that are part of an accessible route required by the Building Code of New York State & Residential Code of New York State shall comply with ICC A117.1

D. When a home is elevated as part of rehabilitation, a ramp shall be installed in place of stairs for one home entrance at the owner's choice if the owner is elderly or disabled as verified by Design Professional (DP). These costs are program eligible. If the home is located within a historical district governed by the Design Standards for Historic properties then the location of the ramp or lift must comply with those guidelines.

E. A lift may be installed in place of a ramp under several circumstances. If the ramp is eligible and of such a height that a lift is more cost effective, the lift must be installed and would be eligible. If the ramp cannot be constructed to meet UFAS & RC due to site and home location geometry, a lift may be constructed and would be eligible even if more costly. If the homeowner chooses to construct a lift instead of the ramp and the lift is more costly than the ramp the owner must pay for the incremental lift installation costs. In the majority of cases and due to the 1:12 slope requirements, lifts shall be necessary for homes elevated 3-foot or above.

F. Repair, renovations, alterations, reconstructions of existing wood framing shall comply with the currently enforced RC for amended Ordnances of the participating local governments.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Immediately upon delivery to job site, place materials in area protected from weather.

B. Store materials in a minimum of 6-inch above ground on framework or blocking and cover with protective water-proof covering providing for adequate air circulation or ventilation.

C. Do not store seasoned materials in wet, damp portions of building.

D. All materials used in framing and constructing ramps and landing associated with the installation of a Lift shall be pressure treated wood.

1.07 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

1.08 WARRANTY

A. Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Immediately upon delivery to job site, place materials in area protected from weather.

B. Store materials in a minimum of 6-inch above ground on framework or blocking and cover with protective water-proof covering providing for adequate air circulation or ventilation.

C. Do not store seasoned materials in wet, damp portions of building.

D. All materials used in framing and constructing ramps and landing associated with the installation of a Lift shall be pressure treated wood.

2.02 MATERIAL STANDARDS FOR RAMPS AND FRAMING AROUND LIFT

A. Rough Lumber Exterior
   1. All lumber to be grade marked and surfaced 4 sides. Minimum grading of lumber shall be as set forth in this section. All rough and framing lumber in contact with concrete will be termite resistant pressure treated lumber. All wood structural members shall be of sufficient size to carry the dead and require live loads without exceeding the allowable working stresses. A minimum size for support members shall be nominal dimension 4 x4. Anchorage of wood framing shall be in accordance with Wind Storm Specifications and all other applicable codes.

B. The width of ramp and associated landings shall conform to the dimensional requirements of UFAS and shall be a minimum width of 36-inches. Hand rails shall be located 34 to 38-inches above ramp or landing surface and shall be 1-½” from face of wall if that condition occurs.

C. Lumber Grading Rules and Wood Species to be in conformance with Voluntary Product Standard PS 20-70. Grading rules of the following associations apply to materials furnished under this section:
   1. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
   2. Southern Pine Inspection Bureau (SPIB).
   3. Northern Hardwood and Pine Manufacturer's Association (NHPMA).

D. General Standards
   1. Identify all lumber and plywood by official grade mark.
      a. Specified lumber dimensions are nominal.
      b. Actual dimensions conform to industry standards established by the American Lumber Standards Committee and the rules writing agencies.
   2. Surfacing:
      a. Surface four sides (54S), unless specified otherwise.
   3. Moisture Content
      a. 15% maximum for lumber items not specified to receive wood preservative treatment.

E. Framing Lumber
   1. Furring and grounds: Minimum Grade, No. 3 common.
   2. Light framing lumber (less than 6-inch wide) minimum grade #2 (SPIB).
   3. Structural framing (6-inch and wider): Any species and grade meeting the following value: Fb = 1150 psi, E + 1,400,000 psi.

F. Plywood
   1. Plywood Grading Rules
      a. Softwood Plywood: Construction and Industrial: Product Standard PS 1-66.
      b. Hardwood Plywood: Product Standard PS 51-71.

G. Concealed Plywood
   1. Where plywood will be concealed by other work, provide C-D Plugged/ INT-APA.

H. Treated Wood
   1. Preservative
      a. Pressure method in accordance with interim FS TT - W - 571 H Table III C.C.A. 0.25 pounds retention per cu. ft. "Wood Preservative Treating Practice" and published standards of AWPA. Treatment shall be dry salt method.
      b. Kiln-dry to 15% moisture content after treatment of the following:
         1) Wood sills, sleepers, blocking, furring, stripping and similar concealed members in contact with masonry or concrete.
         2) Pressure-treat the following with water-borne preservatives for ground contact use complying with AWPB LP-22.
         3) Wood members in contact with ground.

I. Fasteners: Rough Hardware Bolts:
   1. FS FF-B-575C.
   2. FS FF-B-584 D.
   3. Nuts: FS FF-N-836C.
   4. Expansion shields: FS FF-B-561C.
   5. Lag screws and bolts: FS FF-B-561C.

6. Toggle bolts: FS FF-B-588C.
7. Wood screws: FS FF-S-lllC.
8. Nails and staples: FS FF-N-105B.

J. Standards for Lift
1. Where applicable when space is limited for Ramp configuration and travel/lift distance is in excess of 3'-0" provide weather resistant electrical lift with adjacent access.
   a. Basis of design is the Trus-T-Lift by Ram Manufacturing. The following are the product specifications:
      1) Adjacent Access.
      2) Deck Dimension: 54" x 40" x 54"
      3) Travel distance: 28" to 144"
      4) Tower Height: 48" to 166"
      5) Lift Capacity: 550 Lbs.
      6) Lift Speed: 8 feet per Minutes
      7) Finish: Baked Powder Coat
      8) UL & CSA Certified
      9) 20 Amp Dedicated Circuit
      10) Emergency Manual Operation
      11) Emergency Battery Backup
2. Manufacturers: Subject to compliance with requirements. Provide products by one of the following:
   a. T-Ram;
   b. AmeriGlide;
   c. McKinley Elevator;
   d. Or equal.
3. Lift shall comply with governing codes including local governing jurisdictions including UFAS and RC
4. Reframing of existing deck or porch may be required. In some cases a platform must be created to create a barrier free ADA compliant access to the residence.
5. Mounting Surface: Provide minimum 72" x 72" x 4" broom finished concrete pad with 3000 PSI Compressive strength at 28 days with steel reinforcing installed per the Concrete Reinforcing Steel Institutes recommended best practices for placing & supporting reinforcement.

PART 3 – EXECUTION (Not used)

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SECTION 221116 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes under-building-slab and aboveground domestic water pipes, tubes, and fittings inside buildings.

1.2 SUBMITTALS

A. Product data/catalog cut sheets: For each type of product provided.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Potable-water piping and components shall comply with NSF 14 and NSF 61. Plastic piping components shall be marked with "NSF-pw."

2.2 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

B. Soft Copper Tube: ASTM B 88, Type K water tube, annealed temper.

C. Cast-Copper, Solder-Joint Fittings: ASME B16.18, pressure fittings.

D. Wrought-Copper, Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

E. Bronze Flanges: ASME B16.24, Class 150, with solder-joint ends.

F. Copper Unions:

1. MSS SP-123.
2. Cast-copper-alloy, hexagonal-stock body.
3. Ball-and-socket, metal-to-metal seating surfaces.
4. Solder-joint or threaded ends.

G. Copper Pressure-Seal-Joint Fittings:

1. Fittings for NPS 2 and Smaller: Wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

2. Fittings for NPS 2-1/2 to NPS: Cast-bronze or wrought-copper fitting with EPDM-rubber, O-ring seal in each end.

H. Copper Push-on-Joint Fittings:

1. Cast-copper fitting complying with ASME B16.18 or wrought-copper fitting complying with ASME B 16.22.
2. Stainless-steel teeth and EPDM-rubber, O-ring seal in each end instead of solder-joint ends.

2.3 DUCTILE-IRON PIPE AND FITTINGS

A. Mechanical-Joint, Ductile-Iron Pipe:

1. AWWA C151/A21.51, with mechanical-joint bell and plain spigot end unless grooved or flanged ends are indicated.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

B. Standard-Pattern, Mechanical-Joint Fittings:

1. AWWA C110/A21.10, ductile or gray iron.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

C. Compact-Pattern, Mechanical-Joint Fittings:

1. AWWA C153/A21.53, ductile iron.
2. Glands, Gaskets, and Bolts: AWWA C111/A21.11, ductile- or gray-iron glands, rubber gaskets, and steel bolts.

2.4 GALVANIZED-STEEL PIPE AND FITTINGS

A. Galvanized-Steel Pipe:

1. ASTM A 53/A 53M, Grade B, Standard Weight.
2. Include ends matching joining method.

B. Galvanized-Steel Pipe Nipples: ASTM A 733, made of ASTM A 53/A 53M or ASTM A 106/A 106M, Standard Weight, seamless steel pipe with threaded ends.

C. Galvanized, Gray-Iron Threaded Fittings: ASME B16.4, Class 125, standard pattern.

D. Malleable-Iron Unions:

1. ASME B16.39, Class 150.
2. Hexagonal-stock body.
3. Ball-and-socket, metal-to-metal, bronze seating surface.
4. Threaded ends.

E. Flanges: ASME B16.1, Class 125, cast iron.

2.5 PEX TUBE AND FITTINGS

A. PEX Distribution System: ASTM F 877, SDR 9 tubing.

B. Fittings for PEX Tube: ASTM F 1807, metal-insert type with copper or stainless-steel crimp rings and matching PEX tube dimensions.

C. Manifold: Multiple-outlet, plastic or corrosion-resistant-metal assembly complying with ASTM F 877; with plastic or corrosion-resistant-metal valve for each outlet.

2.6 PIPING JOINING MATERIALS

A. Pipe-Flange Gasket Materials:

1. AWWA C110/A21.10, rubber, flat face, 1/8 inch (3.2 mm) thick or ASME B16.21, nonmetallic and asbestos free unless otherwise indicated.
2. Full-face or ring type unless otherwise indicated.

B. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.

C. Solder Filler Metals: ASTM B 32, lead-free alloys.

D. Flux: ASTM B 813, water flushable.

E. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.

F. Plastic, Pipe-Flange Gaskets, Bolts, and Nuts: Type and material recommended by piping system manufacturer unless otherwise indicated.

2.7 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.
2. Pressure rating at least equal to pipes to be joined.
3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

2.8 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:
   1. Subject to compliance with requirements, provide a product by one of the following:

      a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
      b. Central Plastics Company.
      c. Hart Industries International, Inc.
      d. Jomar International.
      e. Matco-Norca.
      f. McDonald, A. Y. Mfg. Co.
      g. Watts; a division of Watts Water Technologies, Inc.
      h. Wilkins; a Zurn company.
      i. Approved equal.

   2. Standard: ASSE 1079.
   3. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
   4. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:
   1. Subject to compliance with requirements, a product by one of the following:

      a. Capitol Manufacturing Company; member of the Phoenix Forge Group.
      b. Central Plastics Company.
      c. Matco-Norca.
      d. Watts; a division of Watts Water Technologies, Inc.
      e. Wilkins; a Zurn company.
      f. Approved equal.

   2. Standard: ASSE 1079.
   3. Factory-fabricated, bolted, companion-flange assembly.
   4. Pressure Rating: 125 psig (860 kPa) minimum at 180 deg F (82 deg C).
   5. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:
   1. Subject to compliance with requirements, provide a product by one of the following:

      a. Advance Products & Systems, Inc.
      b. Calpico, Inc.
      c. Central Plastics Company.
      d. Pipeline Seal and Insulator, Inc.
      e. Approved equal.

   2. Nonconducting materials for field assembly of companion flanges.
   3. Pressure Rating: 150 psig (1035 kPa).
   4. Gasket: Neoprene or phenolic.
   5. Bolt Sleeves: Phenolic or polyethylene.
   6. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:
   1. Subject to compliance with requirements, provide a product by one of the following:

a. Elster Perfection Corporation.
b. Grinnell Mechanical Products; Tyco Fire Products LP.
c. Matco-Norca.
d. Precision Plumbing Products, Inc.
e. Victaulic Company.
f. Approved equal.

2. Standard: IAPMO PS 66.
3. Electroplated steel nipple complying with ASTM F 1545.
4. Pressure Rating and Temperature: 300 psig (2070 kPa) at 225 deg F (107 deg C).
5. End Connections: Male threaded or grooved.
6. Lining: Inert and noncorrosive, propylene.

PART 3 - EXECUTION

3.1 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve inside the building at each domestic water-service entrance. Install shutoff valve immediately upstream of each dielectric fitting.

E. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

F. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

G. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

H. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

I. Install piping to permit valve servicing.

J. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than the system pressure rating used in applications below unless otherwise indicated.

K. Install piping free of sags and bends.

L. Install fittings for changes in direction and branch connections.

M. Install PEX piping with loop at each change of direction of more than 90 degrees.

N. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

O. Install pressure gages on suction and discharge piping for each plumbing pump and packaged booster pump. Install sleeves for piping penetrations of walls, ceilings, and floors.

P. Install sleeve seals for piping penetrations of concrete walls and slabs.

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.2 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Brazed Joints for Copper Tubing: Comply with CDA's "Copper Tube Handbook," "Brazed Joints" chapter.

E. Soldered Joints for Copper Tubing: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

F. Pressure-Sealed Joints for Copper Tubing: Join copper tube and pressure-seal fittings with tools recommended by fitting manufacturer.

G. Flanged Joints: Select appropriate asbestos-free, nonmetallic gasket material in size, type, and thickness suitable for domestic water service. Join flanges with gasket and bolts according to ASME B31.9.

H. Joints for PEX Piping: Join according to ASTM F 1807.

I. Joints for Dissimilar-Material Piping: Make joints using adapters compatible with materials of both piping systems.

3.3 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. Fittings for NPS 1-1/2 (DN 40) and Smaller: Fitting-type coupling.
2. Fittings for NPS 2 (DN 50) and Larger: Sleeve-type coupling.

3.4 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 (DN 50)and Smaller: Use dielectric couplings, nipples or unions.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Use dielectric flange or nipples.

D. Dielectric Fittings for NPS 5 (DN 125) and Larger: Use dielectric flange kits.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for pipe hanger, support products, and installation below.

1. Vertical Piping: MSS Type 8 or 42, clamps.
2. Individual, Straight, Horizontal Piping Runs:

   a. 100 Feet (30 m) and Less: MSS Type 1, adjustable, steel clevis hangers.
   b. Longer Than 100 Feet (30 m): MSS Type 43, adjustable roller hangers.
   c. Longer Than 100 Feet (30 m) if Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 Feet (30 m) or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

B. Support vertical piping and tubing at base and at each floor.

C. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

D. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 (DN 20) and Smaller: 60 inches (1500 mm) with 3/8-inch (10-mm) rod.
2. NPS 1 and NPS 1-1/4 (DN 25 and DN 32): 72 inches (1800 mm) with 3/8-inch (10-mm) rod.
3. NPS 1-1/2 and NPS 2 (DN 40 and DN 50): 96 inches (2400 mm) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 108 inches (2700 mm) with 1/2-inch (13-mm) rod.
5. NPS 3 to NPS 5 (DN 80 to DN 125): 10 feet (3 m) with 1/2-inch (13-mm) rod.

6. NPS 6 (DN 150): 10 feet (3 m) with 5/8-inch (16-mm) rod.
7. NPS 8 (DN 200): 10 feet (3 m) with 3/4-inch (19-mm) rod.

E. Install supports for vertical copper tubing every 10 feet (3 m).

F. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 (DN 32) and Smaller: 84 inches (2100 mm) with 3/8-inch (10-mm) rod.
2. NPS 1-1/2 (DN 40): 108 inches (2700 mm) with 3/8-inch (10-mm) rod.
3. NPS 2 (DN 50): 10 feet (3 m) with 3/8-inch (10-mm) rod.
4. NPS 2-1/2 (DN 65): 11 feet (3.4 m) with 1/2-inch (13-mm) rod.
5. NPS 3 and NPS 3-1/2 (DN 80 and DN 90): 12 feet (3.7 m) with 1/2-inch (13-mm) rod.
6. NPS 4 and NPS 5 (DN 100 and DN 125): 12 feet (3.7 m) with 5/8-inch (16-mm) rod.
7. NPS 6 (DN 150): 12 feet (3.7 m) with 3/4-inch (19-mm) rod.
8. NPS 8 to NPS 12 (DN 200 to DN 300): 12 feet (3.7 m) with 7/8-inch (22-mm) rod.

G. Install supports for vertical steel piping every 15 feet (4.5 m).

H. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 (DN 25) and Smaller: 32 inches (815 mm) with 3/8-inch (10-mm) rod.

I. Install hangers for vertical PEX piping every 48 inches (1200 mm).

J. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.6 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. When installing piping adjacent to equipment and machines, allow space for service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water-supply piping in sizes indicated, but not smaller than that required by plumbing code.
4. Equipment: Cold- and hot-water-supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 (DN 65) and larger.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections:

1. Piping Inspections:

   a. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.
   b. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

      1) Roughing-in Inspection: Arrange for inspection of piping before concealing or closing in after roughing in and before setting fixtures.
      2) Final Inspection: Arrange for authorities having jurisdiction to observe tests specified in "Piping Tests" Subparagraph below and to ensure compliance with requirements.

   c. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.
   d. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

2. Piping Tests:

   a. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.
   b. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.
   c. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.
   d. Cap and subject piping to static water pressure of 50 psig (345 kPa) above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow it to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.
   e. Repair leaks and defects with new materials, and retest piping or portion thereof until satisfactory results are obtained.
   f. Prepare reports for tests and for corrective action required.

B. Domestic water piping will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports for authority having jurisdiction.

3.8 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.

2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.

    a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide hot-water flow in each branch.
    b. Adjust calibrated balancing valves to flows indicated.

5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.9 CLEANING

A. Clean and disinfect potable domestic water piping as follows:

1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:

    a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
    b. Fill and isolate system according to either of the following:

        1) Fill system or part thereof with water/chlorine solution with at least 50 ppm (50 mg/L) of chlorine. Isolate with valves and allow to stand for 24 hours.
        2) Fill system or part thereof with water/chlorine solution with at least 200 ppm (200 mg/L) of chlorine. Isolate and allow to stand for three hours.

    c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
    d. Repeat procedures if biological examination shows contamination.
    e. Submit water samples in sterile bottles to authorities having jurisdiction.

B. Prepare and submit reports of purging and disinfecting activities. Include copies of water-sample approvals from authorities having jurisdiction.

C. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.10 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Under-building-slab, domestic water, building-service and domestic water piping, NPS3 (DN 80) and smaller shall be the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed or copper pressure-seal fittings; and pressure-sealed joints.

D. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 (DN 100 to DN 200) and larger shall be one of the following:

1. Soft copper tube, ASTM B 88, Type K; wrought-copper, solder-joint fittings; and brazed joints.
2. Plain-end, ductile-iron pipe; grooved-joint, ductile-iron-pipe appurtenances; and grooved joints.

E. Aboveground domestic water piping, NPS 4 (DN 50) and smaller shall be one of the following:

1. Galvanized-steel pipe and nipples; galvanized, gray-iron threaded fittings; and threaded joints.
2. Hard copper tube, ASTM B 88, Type L; cast or wrought-copper, solder-joint fittings; and [brazed] [soldered] joints.
3. Hard copper tube, ASTM B 88, Type L; copper pressure-seal-joint fittings; and pressure-sealed joints.
4. Hard copper tube, ASTM B 88, Type L; copper push-on-joint fittings; and push-on joints.
5. PEX tube, NPS 1 (DN 25) and smaller; fittings for PEX tube; and crimped joints.

END OF SECTION 221116

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SECTION 223300 – ELECTRIC, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Residential, small-capacity, electric, domestic-water heaters.
   2. Flow-control, electric, tankless, domestic-water heaters.
   3. Thermostat-control, electric, tankless, domestic-water heaters.
   4. Domestic-water heater accessories.

1.2 PERFORMANCE REQUIREMENTS

1.3 SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For electric, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2011 (NEC), by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.2-2007.

C. ASME Compliance: Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

E. When replacing domestic water heating systems(s), ensure the system(s) meet or exceed the efficiency requirements of ENERGY STAR for Homes' Reference Design. Insulate all pipes by at least R-4.

1.6 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of electric, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Residential, Electric, Storage, Domestic-Water Heaters:

1) Storage Tank: 10 years.
2) Controls and Other Components: 10 years.

b. Electric, Tankless, Domestic-Water Heaters 5 years.
c. Compression Tanks: 5 years.

PART 2 - PRODUCTS

2.1 RESIDENTIAL, ELECTRIC, domestic-WATER HEATERS

A. Residential, Small-Capacity (1-5 Gallon), Electric, Domestic-Water Heaters:

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

a. American Water Heaters.
b. Bosch Water Heating.
c. Bradford White Corporation.
d. Lochinvar Corporation.
e. Rheem Manufacturing Company.
f. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
g. Approved equal.

2. Standard: UL 174.
3. Storage-Tank Construction: Corrosion-resistant metal or steel with corrosion-resistant coating.

a. Tappings: ASME B1.20.1 pipe thread.

b. Pressure Rating: 150 psig (1035 kPa).
c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

4. Factory-Installed Storage-Tank Appurtenances:

a. Drain Valve: ASSE 1005 if tank has drain outlet. Provide hose-end drain valve in piping for domestic-water heaters without drain outlet.
b. Insulation: Comply with ASHRAE 90.2-2007.
c. Jacket: Steel with enameled finish.
d. Heating Element: One; electric, screw-in immersion type.
e. Temperature Control: Adjustable thermostat.
f. Safety Control: High-temperature-limit cutoff device or system.
g. Power Supply Cord: 24 to 72 inches (610 to 1830 mm) with plug.
h. Relief Valve: ASME rated and stamped for combination temperature-and-pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.
i. Provide adequate drainage for water heaters that include drains or catch pans with drains piped to the exterior of the dwelling.

B. Residential, Electric, Storage, Domestic-Water Heaters:

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

a. American Water Heaters.
b. Bradford White Corporation.
c. Electric Heater Company (The).
d. GSW Water Heating.
e. Heat Transfer Products, Inc.
f. HESco Industries, Inc.
g. Lochinvar Corporation.
h. Rheem Manufacturing Company.
i. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
j. State Industries.
k. Vaughn Manufacturing Corporation.
l. Approved equal.

2. Standard: UL 174.
3. Storage-Tank Construction: Steel.

a. Tappings: ASME B1.20.1 pipe thread.
b. Pressure Rating: 150 psig (1035 kPa).
c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

4. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Dip Tube: Required unless cold-water inlet is near bottom of tank.

c. Drain Valve: ASSE 1005.
d. Insulation: Comply with ASHRAE 90.2-2007.
e. Jacket: Steel, cylindrical, with enameled finish.
f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
g. Heating Elements: Two; electric, screw-in immersion type; wired for nonsimultaneous operation unless otherwise indicated. Limited to 12 kW total.
h. Temperature Control: Adjustable thermostat.
i. Safety Control: High-temperature-limit cutoff device or system.
j. Relief Valve: ASME rated and stamped for combination temperature-and-pressure relief valves. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.

2.2 ELECTRIC, TANKLESS, domestic-WATER HEATERS

A. Flow-Control, Electric, Tankless, Domestic-Water Heaters:

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

   a. Bosch Water Heating.
   b. Chronomite Laboratories, Inc.
   c. Eemax, Inc.
   d. Stiebel Eltron, Inc.

   e. Approved equal. Standard: UL 499 for electric, tankless, (domestic-water heater) heating appliance.
2. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.

   a. Connections: ASME B1.20.1 pipe thread.
   b. Pressure Rating: 150 psig (1035 kPa).
   c. Heating Element: Resistance heating system.
   d. Temperature Control: Flow-control fitting.
   e. Safety Control: High-temperature-limit cutoff device or system.
   f. Jacket: Aluminum or steel with enameled finish or plastic.

3. Support: Bracket for wall mounting.
4. Capacity and Characteristics:

   a. Flow Rate: 2.4 gpm at a temperature rise of 75 deg F.
   b. Power Demand: 26.85 kW.
   c. Electrical Characteristics:

      1) Volts: 240.
      2) Phases: Single.
      3) Hertz: 60.
      4) Full-Load Amperes: 120

2.3 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:
   1. Manufacturers: Subject to compliance with requirements, provide a product by one of the following:

      a. AMTROL Inc.
      b. Flexcon Industries.
      c. Honeywell International Inc.
      d. Pentair Pump Group (The); Myers.
      e. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
      f. State Industries.
      g. Taco, Inc.
      h. Approved equal.

   2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
   3. Construction:

      a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
      b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
      c. Air-Charging Valve: Factory installed.

   4. Capacity and Characteristics:

      a. Working-Pressure Rating: 150 psig.
      b. Capacity Acceptable: 2 gallon minimum.
      c. Pre-charged

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.2-2007.

D. Heat-Trap Fittings: ASHRAE 90.2-2007.

E. Combination Temperature-and-Pressure Relief Valves: ASME rated and stamped. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

F. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.

G. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.

H. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

I. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.

J. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

PART 3 - EXECUTION

3.1 DOMESTIC-WATER HEATER INSTALLATION

A. Residential, Electric, Domestic-Water Heater Mounting: Install residential, electric, domestic-water heaters on noncombustible floor.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

B. Electric, Tankless, Domestic-Water Heater Mounting: Install electric, tankless, domestic-water heaters on wall bracket.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

C. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 " Valves for Plumbing Piping."

D. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend commercial-water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

E. Install combination temperature-and-pressure relief valves in water piping for electric, domestic-water heaters without storage. Extend commercial-water-heater relief-valve outlet,

with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

F. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for electric, domestic-water heaters that do not have tank drains. Install piping-type heat traps on inlet and outlet piping of electric, domestic-water heater storage tanks without integral or fitting-type heat traps.

G. Fill electric, domestic-water heaters with water.

H. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Where installing piping adjacent to electric, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.
   1. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION

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SECTION 223400 – FUEL-FIRED, DOMESTIC-WATER HEATERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Residential, , gas-fired, storage, domestic-water heaters.
   2. Residential, direct-vent, gas-fired, storage, domestic-water heaters.
   3. Residential, power-vent, gas-fired, storage, domestic-water heaters.
   4. Residential, oil-fired, storage, domestic-water heaters.
   5. Domestic-water heater accessories.

1.2 SUBMITTALS

A. Product Data: For each type and size of domestic-water heater indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Domestic-Water Heater Labeling: Certified and labeled by testing agency acceptable to authorities having jurisdiction.

C. Warranty

1.3 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fuel-fired, domestic-water heaters to include in emergency, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2011 (NEC), by a qualified testing agency, and marked for intended location and application.

B. ASHRAE/IESNA Compliance: Fabricate and label fuel-fired, domestic-water heaters to comply with ASHRAE/IESNA 90.2-2010.

C. ASME Compliance:

   1. Where ASME-code construction is indicated, fabricate and label commercial, domestic-water heater storage tanks to comply with ASME Boiler and Pressure Vessel Code: Section VIII, Division 1.
   2. Where ASME-code construction is indicated, fabricate and label commercial, finned-tube, domestic-water heaters to comply with ASME Boiler and Pressure Vessel Code: Section IV.

D. NSF Compliance: Fabricate and label equipment components that will be in contact with potable water to comply with NSF 61, "Drinking Water System Components - Health Effects."

E. Gas water heaters shall be an ENERGY STAR qualified gas storage water heater.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of fuel-fired, domestic-water heaters that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including storage tank and supports.
b. Faulty operation of controls.
c. Deterioration of metals, metal finishes, and other materials beyond normal use.

2. Warranty Periods: From date of Substantial Completion.

a. Residential, Gas-Fired, Storage, Domestic-Water Heaters:

1) Storage Tank: 10 years.
2) Controls and Other Components: 10 years.

b. Residential, Oil-Fired, Storage, Domestic-Water Heaters:

1) Storage Tank: 5 years.
2) Burner: 2 years.
3) Controls and Other Components: 2 years.

c. Compression Tanks: 5 years.

PART 2 - PRODUCTS

2.1 GAS-FIRED, TANKLESS, domestic-WATER HEATERS

A. Manufacturers: Subject to compliance with requirements, provide a product by one of the following:

1. Baxi.
2. Bosch Water Heating.
3. Bradford White Corporation.
4. NORITZ America Corp.
5. Paloma Industries, Inc.
6. Rheem Manufacturing Company; Rheem Water Heating.
7. Rinnai Corporation.
8. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
9. State Industries.

10. Takagi.
11. WaiWela.

B. Standard: ANSI Z21.10.3/CSA 4.3 for gas-fired, instantaneous, domestic-water heaters for indoor application.

C. Construction: Copper piping or tubing complying with NSF 61 barrier materials for potable water, without storage capacity.

1. Tappings: ASME B1.20.1 pipe thread.
2. Pressure Rating: 150 psig (1035 kPa).
3. Heat Exchanger: Copper tubing.
4. Insulation: Comply with ASHRAE/IESNA 90.2-2010.
5. Jacket: Metal, with enameled finish, or plastic.
6. Burner: For use with tankless, domestic-water heaters, natural-gas and LP-gas fuel.
7. Automatic Ignition: Manufacturer's proprietary system for automatic, gas ignition.
8. Temperature Control: Adjustable thermostat.

D. Support: Bracket for wall mounting.

E. Capacity and Characteristics:

1. Flow Rate: 5 gpm at 45 deg. F temperature rise.
2. Fuel Gas Input: 140,000 Btu/h.
3. Gas Pressure Regulator:

2.2 RESIDENTIAL, GAS-Fired, STORAGE, domestic-WATER HEATERS

A. Residential, Direct-Vent, Gas-Fired, Storage, Domestic-Water Heaters:

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

a. Apollo HydroHeat & Cooling; a division of State Industries.
b. Bradford White Corporation.
c. Lochinvar Corporation.
d. Rheem Manufacturing Company.
e. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
f. State Industries.

2. Standard: ANSI Z21.10.1/CSA 4.1.
3. Storage-Tank Construction: Steel.

a. Tappings: ASME B1.20.1 pipe thread.
b. Pressure Rating: 150 psig.
c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

4. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
c. Drain Valve: ASSE 1005.
d. Insulation: Comply with ASHRAE/IESNA 90.2-2010.
e. Jacket: Steel with enameled finish.
f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
g. Burner: For use with direct-vent, gas-fired, domestic-water heaters, natural-gas and LP-gas fuel.
h. Automatic Ignition: ANSI Z21.20/CSA C22.2 No. 199, electric, automatic, gas-ignition system.
i. Temperature Control: Adjustable thermostat.
j. Combination Temperature-and-Pressure Relief Valve: ANSI Z21.22/CSA 4.4-M. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.

5. Direct-Vent System: Through wall or roof, coaxial- or double-channel vent assembly with domestic-water heater manufacturers' outside intake/exhaust screen.

B. Residential, Power-Vent, Gas-Fired, Storage, Domestic-Water Heaters:

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

a. American Water Heaters.
b. Apollo HydroHeat & Cooling; a division of State Industries.
c. Bradford White Corporation.
d. GSW Water Heating.
e. Lochinvar Corporation.
f. Rheem Manufacturing Company.
g. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
h. State Industries.

2. Standard: ANSI Z21.10.1/CSA 4.1.
3. Storage-Tank Construction: Steel.

a. Tappings: ASME B1.20.1 pipe thread.
b. Pressure Rating: 150 psig.
c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

4. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
c. Drain Valve: ASSE 1005.
d. Insulation: Comply with ASHRAE/IESNA 90.2-2010.
e. Jacket: Steel with enameled finish.
f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.

g. Burner: For use with power-vent, gas-fired, domestic- water heaters, natural-gas and LP-gas fuel.
h. Automatic Ignition: ANSI Z21.20/CSA C22.2 No. 199, electric, automatic, gas-ignition system.
i. Temperature Control: Adjustable thermostat.
j. Combination Temperature-and-Pressure Relief Valve: ANSI Z21.22/CSA 4.4-M. Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valve with sensing element that extends into storage tank.

5. Power-Vent System: Exhaust fan, interlocked with burner.

C. Capacity and Characteristics:

1. Capacity: 40 gal.
2. Recovery: 40 gph at 90 deg F temperature rise.
3. Fuel Gas Input: 40,000 Btu/h.
4. Gas Pressure Regulator:

2.3 HEATERS

A. Residential, Oil-Fired, Storage, Domestic-Water Heaters:
1. Manufacturers: Subject to compliance with requirements, provide a product by one of the following:

a. Bock Water Heaters, Inc.
b. Bradford White Corporation.
c. GSW Water Heating.
d. Heat Transfer Products, Inc.
e. Therma-Flow/Everhot.

2. Standard: UL 732 for storage, domestic-water heaters.
3. Storage-Tank Construction: Steel.

a. Tappings: ASME B1.20.1 pipe thread.
b. Pressure Rating: 150 psig.
c. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending lining material into tappings.

4. Factory-Installed Storage-Tank Appurtenances:

a. Anode Rod: Replaceable magnesium.
b. Dip Tube: Required unless cold-water inlet is near bottom of tank.
c. Drain Valve: ASSE 1005.
d. Insulation: Comply with ASHRAE/IESNA 90.2-2010.
e. Jacket: Steel with enameled finish.
f. Heat-Trap Fittings: Inlet type in cold-water inlet and outlet type in hot-water outlet.
g. Temperature Control: Adjustable thermostat.

h. Relief Valves: ASME rated and stamped for combination temperature-and-pressure relief valves. Include one or more relief valves with total relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select one relief valve with sensing element that extends into storage tank.

5. Oil Burner: UL 296 for use with No. 2 fuel oil.
6. Draft Regulator: Barometric type or adjustable-damper device.

B. Capacity and Characteristics:

1. Capacity: 32 gal.
2. Recovery: 111 gph at 90 deg F temperature rise.
3. Fuel-Oil Demand: 0.65 gph.

2.4 DOMESTIC-WATER HEATER ACCESSORIES

A. Domestic-Water Compression Tanks:
1. Manufacturers: Subject to compliance with requirements, provide a product by one of the following:

a. AMTROL Inc.
b. Flexcon Industries.
c. Honeywell International Inc.
d. Pentair Pump Group (The); Myers.
e. Smith, A. O. Water Products Co.; a division of A. O. Smith Corporation.
f. State Industries.
g. Taco, Inc.

2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:

a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
b. Interior Finish: Comply with NSF 61 barrier materials for potable-water tank linings, including extending finish into and through tank fittings and outlets.
c. Air-Charging Valve: Factory installed.

4. Capacity and Characteristics:

a. Working-Pressure Rating: 150 psig.
b. Capacity Acceptable: 2. gal. minimum.
c. Pre-charged

B. Drain Pans: Corrosion-resistant metal with raised edge. Comply with ANSI/CSA LC 3. Include dimensions not less than base of domestic-water heater, and include drain outlet not less than NPS 3/4 with ASME B1.20.1 pipe threads or with ASME B1.20.7 garden-hose threads.

C. Piping-Type Heat Traps: Field-fabricated piping arrangement according to ASHRAE/IESNA 90.1-2010.

D. Heat-Trap Fittings: ASHRAE 90.2-2010.

E. Pressure Relief Valves: ASME rated and stamped. Include pressure setting less than domestic-water heater working-pressure rating.

F. Vacuum Relief Valves: ANSI Z21.22/CSA 4.4.

G. Shock Absorbers: ASSE 1010 or PDI-WH 201, Size A water hammer arrester.

H. Domestic-Water Heater Stands: Manufacturer's factory-fabricated steel stand for floor mounting, capable of supporting domestic-water heater and water. Include dimension that will support bottom of domestic-water heater a minimum of 18 inches above the floor.

I. Domestic-Water Heater Mounting Brackets: Manufacturer's factory-fabricated steel bracket for wall mounting, capable of supporting domestic-water heater and water.

J. Gas Shutoff Valves: ANSI Z21.15/CSA 9.1-M, manually operated. Furnish for installation in piping.

K. Automatic Gas Valves: ANSI Z21.21/CSA 6.5, appliance, electrically operated, on-off automatic valve.

L. Combination Temperature-and-Pressure Relief Valves: Include relieving capacity at least as great as heat input, and include pressure setting less than domestic-water heater working-pressure rating. Select relief valves with sensing element that extends into storage tank.

1. Gas-Fired, Domestic-Water Heaters: ANSI Z21.22/CSA 4.4-M.
2. Oil-Fired, Domestic-Water Heaters: ASME rated and stamped.

PART 3 - EXECUTION

A. Residential, Electric, Domestic-Water Heater Mounting: Install residential, electric, domestic-water heaters on noncombustible floor.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.
3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

B. Electric, Tankless, Domestic-Water Heater Mounting: Install electric, tankless, domestic-water heaters on wall bracket.

1. Maintain manufacturer's recommended clearances.
2. Arrange units so controls and devices that require servicing are accessible.

3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
4. Install anchor bolts to elevations required for proper attachment to supported equipment.
5. Anchor domestic-water heaters to substrate.

C. Install electric, domestic-water heaters level and plumb, according to layout drawings, original design, and referenced standards. Maintain manufacturer's recommended clearances. Arrange units so controls and devices needing service are accessible.

1. Install shutoff valves on domestic-water-supply piping to domestic-water heaters and on domestic-hot-water outlet piping. Comply with requirements for shutoff valves specified in Section 220523 " Valves."

D. Install gas-fired, domestic-water heaters according to NFPA 54 and NYS Fuel Gas Code.

1. Install gas shutoff valves on gas supply piping to gas-fired, domestic-water heaters without shutoff valves.
2. Install gas pressure regulators on gas supplies to gas-fired, domestic-water heaters without gas pressure regulators if gas pressure regulators are required to reduce gas pressure at burner.
3. Install automatic gas valves on gas supplies to gas-fired, domestic-water heaters if required for operation of safety control.

E. Install oil-fired, domestic-water heaters according to NFPA 31.

1. Install shutoff valves on fuel-oil supply piping to oil-fired water-heater burners without shutoff valves.

F. Install combination temperature-and-pressure relief valves in top portion of storage tanks. Use relief valves with sensing elements that extend into tanks. Extend water-heater relief-valve outlet, with drain piping same as domestic-water piping in continuous downward pitch, and discharge by positive air gap onto closest floor drain.

G. Install water-heater drain piping as indirect waste to spill by positive air gap into open drains or over floor drains. Install hose-end drain valves at low points in water piping for domestic-water heaters that do not have tank drains.

H. Assemble and install inlet and outlet piping manifold kits for multiple domestic-water heaters. Fabricate, modify, or arrange manifolds for balanced water flow through each domestic-water heater. Include shutoff valve and thermometer in each domestic-water heater inlet and outlet, and throttling valve in each domestic-water heater outlet. "

I. Install piping-type heat traps on inlet and outlet piping of domestic-water heater storage tanks without integral or fitting-type heat traps.

J. Fill domestic-water heaters with water.

K. Charge domestic-water compression tanks with air.

3.2 CONNECTIONS

A. Where installing piping adjacent to fuel-fired, domestic-water heaters, allow space for service and maintenance of water heaters. Arrange piping for easy removal of domestic-water heaters.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.
   1. Operational Test: After electrical circuitry has been energized, start units to confirm proper operation.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

END OF SECTION 223400

SECTION 224100 - PLUMBING

PART 1 - GENERAL

1.01 SCOPE

A. Furnish materials accessories, fittings, fixtures, and equipment; perform work required to place the plumbing system in a complete, proper and legal operating condition.

B. This Section includes plumbing fixtures and related components.

C. All appliances in rehabilitation and reconstruction projects must be energy star rated, where possible.

F. Make any necessary arrangements with the utility service companies for services or for work required on their equipment or systems.

1.02 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2011, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. All plumbing water piping shall confirm to NSF 61.

C. All plumbing fixture shall meet EPA WaterSense® Criteria.

D. Select combinations of fixtures and trim, faucets, fittings, and other components that are compatible.

E. Comply with the following applicable standards and other requirements specified for plumbing fixtures:

1. Enameled, Cast-Iron Fixtures: ASME A112.19.1M.

2. Hand Sinks: NSF 2 construction.

3. Plastic Bathtubs: ANSI Z124.1.

4. Plastic Lavatories: ANSI Z124.3.

5. Plastic Sinks: ANSI Z124.6.

6. Porcelain-Enameled, Formed-Steel Fixtures: ASME A112.19.4M.

7. Slip-Resistant Bathing Surfaces: ASTM F462.

8. Vitreous-China Fixtures: ASME A112.19.2M.

F. Comply with the following applicable standards and other requirements specified for lavatory and sink faucets:

1. Backflow Protection Devices for Faucets with Side Spray: ASME A112.18.3M.

2. Backflow Protection Devices for Faucets with Hose-Thread Outlet: ASME A112.18.3M.

3. Diverter Valves for Faucets with Hose Spray: ASSE 1025.

4. Faucet Hose: ASTM D3901.

5. Faucets: ASME A112.18.1M.

6. Hose-Connection Vacuum Breakers: ASSE 1011.

7. Hose-Coupling Threads: ASME B1.20.7.

8. Integral, Atmospheric Vacuum Breakers: ASSE 1001.

9. NSF Materials: NSF 61.

10. Pipe Threads: ASME B1.20.1.

11. Supply and Drain Fittings: ASME A112.18.1M.

G. Comply with the following applicable standards and other requirements specified for bathtub and shower faucets:

1. Backflow Protection Devices for Hand-Held Showers: ASME A112.18.3M.

2. Combination, Pressure-Equalizing and Thermostatic-Control Antiscald Faucets: ASSE 1016.

3. Faucets: ASME A112.18.1M.

4. Hand-Held Showers: ASSE 1014.

5. Hose-Coupling Threads: ASME B1.20.7.

6. Pipe Threads: ASME B1.20.1.

1.03 SUBMITTALS

A. Product Data: For each type and size of product provide manufacturer's product data show capacities, operating characteristics and furnished specialties and accessories.

B. Provide color selection where appropriate.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection.

1. Bathtubs
2. Bathtub trim
3. Kitchen sink, stainless steel
4. Kitchen sink drain.
5. Kitchen sink supply/trim.
6. Lavatory
7. Lavatory trim
8. Shower head, trim.
9. Water closet
10. Water closet trim.
11. Hose bibb
12. Faucet
13. Bath/Shower Fittings

B. Approved manufacturers: American Standard, Crane, Eljer, Kohler, Delta, or approved equal.

2.02 FAUCETS

A. Lavatory Faucet:

1. **Base Standard**: Delta, Foundation Core single handle center set faucet with pop- up drain, model: B510-LF, 4-inch center (coordinate faucet center drillings with lavatory). 1.5 GPM flow rate at 60 psi.

B. Bathtub Faucet: Tub and Shower Trim

1. **Base Standard**: Delta Foundation Core Monitor 13 Series Tub & Shower Trim, with rough valve, Model: BT13410, or equal. 2.0 gpm flow rate at 80 psi.

C. Sink Faucet

1. **Base Standard**: Delta Faucet, Foundation Core Single Handle Kitchen Faucet with Integral Sprayer, model: B3310LF, or equal (coordinate faucet center drillings with sink). 1.8 GPM flow rate at 60 psi.

2.03 FIXTURES

A. Toilet Seat: Solid plastic. Include in Water Closet

1. Configuration: Closed front with cover

2. Size: Verify and coordinate with water closet

3. Class: Residential

4. Color: White

B. Water Closets: Water closet shall be "Americana Standard" Champion Pro Right Height 1.28 GPF, or approved equal, elongated or round toilet kit, 12” rough in and seat included.

C. Countertop Lavatory: Countertop Lavatory, shall be "American Standard" or equal
Aqualyn sink, Model: 0476.028, vitreous china lavatory with 4-inch center

D. Lavatory Cabinet Combo: Vanity combo by American Classics, Model: PPAGJVO24, Size: 24-inch x 18-inch, with culture marble top with integral bowl, and 4-inch centerset faucet, or approved equal.

E. One Piece Tub and Shower Unit: Fiberglass reinforced acrylic, 5-foot length, "American Standard" Acrylux, Model 6030Y1K.102 (right outlet) or 6030Y1K.202 (left outlet) unit, or approved equal.

F. Bathtubs: "American Standard" Princeton, Model: 2390.202 (left hand) or 2391.202 (right hand), 5-foot formed steel enameled tub complete with lever operated pop-up drain and overflow, or approved equal.

G. Kitchen sink shall be 22-inch x 33-inch x 8-inch deep double compartment, 20-gauge, self-rimming, nickel stainless steel, with back ledge. Underside of bowl coated with sound deadening material.

2.04 PIPING

C. All underground soil, waste, and vent piping shall be schedule 40 PVC or A.B.S.

D. All above grade soil, waste and vent piping shall be schedule 40 CPVC pipe and fittings.

E. All gas piping shall be galvanized black steel pipe with malleable fittings.

2.05 EQUIPMENT

A. Flood Control System

1. Must have a minimum of 5 years installation experience.

2. Acceptable manufacturers:
   a. Eveready
   b. Xpert Flood control
   c. Or Equal provider and installer.

3. System shall consist of:
   a. Back water valve to stop the sewer water backflow made of corrosive free material and parts.
   b. Ejector pump/ Sump pump, water resistant, ½ hp or greater motor with automatic heat dissipation. Discharge shall be a 2”-3” NPT fitting for tie in.
   c. Flood prevention using a French drain diversion system.
   d. Housing or Basin for the valves and ejector pump. Basin cover shall be recessed with a plated cover so the cover can be mowed over.
   e. Interior and exterior drain tiles for seepage and flood protection.
   f. Control panel shall be wired with a battery backup for operation of the pump.

4. Test and Inspect

   a. All parts including the motors, switches, valves, and piping shall be in

good working order as specified by the manufacturer.

PART 3 - EXECUTION

3.01 CUTTING AND PATCHING

A. Perform cutting and patching of materials which are essential to installation or to work.
Do not cut structural framing members, wiring, or mechanical work.

B. Provide sleeving for rough-in work.

C. Restore cut or damaged surfaces to original finish to match surrounding work.

D. Install chrome-plated escutcheons where piping passes through finished surfaces which are exposed to view.

E. Piping shall be installed without critical damage to the structural members. No notching, cutting, or drilling over 2-inch shall be done without permission.

3.02 PIPING INSTALLATION

A. Piping - Supply & Distribution

1. All water supply pipes and control valves shall be of sufficient size and capacity to supply water to all fixtures. All water supply pipes, riser pipes, and distributing pipes shall be graduated as to size and shall be interconnected in such manner that a full volume of water may be discharged into forty percent of the plumbing fixtures, of any building, when operated at any given time, without causing loss of more than ten pounds pressure at the plumbing fixtures, which are located on upper floor of such building for a length of time not less than sixty minutes.

2. Hot water and cold water (as appropriate)shutoff valves shall be provided to and at each lavatory, water closet, and kitchen sink, water heater and washing machine.

3. Drainage

a. All connections to risers and fixtures shall be provided so that the entire system can be drained at low point.

3.03 FIXTURE INSTALLATION

A. Assemble fixtures, trim, fittings, and other components according to

manufacturers' written instructions. All fixtures in the same room shall be the same color. All fixtures of the same type shall be the same color.

1. Kitchen Sink and Faucet

2. Lavatory and Faucet

3. Bathtub and Shower with Faucet and trim kit

4. Toilet and Seat

B. Install floor-mounted water closets on metal closet flanges and other floor mounted fixtures shall be attached attachments to piping and building substrate in accordance with the manufacturer's installation instructions.

C. Install counter-mounting fixtures in and attached to casework.

D. Install fixtures level and plumb according to manufacturers' written instructions and roughing-in drawings.

E. Install water-supply piping with stop on each supply to each fixture to be connected to water distribution piping. Attach supplies to supports or substrate within pipe spaces behind fixtures. Install stops in locations where they can be easily reached for operation.

1. Exception: Use ball, gate, or globe valve if stops are not specified with fixture.

F. Install trap and tubular waste piping on drain outlet of each fixture to be directly connected to sanitary drainage system.

G. Install tubular waste piping on drain outlet of each fixture to be indirectly connected to drainage system.

H. Install tanks for accessible, tank-type water closets with lever handle mounted on wide side of compartment.

I. Install toilet seats on water closets.

J. Install faucet-spout fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

K. Install water-supply, flow-control fittings with specified flow rates in fixture supplies at stop valves.

L. Install faucet, flow-control fittings with specified flow rates and patterns in faucet spouts if faucets are not available with required rates and patterns. Include adapters if required.

M. Install shower, flow-control fittings with specified maximum flow rates in shower arms.

N. Install traps on fixture outlets.

1. Exception: Omit trap on fixtures with integral traps.

O. Install escutcheons at piping wall ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding fittings.

P. Set bathtubs in leveling bed of cement grout.

Q. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one- part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

3.04 CONNECTIONS

A. Connect water supplies from water distribution piping to fixtures.

B. Connect drain piping from fixtures to drainage piping.

C. Supply and Waste Connections to Plumbing Fixtures: Connect fixtures with water supplies, stops, risers, traps, and waste piping. Use size fittings required to match fixtures. Connect to plumbing piping.

D. Supply and Waste Connections to Fixtures and Equipment Specified in Other Sections: Connect fixtures and equipment with water supplies, stops, risers, traps, and waste piping specified. Use size fittings required to match fixtures and equipment. Connect to plumbing piping.

3.05 REPAIRS

A. Sewer Line in Yard

1. Repair:

a. Expose sewer line leak as indicated above.

b. Make repairs as necessary.

c. Install new cleanout if one does not exist or repair existing to work.

2. Install

a. Remove defective line as specified above.

b. Replace with all new materials

B. Sewer Line under Structure

1. Repair:

a. Remove defective area through to fixture connection(s)

b. Replace with all new materials complete to fixture hook-up.

C. Sewer Line Snake

1. Snake out waste lines as indicated in work write-up to ensure clear lines to street sewer.

D. Water Closet

1. Install:

a. Remove existing and replace with new unit complete with stop valve..

E. Gas Lines

1. Install:

a. Remove specified line and replace with new line

b. Test lines for pressure.

2. Repair

a. Check all gas piping, replace improper connections, and cap unused lines, and install vent flue cover.

F. Trap and Drains

1. Repair

a. Replace any defective parts at the locations.

b. Seal openings around pipe at floors.

2. Install;

a. Remove specified unit(s) and replace with new unit.

G. Handicap Bath Accessories

1. Install;

a. All bars shall be anchored securely to studs in appropriate locations. Installation to meet the Codes of NYS as well as ANSI 117.1

b. Dimension and sizes to conform to ADDAG.

I. Bath Tub

1. Install

a. Remove the existing tub.

b. Box- in exposed plumbing.

c. Repair exposed wall and floor surfaces.

d. Install tub with tub kit.

e. Trim and install new hardware (head, mixer valve, faucet, waste, overflow, trap, and pipe).

f. Grout edges.

J. Sink

1. Install

a. Remove existing sink and replace with new stainless steel double unit complete with vented drain trap, washer less faucets and stop valves.

K. Hose Bibs

1. Install: Provide two hose bib, one front and one at rear, frost-proof type with inside cut offs whenever possible and called for. To include back flow preventer on each bib.

L. Water lines

1. Repair

   a. Repair Find leak in line and replace sections as needed

2. Install

   a. Finds leaks under and inside structure and seal.

   b. Replace defective cutoffs and valves.

   c. Install new cutoffs at any location missing cutoff.

   d. Use: Seamless copper tubing.

3.06 INSTALLATION OF WATER SERVICE

A. Contractor is to install a new water service. Tap is to be made at closest point to residence or at location indicated in work write-up or drawings.

B. Contractor is to furnish all permits and pay all fees. All disturbed areas are to be restored to original condition. Installation is to be in accordance with all local codes.

C. Water Lines-Under Structure/Install

1. Remove the line(s) specified above (See, Water Lines-Under Structure/Repair)

2. Install new replacement lines complete to include all hardware and cutoffs.

3. Use: Use seamless copper tubing.

4. All debris to be removed from job site and all disturbed earth shall be finished graded to provide smooth transition with adjacent areas. Lawn grass seed shall be worked into soil by raking or watering.

5. All equipment and plumbing in unheated areas shall be fairly insulated and protected against freezing.

3.07 PROTECTION

A. Provide protective covering for installed fixtures and fittings.

B. Do not allow use of fixtures for temporary facilities unless approved in writing by Owner.

END OF SECTION

SECTION 230523 - VALVES

PART 1 GENERAL

1.01 SUBMITTALS

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

B. Valve Schedule: Valve schedule listing type of valve, manufacturer's model number and size for each service application.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Valves shall conform to the specifications, regulations and requirements of all Agencies (Federal, State and Local), Codes, having jurisdiction governing construction, sizing, application and location of same.

PART 2 PRODUCTS

2.01 VALVES - GENERAL

A. Valve Standardization: Valves from one (1) or more manufacturers may be used, however valves supplied for each specific valve type shall be the product of one (1) manufacturer.

B. Valves shall be first quality, free from all imperfections and defects, with body markings indicating manufacturer and rating. Valve parts of same manufacturer, size and type shall be interchangeable. All manually operated gate, globe and angle valves shall be of rising stem type, unless otherwise specified. All valves, which use packing, shall be capable of being packed when wide open and under full working pressure. Size valves the same size as the piping in which they are installed, unless specified otherwise. The valve opening shall be the full diameter of the piping in which it is installed, for gate and ball valves.

C. Vales specified in this section are for both plumbing and heating systems.

2.02 GATE VALVES

A. Bronze Body Gate Valve: Class 150; bronze body, screwed ends, rising stem, solid wedge disc, stem copper-silicon bronze, malleable iron handwheel, non-asbestos packing. Acceptable Valves: Hammond 1B629, Milwaukee 1151, Nibco/Scott T134, Stockham B120.

2.03 BALANCING VALVES

A. Balancing valves shall be factory assembled heavy cast brass construction built for a working water pressure of 175 psig at 250 degrees F., of angle or straightway pattern with one union connection and one screwed or sweat end as required by application. Adjustment shall be by means of screw drive slot and shall open or close in one quarter turn. Valve may also be globe valve type with handwheel with locking/memory position indicator, positive shut-off and numeric readout on the handwheel. All valves shall have a drain connection. Valves

shall have schrader valve connections to allow for the attachment of measuring hoses. Acceptable manufacturers: Bell and Gossett.

2.04 BALL VALVES

A. Brass Body Ball Valves: Full port design. 600 psig, cold, non-shock and a minimum working water pressure of 600 psig at 250 degrees F., with sweat or screwed ends. Furnish brass body valve with stainless ball, "Teflon" seats, stainless blow-out proof brass stem and corrosion resistant steel manual operating handle with a cool gripping cover. For natural gas application, valve shall be UL listed and FM approved for use in natural gas systems. Acceptable Manufacturer's: Stockham, Nibco.

2.05 DRAIN VALVES

A. Drain valves shall be cast brass drain cocks, ninty degree pattern, with 3/4 inch male pipe thread inlet and 3/4 inch hose thread outlet.

2.06 ZONE VALVES

B. Construction: Bronze body with solder end connections, capable of sustaining operation against pump heads up to 150 Ft., maximum working pressure 125 PSIG, Temperature range, 40-240 degrees F., factory tested, globe valve type construction.

1. Valve Operator:
   a. Removable type operator.
   b. Removable cover.
   c. 24V operation.
   d. 360 degree rotation.
   e. Three (3) solderless terminal voltage connections.

C. Manufacturer: Taco, Series 555, or approved equal.

1. Schedule:

GPM	Cv	Model
1-4.5	4.2	555
4.5-6	6.1	556
6-10	7.0	557

2.07 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc:

1. Manufacturers:

   a. American Valve, Inc.
   b. Crane Co.; Crane Valve Group; Crane Valves.
   c. Crane Co.; Crane Valve Group; Jenkins Valves.
   d. Crane Co.; Crane Valve Group; Stockham Division.

e. Hammond Valve.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Red-White Valve Corporation.
k. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
l. Or approved equal.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig (1380 kPa).
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded.
f. Disc: Bronze.

PART 3 EXECUTION

3.01 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

3.02 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.03 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball or gate valves.
2. Throttling Service, Except Steam: Globe or ball valves.
3. Throttling Service, Steam: Globe valves.
4. Pump-Discharge Check Valves.

B. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 (DN 50) and Smaller: Threaded ends or solder-joint valve-ends.
2. For Copper Tubing, NPS 2-1/2 and larger : Flanged ends or threaded valve-end.
3. For Steel Piping, NPS 2 (DN 50) and Smaller: Threaded ends.
4. For Steel Piping, NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Flanged ends or threaded valve-end option.
5. For Steel Piping, NPS 5 (DN 125) and Larger: Flanged ends.

END OF SECTION

SECTION 230719 – HOT WATER PIPING INSULATION

PART 1 GENERAL

1.02 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for each item specified, excluding Miscellaneous Materials.
   1. Insulate piping in accordance with the requirements of the N.Y. State Energy Conservation Construction Code.

1.04 ACCEPTABLE MANUFACTURERS

A. Certainteed

B. Knauf

C. Manville

D. Owens/Corning

E. Or Equal

PART 2 PRODUCTS

2.01 PIPE INSULATION

A. Fiberglass; Conform with Federal Specification HH-I-558B, Form D, Type III, Class 12.
   1. Fire and Smoke Hazard Classification Rating (ASTM E-84):
      a. Flame Spread: 25 or less.
      b. Smoke Developed: 50 or less.
   2. Minimum density of 4 pcf, thermal conductivity (K value at 75 degrees F.) of .26.

2.02 JACKET MATERIAL

A. All Service Jacket: Vapor barrier type, factory applied over fiberglass insulation, comprised of a Kraft paper outer cover bonded to aluminum foil, and reinforced with fiberglass yarn. Jacket material shall be treated for permanent fire and smoke resistance. A vapor barrier jacket seal shall be accomplished with a 1-1/2" longitudinal flap, and 3" wide butt strips, factory supplied, for making circumferential joints.

1. Fire and Smoke Hazard Classification Rating (composite, including jacket and adhesive, ASTM E-84):
   a. Flame Spread: 25 or less.
   b. Smoke Developed: 50 or less.
2. Water Vapor Permeability (ASTM E-96): 0.02 perm.
3. Tensile Strength: 40 lb./in. width.
4. Mullen Burst: 70 psi.

2.03 FITTING INSULATION

A. Fiberglass Insulation System:
   1. Pre-molded fitting insulation: Same thickness as the adjacent pipe covering.
      a. Conform to Federal Specification HH-I-558B, Form E, Class 16.
   2. PVC/Fiberglass Fitting Insulation: Polyvinyl chloride pre-molded flexible fitting cover with batt type, pre-cut fiberglass insert.
      a. PVC: Conform with Federal Specification L-P-535C, Composition A, Type II, Grade GU.
      b. Fiberglass: Conform with Federal Specification HH-I-558B, Form B, Type I, Class 7&8.
   3. Miter Cut Fitting Insulation: Fabricated from materials employed for pipe insulation.

2.04 MISCELLANEOUS MATERIALS

A. Sealing Tape: Vapor barrier, color matching, of same material as the pipe or fitting cover to which applied; as manufactured by Arno Inc., Compac Corp., Fasson Adhesive Co.; or as recommended by the manufacturer of the jacket material to which applied.

PART 3 EXECUTION

3.01 PREPARATION

A. Do not install insulation until the piping Work has been tested and accepted by the Owner's Representative.

B. Clean and dry all Work to be insulated prior to applying insulation.

3.02 INSTALLATION, GENERAL

A. Install the Work of this section in accordance with the manufacturer's printed installation instructions, except as specified otherwise.

3.03 INSTALLATION OF FIBERGLASS INSULATION

A. Seal jacket longitudinal flap with vapor barrier sealing tape. Rub out all wrinkles and smooth excess sealant flush with outer surface of jacket.

B. PVC/Fiberglass Fitting Insulation: Tuck the ends of the pre- cut insulation batt snugly into the throat of the fitting, tuft and tuck-in the edges adjacent to the pipe insulation. Install fitting cover and seal as follows:
   1. Hot Service Insulation: Secure the cover with staples, or sealing tape.

C. Pre-Molded and Miter Cut Fitting Insulation: Insulate to the same thickness as the adjoining pipe insulation. Apply joint sealant to the mating edges of the sections, and to the butt joint. Secure sections together with sealing tape.

3.04 INSTALLATION AT HANGERS

A. Reset and realign hangers and supports if they are displaced while installing the piping insulation.

3.05 PIPING INSULATION SCHEDULES

A. Insulate all piping in accordance with the Schedules listed below.

B. Install insulation intact through pipe sleeves, and openings in building construction, maintaining the vapor barrier integrity of the system.

C. Insulate valve bodies up to but not including the packing nuts.

D. Insulation Options: Select and submit only one of the first 3 options for fiberglass pipe insulation. Do not intermix insulation types on individual runs of piping.
   1. Option 1: Fiberglass pipe insulation, with pre-molded fitting insulation.
   2. Option 2: Fiberglass pipe insulation, with PVC/fiberglass fitting insulating system.
   3. Option 3: Fiberglass pipe insulation, with miter cut fitting insulation.

E. Insulation Schedule:

System	Material	Insulation Thickness	
		Pipe ≤ 1.5”	Pipe > 1.5”
Hot Water (Heating and Plumbing)	Fiberglass	1.5”	2”

END OF SECTION

SECTION 231000 - HEATING VENTILATION AND AIR CONDITIONING

PART 1 - GENERAL

1.01 SUMMARY

A. Provide all labor, materials, equipment, services and perform all operations required for complete installation of all packaged units and related work as specified herein including:

1. Ductwork.

2. Air distribution devices.

3. Heating and air conditioning control wiring.

4. Fuel burning furnaces.

5. Electric heat pumps.

B Referenced in other Divisions

1. Bath and kitchen vent fans.

2. Kitchen exhaust fan.

C. Electrical work associated with the mechanical system including, but not limited to, equipment, devices shall be included within the scope of the Mechanical work.

D. HVAC System Scope

1. Construction and installation of HVAC equipment, accessories and appurtenances shall comply with the published accepted standards of the relevant professional associations.

2. Equipment shall be replaceable without requiring dismantling of adjacent piping, equipment or any fixed construction.

3. Controls shall be by low voltage programmable digital thermostat.

5. Gas System shall have an energy rating of 92% AFUE or better.

6. All duct work shall be constructed of galvanized sheet steel. Galvanized sheet steel joints shall be sealed with approved sealant for duct systems. Ducts will be provided with dampers as recommended by ASHRAE.

7. Air handlers shall be installed with condensate drain which shall drain into the domestic waste system. All return air shall be through filtered grill with replaceable type filters.

8. HVAC system is to be a minimum of 16 SEER.

9. When replacing HVAC system, size heating and cooling equipment in accordance with the Air Conditioning Contractors of America (ACCA) Manuals, Parts J and S, or 2012 ASHRAE Handbook – HVAC Systems and Equipment or most recent edition.

F. Related Electrical Scope

1. Electrical work associated with the mechanical system including, but not limited to, equipment, devices shall be included within the scope of the Mechanical work.

2. All electric motors for plumbing and HVAC equipment shall be provided by Mechanical trades.

3. All other electrical devices such as thermostats, etc., for the control or operation of HVAC and plumbing equipment shall be provided and wired by mechanical trades. These items shall comply with Section 261000, Electrical.

4. Power supply wiring for all equipment shall be provided by electrical trades.

5. Mechanical trades shall coordinate with the Electrical trades for wiring of power requirements of approved equipment submittals. Also coordinate specified control functions.

6. Each bidder shall thoroughly inspect the site and existing conditions affecting the work.

7. For equipment consisting of an assembly of multiple components such multiple components do not have to be the products of a single manufacturer.

1.02 QUALITY ASSURANCE

A. Testing

1. The Contractor shall, at his expense, conduct capacity and general operating test on each system when requested by the Agency. The test shall demonstrate the specified capacities of the various pieces of equipment, and shall be conducted in the presence of the owner or his authorized representative. The general operating tests shall demonstrate that the entire equipment is functioning in accordance with the contract documents.

B. Codes

1. All work must conform to the New York State family codes and regulations adopted by its participating local governments. In addition, installations shall comply with appropriate sections of:

a. ASHRAE.

b. SMACNA

C. All products shall be ENERGY STAR rated.

C. Performance

1. All performance data specified herein shall be considered actual performance of equipment as installed. If installation details are such that actual operating conditions unfavorably affect performance as compared to conditions under which the equipment was rated, suitable allowance shall be made by the Contractor.

2. Labeling and listing of equipment by Underwriter's Laboratories, Inc., is accepted as conforming to design standards.

3. Required ductwork shall be corrosion-resistant materials, be air tight to prevent leaking along runs. Ductwork will be seal all penetrations to reduce leakage in order to meet or exceed ENERGY STAR for Homes duck leakage standard.

1.03 SUBMITTALS

A. Product Data: For each type and size of product provide manufacturer's product data show capacities, operating characteristics and furnished specialties and accessories.

1.04 PERFORMANCE

A. All performance data specified herein shall be considered actual performance of equipment as installed. If installation details are such that actual operating conditions unfavorably affect performance as compared to conditions under which the equipment was rated, suitable allowance shall be made by the Contractor.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.

2. Products: Subject to compliance with requirements, provide one of the products specified.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.02 EQUIPMENT

A. Forced Air and Gravity Air Furnaces

1. Approved manufacturers:

a. Carrier.

b. Fedders

c. Lennox

d. Mueller.

e. Trane.

f. Approved equal.

B. Duct Work

1. All duct work is to be shop fabricated

2. Provide and install all units and accessories in accordance with the provisions of the following:

a. SMACNA Installation Standard and Guides

b. ASHRAE Guide and Data Books

c. UL 181, UL 181A and UL 181B Insulated Air Ducts.

C. Devices

1. Approved manufacturers

a. U.S. Register

b. Anemostat

c. Connors

d. Tuille and Bailey

e. Approved equal

D. Controls

1. Approved manufacturers

a. Honeywell

b. Johnson

c. White Rogers

d. 3M/Filtrete

e. Approved equal

E. Air Conditioning Equipment

1. Approved manufacturers

a. Carrier

b. Fedders

c. Lennox

d. Trane

e. Approved equal

F. Heat Pumps

1. UNITARY HEAT PUMPS shall comply with the requirement of ARI-240 and UL-559. Units shall be tested, rated, labeled and listed accordingly.

2. Outdoor sections of all heat pump units shall be sound rated in accordance with ARI-270, and installed to produce a sound pressure level not exceeding 60 db (a) maximum.

G. Air Distribution Devices

1. Devices must comply with provisions of SMACNA.

H. Control Wiring

1. All control wiring shall be as per the NEC. The NEC requirements are hereby upgraded to the extent that all control wiring shall be run in rigid steel conduit outdoors.

I. Split System Heat Pump

1. Indoor Fan Coil Section: Furnish and install direct expansion fan coil equipped with electric heater. Unit shall operate in the vertical upflow position and is to be installed with duct-work. Unit enclosure shall be insulated and constructed of galvanized steel, bonderized and finished with baked enamel. Reversible filter rack shall have duct connection flanges and be equipped with permanent or throw away type filter. Fan shall be forward curved with double inlet mounted on motor shaft, dynamically and statically balanced. The multi-speed fan motor shall be factory lubricated, have internal overload protection, and be resiliently mounted. Cooling coil shall be

constructed with aluminum fins bonded to copper or aluminum tubing, coil shall have factory installed; refrigerant metering device, refrigerant line fittings, (2) condensate pans. Electric heater shall be factory installed and wired for single stage operation. All heaters shall be equipped with both thermal and current overload protection, and the required heating and cooling system controls, including a control circuit transformer.

2. Outdoor unit - Furnish and install an air to air electric heat pump designed and tested for Refrigerant 410a or equivalent. Brass service valves with refrigerant line fittings and service parts shall be provided. Outdoor coil shall be constructed with aluminum fins mechanically bonded to copper or aluminum tubes. Coil shall be protected by grille. Fan shall be direct drive propeller type. Compressor shall be of the welded hermetic type with internal vibration isolation. Compressor motor shall have both thermal and current sensitive overload device and be equipped with crank-case heater and high pressure protection. Controls and protective devices shall include a liquid line low pressure switch, suction line accumulator and pressure relief device. Provide an automatic defrost system. Accessories shall include indoor thermostat, pre-charged tubing, outdoor thermostat, emergency heat relay, filter drier, time guard and start thermostat.

J. Temperature Control System:

1. Furnish and install a system of low voltage 7-day programmable digital thermostat control as hereinafter specified and as recommended by heat pump unit manufacturer.

2. Warm Air Heating System: A wall mounted heating cooling thermostat with manual changeover, fan on-auto switch, and emergency heat switch shall control the heat pump compressor, outdoor fan, and indoor fan to maintain its setting. When additional heat is required, the thermostat shall energize the supplementary electric heating coil unless overridden by the setting of the outdoor air thermostat (located in the heat pump outdoor unit). The emergency switch shall override the outdoor thermostat and permit use of the supplementary heating coil for heating if the compressor is inoperative.

3. Cool Air Cooling System: The wall mounted thermostat shall control the heat pump compressor, outdoor fan and indoor fan to maintain its setting.

4. In accordance with "Low Velocity, Duct Construction Standards" as published by Sheet Metal, Air Conditioning Contractors National Association, Inc. (SMACNA), all references to tables, plates in this paragraph: refer to referenced manual. Duct: Constructed of galvanized sheet steel or sheet aluminum. Duct dimension, metal gauges, seam construction, reinforcing angles: In accordance with SMACNA's latest edition.

2. Fittings, Hangers

a. Constructed in accordance with SMACNA tables 1-1 thru 5-2.

Flexible Duct Connectors

1. Provide flexible duct connectors at duct connections with fan units. Connectors: neoprene coated glass fabric, 30 oz. per square yds. or approved equal. Shall be

in accordance with SMACNA Low Velocity Table 2-1. Each flex connector shall be designed to allow one inch of free movement, completely air tight, and shall have sewed and cemented seams.

M. Volume Dampers

1. Shall be installed where indicated on the drawings and at locations where branches take off by splitter connections in the mains. Damper control hardware shall be of the locking quadrant type.

N. Sheet Metal Gauges

1. Sheet metal gauges for low velocity rectangular ductwork shall be governed by the major duct dimension and shall be as follows:

   a. Up to 12-inches: No. 26 gauge; 13-inches to 30-inches: No. 24 gauge and shall be as per 2006 IRC.

O. Low Velocity Ductwork

1. Low velocity ductwork shall have joints fabricated by approved methods of crimping which will provide a neat appearance and which will be substantial and air tight. Transverse joint connections shall be governed by the major duct dimensions and shall be as follows:

   a. Up to 24-inches: S or Drive slips; 25 to 40 inches: 1-inch pocket or 1-inch bar slip.

Q. Rectangular Ducts

1. All rectangular ducts shall be securely hung or attached to the building construction with hanger design and spacing governed by major dimension as follows:

   a. Up to 12-inches: Band hangers around bottom and sides and attached to two points above top of duct.

   b. 8-foot O.C. 13-inches to 30-inches: Band hangers on bottom and sides and attached to two points above edges of duct 6 ft O. C.

R. Registers and Grills

1. Return and exhaust registers, unless otherwise specified shall be steel, fixed bar type, with opposed blade key operated dampers. Registers in walls shall have horizontal bars set at angle like Tuttle & Bailey Type T-117D. Registers in ceilings shall have straight bars and shall be equivalent to Tuttle & Bailey Type T117. Finish shall be baked on white enamel. Grilles shall be the same as specified for registers except volume dampers are omitted.

S. Furnaces

1. All fuel fired equipment shall provide full cut off electric ignition.

   a. Gas fired furnaces: American Gas Association (AGA) approved.

   b. Oil fired furnaces: Underwriter's Laboratories (UL) approved.

T. Roof Self Mounted Air Conditioning Unit

1. Unit shall be designed for outdoors complete with full roof curb and be a factory tested, assembled piped and fully charged unit.

2. Unit to be equipped with 100% outside air economizer cycle relief and return dampers for "free cooling".

3. Unit to be wired in accordance with the National Electrical Code. Unit to be rated in accordance with ARI Standard 210.

4. Installation, maintenance and operating instructions with electrical diagrams to be shipped with unit.

5. Exterior casing could be heavy zinc coated steel with an epoxy primer and finished paint. Doors to be hinged and have fasteners and air tight gaskets.

6. Interior surfaces on the casings shall be insulated for thermal insulation.

7. All joints of metal panels shall be sealed internally to provide an air tight, water tight enclosure.

8. Compressor shall be industrial type with forced feed lubrication and electric unloading controls, plus safety controls which shall include hi and low pressure cut off, oil pressure cut off, non-recycling pump down and reset relays among others.

9. Fan shaft shall be mounted on at least two greased lubricated ball bearings designed for 200,000 hours average life. Grease lines to be extended outside of unit.

10. Entire fan assembly shall be completely isolated from the unit on rubber and cork isolators.

11. Unit shall be supplied with a remote control monitor panel to be mounted on an interior wall.

U. Insulation

1. Coverings and insulation of equipment, ductwork and piping, including vapor barriers, shall have a flame spread rating not over 25 without evidence of continued progressive combustion and with a smoke developed rating not higher than SO based on test procedure ASTM E-84. If the coverings and insulation, including vapor barriers, are to be applied with adhesives, the adhesives used shall have a flame spread rating not over

25 and a smoke developed rating not higher than 50.

2. Flexible foamed plastic insulation shall be O-C flexible tubing.

3. Rigid duct liner board insulation (sound-lining) shall be O-C Fiberglass A-6.

4. Flexible duct insulation shall be OC Faced Duct Warp FRK 25, Series ED-150.

5. Insulating cement shall be O-C 110.

6. Sound Lining

   a. All sound lining materials shall conform to U.L. requirements for use in air duct systems, and shall be guaranteed by the manufacturer against erosion of fibers at the actual air velocities in the system.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practicable. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify IDRP for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

D. Gas Furnace Installation

1. All equipment and installations shall be in compliance with federal, state and local codes and regulations.

2. All equipment and installations shall be in accordance with the Manufacturer's recommendations.

3. Contractor shall furnish and install electric start gas fixed heating unit system(s) complete and operable in every detail, as shown on drawings supplied by contractor and hereinafter specified.

4. Unit shall be complete with all necessary connections for operation including: fans, blowers, controls and thermostatic controls.

5. Unit is to contain electric spark ignition.

6. Clearances shall be in accordance with the listing and the Manufacturer's installation requirements.

7. All duct work in finished areas that is not to be enclosed shall be painted with metal primer finish paint.

8. All ducts in unheated spaces to be insulated with min. R-8 duct insulation and taped in place.

9. Contractor shall guarantee a trouble free system and shall repair or replace all defective parts and/or workmanship at his expense for a period of one year from date of acceptance of completed job in addition to the previous warranty requirements listed.

E. Electric Furnace Installation

1. Contractor shall furnish and install system(s) complete and operable in every detail, as shown on drawings supplied by contractor and hereinafter specified.

2. Electric furnace complete with all electrical connections: fans, blowers, controls, thermostatic controls and all other necessary connections and controls for a completely operable unit.

3. All equipment and installations shall be in compliance with local codes and regulations.

4. All duct work in finished area that is not to be enclosed shall be painted with metal primer finish paint.

5. All ducts in unheated spaces to be insulated with min. R-8 duct insulation and taped in place.

F. Electrical Central Air Conditioner

1. Contractor shall furnish and install air conditioning system(s) complete and operable in every detail, as shown on drawings supplied by contractor and hereinafter specified. With all electrical connections, thermostatic controls that can be sent for fan only, condensing unit, "A" type evaporator coils, housings, lines, ducts, registers and all other necessary connections, controls and equipment for a completely operable unit, including concrete exterior pad (location selected by home owner).

2. If not existing, return ducting with registers shall be installed at each floor of house. All supply registers shall be replaced and adjustable for most effective air distribution for heating and air conditioning. All duct work in finished area that is not to be enclosed shall be painted with metal primer finish paint. All ducts in unheated spaces shall be insulated with a minimum of 2-inch fiberglass duct insulation and taped in place.

3. All equipment and installations shall be in compliance with local codes and regulations.

4. Interior units shall be provided with a full coverage auxiliary drain pan with a cutoff switch to prevent water damage when the unit pan fills. The outlet of the pan shall be piped to the perimeter of the house to permit visible detection of a failed system.

G. Heat Pump

1. Contractor shall furnish and install Carrier or approved equal heat pump complete with all electrical connections, fans, blowers, controls, thermostat, compressor unit and pad, ducts and registers and all other necessary components and connections for a completely operable heating and cooling unit.

H. Fan Forced Ceiling Heaters

1. Contractor shall furnish and install a Miami-Carey #586 Fan-Forced Ceiling Heaters and switch or approved equal. Installation is to be in accordance with all local codes and manufacturer's recommendations. Contractor is to guarantee work and equipment for one year from date of acceptance.

I. Installation of Wall A.C. Unit

1. A.C. unit to be installed pre-manufactured sleeve through wall. Unit to be supported with metal angle brackets where necessary; all exterior metal to be galvanized or aluminum.

2. Cut hole minimum size to allow proper fit of unit cover. Any masonry or wood structural elements cut shall be headed off with proper size steel angles or wood headers. Exterior hole to be clean cut, flashed on top with Fiberglass insulation to allow removal for service.

3. Trim and caulk where necessary on interior and exterior wall, all trim to be finished to match existing.

4. All glass panels removed for the installation of units shall be infilled with 1/8- inch clear plastic window glazing.

5. Electric outlet to have individual circuit for each A.C. unit; use no extension cord to plug in unit.

J. Installation of Controls

1. Thermostats shall be mounted 54-inch above finished floor on an interior wall away from direct sunlight.

K. Installation of Sound Lining

1. Linings shall be secured to ducts with mechanical clips on 15-inch centers each way and with adhesive over the entire back surface. Caulk all joints with a fire retardant mastic and tape all joints with fire retardant duct tape. Duct construction at leading edge of sound lining must provide a shoulder to receive edge of lining so that interior of lined and unlined sections shall be identical. The installation of all duct sound linings shall comply with the SMANA Sound Liner Application Manual.

3.02 REPAIR AND MAINTENANCE

A. Gas Equipment Maintenance

1. When existing gas fired equipment is to remain, clean burners, combustion chambers, vent stacks, chimney if needed, adjust flame and pilot, correctly set fan limit control switches. Clean and oil blowers and install new filter. Test heating system under stress conditions long enough to establish proper operation, including automatic parts and controls. Proper sized, usable slide baffles shall be provided if missing.

B. Gas Furnace

1. Contractor shall furnish and install electric start gas fixed heating unit system(s) complete and operable in every detail, as shown on drawings supplied by contractor and hereinafter specified. Unit shall be complete with all necessary connections for operation including: fans, blowers, controls and thermostatic controls. Contractor shall guarantee a trouble free system and shall repair or replace all defective parts and/or workmanship at his expense for a period of one year from date of acceptance of heating system. Contractor shall further guarantee that the heating system will maintain heat within the house at 70 degrees F when the outside temperature is 36 degrees F and the wind has a velocity of 15 mph. Unit is to contain electric spark ignition.

2. All duct work in finished areas that is not to be enclosed shall be painted with metal primer finish paint.

3. All ducts in unheated spaces to be insulated with minimum R-8 duct insulation and taped in place.

4. Old heating unit is to be removed and disposed.

C. Heat Unit

1. Housing repair: Install new housing panels to replace damaged panels.

2. Heat exchanger:
   a. Install replacement heat exchanger in accordance with manufacturer's instructions.
   b. Reassemble furnace unit.
3. Forced Air furnace fan motor:
   a. Replace fan motor.
   b. Reinstall motor in furnace assembly.

c. Reinstall fan drive assembly.

D. Central Heat Furnace
1. Clean existing system
2. Check all functional parts for proper working order
3. All defective parts shall be replaced
4. Repair any defective venting and ducts.

E. Heat Registers
1. Replace missing or damage grills and or registers for hot air system.

3.03 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

3.04 CLOSEOUT

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

B. Operator Instructions

1. At the completion of the project, and after all systems have been tested and accepted, the Contractor shall provide a trained representative to instruct Owner in the operation of all systems. During this period, instruct the owner or his representative fully in the operation, adjustment and maintenance.

C. Quality Assurance
2. Install an in-unit ventilation system capable of providing adequate fresh air per ASHRAE 62.2 requirements.

END OF SECTION

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SECTION 232006 - HYDRONIC SPECIALTIES

PART 1 GENERAL

1.01 SUBMITTALS

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

PART 2 PRODUCTS

2.01 EXPANSION TANK

A. Expansion Tanks:
1. Manufacturers: Subject to compliance with requirements, provide a product by one of the following:
   a. Taco, Inc.
   b. Bell and Gossett
   c. Approved equal

2. Description: Steel pressure-rated tank constructed with welded joints and factory-installed butyl-rubber diaphragm. Include air precharge to minimum system-operating pressure at tank.
3. Construction:

   a. Tappings: Factory-fabricated steel, welded to tank before testing and labeling. Include ASME B1.20.1 pipe thread.
   b. Air-Charging Valve: Factory installed.

4. Capacity and Characteristics:

   a. Working-Pressure Rating: 150 psig.
   b. Capacity Acceptable: 2. gal. minimum.
   c. Pre-charged

2.02 COMBINATION AIR SEPARATOR AND SYSTEM STRAINER

A. Type: Sweat copper Brass Compact air separator designed for hydronic heating systems to remove air within the water. Maximums of 150 psi and 250 degree F.

2.03 AIR VENTS

A. Automatic Float Operated Vent; ITT Hoffman Model 78, or approved equal.

1. Float type automatic air vent that is designed to vent air from hydronic heating systems. Forged brass body and cap with non-ferrous internals.

2.04 BOILER FILL VALVE

A. Boiler fill valve shall be dual relief valve and reducing valve. Body construction of both valves shall be brass. Pressure reducing valve shall have a strainer and an inlet pressure check valve. Pressure reducing valve shall have a quick fill handle to allow for quick filling of the system. Pressure reducing valve shall have a pressure range adjustable from 10-25 psig. Relief valve shall have an adjustable pressure range from 20-40 psig, and shall be factory set at 30 psig. Valve shall be of the same manufacturer and shall be factory assembled as a single unit.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install the Work of this Section in accordance with the manufacturer's printed installation instructions.

B. Provide ball valves, nipples and caps for blow downs on all strainers and suction diffusers.

END OF SECTION

SECTION 232113 - HYDRONIC PIPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes pipe and fitting materials and joining methods for the following:

1. Hot-water heating piping.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of pipe.

PART 2 - PRODUCTS

2.1 COPPER TUBE AND FITTINGS

A. Drawn-Temper Copper Tubing: ASTM B 88, Type.

B. Annealed-Temper Copper Tubing: ASTM B 88, Type K.

C. DWV Copper Tubing: ASTM B 306, Type DWV.

D. Wrought-Copper Unions: ASME B16.22.

2.2 STEEL PIPE AND FITTINGS

A. Steel Pipe: ASTM A 53/A 53M, black steel with plain ends; welded and seamless, Grade B, and wall thickness as indicated in "Piping Applications" Article.

B. Cast-Iron Threaded Fittings: ASME B16.4; Classes 125 and 250 as indicated in "Piping Applications" Article.

C. Malleable-Iron Threaded Fittings: ASME B16.3, Classes 150 and 300 as indicated in "Piping Applications" Article.

D. Malleable-Iron Unions: ASME B16.39; Classes 150, 250, and 300 as indicated in "Piping Applications" Article.
   1. Facings: Raised face.

   2. Joint Fittings: ASTM A 536, Grade 65-45-12 ductile iron; ASTM A 47/A 47M, Grade 32510 malleable iron; ASTM A 53/A 53M, Type F, E, or S, Grade B fabricated steel; or ASTM A 106/A 106M, Grade B steel fittings with grooves or shoulders

constructed to accept grooved-end couplings; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

3. Couplings: Ductile- or malleable-iron housing and EPDM or nitrile gasket of central cavity pressure-responsive design; with nuts, bolts, locking pin, locking toggle, or lugs to secure grooved pipe and fittings.

2.3 JOINING MATERIALS

A. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system

B. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

C. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for joining copper with copper; or BAg-1, silver alloy for joining copper with bronze or steel.

D. Welding Filler Metals: Comply with AWS D10.12M/D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.4 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements:

a. A.Y. McDonald Mfg. Co.
b. Capitol Manufacturing Company.
c. Central Plastics Company.
d. Hart Industries International, Inc.
e. Jomar International, Ltd.
f. Matco-Norca.
g. Watts Regulator Co.
h. Zurn Industries, LLC; AquaSpec Commercial Faucet Products.
i. Appoved equal.

2. Description: Standard: ASSE 1079.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

A. Hot-water heating piping, aboveground, shall be the following:

1. Where installation is part of an existing system, match existing system piping.

2. For complete systems, piping shall be:
   a. Type L drawn-temper copper tubing, wrought-copper fittings, and soldered or brazed joints.
   b. Schedule 40 Grade B, Class 125, cast-iron or Class 150, malleable-iron fittings and threaded joints.

B. Hot-Water Heating Piping Installed Belowground and within Slabs: Type K, annealed-temper copper tubing, wrought-copper fittings, and soldered or brazed joints. Use the fewest possible joints.

C. Makeup-water piping installed aboveground shall be the same material as the heating water piping.

D. Condensate-Drain Piping: Type M or Type DWV, drawn-temper copper tubing, wrought-copper fittings, and soldered joints or Schedule 40 PVC plastic pipe and fittings and solvent-welded joints.

E. Safety-Valve-Inlet and -Outlet Piping for Hot-Water Piping: Same materials and joining methods as for piping specified for the service in which safety valve is installed with metal-to-plastic transition fittings for plastic piping systems according to piping manufacturer's written instructions.

3.2 PIPING INSTALLATIONS

A. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

B. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

C. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

D. Install piping to permit valve servicing.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install piping to allow application of insulation.

I. Select system components with pressure rating equal to or greater than system operating pressure.

J. Install groups of pipes parallel to each other, spaced to permit applying insulation and servicing of valves.

K. Install drains, consisting of a tee fitting, ball valve, and short threaded nipple with cap, at low points in piping system mains and elsewhere as required for system drainage.

L. Install piping at a uniform grade of 0.2 percent upward in direction of flow.

M. Reduce pipe sizes using eccentric reducer fitting installed with level side up.

N. Install unions in piping adjacent to valves, at final connections of equipment.

O. Install shutoff valve immediately upstream of each dielectric fitting.

P. Provide expansion fittings and loops for HVAC piping.

Q. Install escutcheons for piping penetrations of walls, ceilings, and floors.

3.3 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

3.4 HANGERS AND SUPPORTS

A. Provide hangers and supports for HVAC piping and equipment. Comply with the NYS Codes requirements for maximum spacing of supports.

3.5 PIPE JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

D. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8/A5.8M.

E. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

3.6 TERMINAL EQUIPMENT CONNECTIONS

A. Sizes for supply and return piping connections shall be the same as or larger than equipment connections.

B. Install control valves in accessible locations close to connected equipment.

C. Install bypass piping with globe valve around control valve. If parallel control valves are installed, only one bypass is required.

3.7 FIELD QUALITY CONTROL

A. Perform the following tests on hydronic piping:

1. Use ambient temperature water as a testing medium unless there is risk of damage due to freezing. Another liquid that is safe for workers and compatible with piping may be used.
2. While filling system, use vents installed at high points of system to release air. Use drains installed at low points for complete draining of test liquid.
3. Isolate expansion tanks and determine that hydronic system is full of water.
4. Subject piping system to hydrostatic test pressure that is not less than 1.5 times the system's working pressure. Test pressure shall not exceed maximum pressure for any vessel, pump, valve, or other component in system under test.
5. After hydrostatic test pressure has been applied for at least 10 minutes, examine piping, joints, and connections for leakage. Eliminate leaks by tightening, repairing, or replacing components, and repeat hydrostatic test until there are no leaks.
6. Prepare written report of testing.

B. Perform the following before operating the system:

1. Open manual valves fully.
2. Inspect pumps for proper rotation and verify lubrication of motors and bearings.
3. Set makeup pressure-reducing valves for required system pressure.
4. Inspect air vents at high points of system and determine if all are installed and operating freely (automatic type), or bleed air completely (manual type).
5. Set temperature controls so all coils are calling for full flow.
6. Inspect and set operating temperatures of hydronic equipment.

END OF SECTION

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SECTION 232123 - PUMPS

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Catalog sheets, product data and installation instructions for pump and starter.

1.02 MAINTENANCE

A. Parts List: Submit complete parts list for all pumps.

1.03 ACCEPTABLE MANUFACTURERS

A. Bell and Gossett

B. Taco

C. Paco

D. Armstrong

E. Approved equal

PART 2 PRODUCTS

2.01 PUMPS - GENERAL

A. Provide pumps that will operate continuously without overheating bearings or motors at every condition of operation on the pump curve, or produce noise audible outside the room or space in which installed.

B. Provide pumps of size, type and capacity as indicated, complete with electric motor and drive assembly, unless otherwise indicated. Design pump casings for the indicated working pressure and factory test at 1-1/2 times the designed pressure.

C. Provide pumps of the same type, the product of a single manufacturer, with pump parts of the same size and type interchangeable.

D. Provide pumps using oil for lubrication, with the exception of in-line circulating and close coupled pumps, with constant level oilers.

E. Pump shall be furnished by the boiler manufacturer when a boiler is being provided as part of the work. Pump shall be sized for a twenty degree temperature difference.

2.02 PUMPS

A. In-Line Pump:

1. Pump Requirements:

a. Single stage volute type pump.

b. Cast or forged bronze impeller.

c. Replaceable mechanical seals with a minimum rating of -20 degrees F to 250 degrees F.

d. Casing shall be ASTM A159 class 30 cast iron drilled to mate to class 125 companion flanges. Pump casing shall be drilled on both the suction and discharge flange for gauge ports.

e. Pump and motors shall be close coupled. Single phase motors may employ a coupler to reduce starting torque.

f. Impeller shall be dynamically balanced.

g. Pump minimum rated working pressure shall be 175 psig.

h. Pump shall be factory tested.

i. Pump shall be capable of being support by standard pipe support on both sides of the pump.

j. Starter: Provide motor starter matched to the pump HP and electrical characteristics.

2. Motor Requirements:

a. 115 VAC, 1 Phase, 60Hz, 1,750 RPM.

b. Premium efficiency motor.

PART 3 EXECUTION

3.01 INSTALLATION

A. Pump may come installed on the boiler or be field installed. If field installed the manufacturer shall provide written installation instructions as to the installation of the pump and boiler.

B. Pump shall be installed in accordance with the manufacturer's written installation instructions.

C. Provide all electrical components (wiring, starter, boxes, etc.) to make a complete and functioning installation.

END OF SECTION

SECTION 233424 - BATHROOM EXHAUST FANS

PART 1 GENERAL

1.01 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, performance charts, specifications and installation instructions for each size fan specified.

B. Contract Closeout Submittals:

1. Operation and Maintenance Data: Deliver three (3) copies covering the installed products, to the Owner's Representative.

1.02 QUALITY ASSURANCE

A. All products shall be an ENERGY STAR qualified.

1. All electrical components shall be UL listed.

PART 2 PRODUCTS

2.01 EXHAUST FANS

A. General: Ventilators shall be of the electric motor, direct driven, wall or ceiling mounted, as shown or noted on drawings, centrifugal fan type, complete with grilles.

B. Fan Assembly:

1. Fan Wheel: Non-overloading centrifugal type, fabricated of aluminum or galvanized steel, balanced at factory. Provide grease packed wheel bearings of the self-aligning, ball bearing type.

2. Motor: Permanently lubricated, continuous duty, thermally protected and resiliently mounted.

C. Wall Cap: Provide a prefabricated steel, baked enamel, wall cap, 3 inch in size, manufactured by the same manufacturer as the fan. Wall cap shall have built in back draft damper and bird screen.

D. Fan Controller: Furnish to the Electrical Contractor for installation a Fan switch with off-delay. Switch shall be three position, with an ON, OFF and OFF-DELAY. Off-Delay shall provide a user adjustable time delay period of 5-60 minutes after switch is turned to the OFF-DELAY position.

E. Acceptable Manufacturers: Broan, Nutone, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install fan in accordance with the manufacturer's written installation instructions. Install fans to make a complete installation, including but not limited to:

1. Support(s)
2. Electrical wiring
3. Controls
4. Metal ductwork
5. Ductwork insulation (in unconditioned spaces)
6. Wall cap
7. Backdraft damper
8. All other products to make a complete installation.

END OF SECTION

SECTION 235223 - CONDENSING BOILER

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Pumps: 232123.

1.02 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, specifications and installation instructions for the boiler and appurtenances as a package.

B. Contract Closeout Submittals:
1. Operation and Maintenance Data: Deliver 2 copies, covering the installed products to the Owner's Representative.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:
1. Boiler shall AHRI Certified and Energy Star rated.

1.04 ACCEPTABLE MANUFACTURERS

A. Weil McLain - Ultra Series.

PART 2 PRODUCTS

2.01 BOILER - GENERAL

A. Type: Low pressure condensing boiler. Capable of developing full IBR gross output capacity at 100 percent firing rate. Minimum AFUE rating of 91.7%.

2.02 BURNER AND ACCESSORIES

A. Equip boiler with fuel burning equipment and controls manufactured or supplied by the boiler manufacturer, designed for natural gas.

B. Gas Burning Equipment: Completely piped gas train.

2.03 WATER BOILER CONTROLS AND ACCESSORIES

A. Dial type combination pressure and temperature gage.

B. Safety valve, of size as required, to provide the relief capacity required by the Codes.

C. Operating Control: Adjustable electric or electronic aquastat, set to maintain a predetermined temperature in the boiler.

D. High Limit Control: Electric aquastat, set to shut down the burner when the temperature in the boiler reaches the predetermined setting. Aquastat shall be of the manual reset type.

E. Automatic low water fuel cutoff with manual reset.

F. Air eliminator boiler fitting, or built-in air eliminator.

2.04 BOILER FLUE CONNECTION

A. Provide venting in accordance with the manufacturer's printed installation instructions.

2.05 CONDENSATE PUMP

A. Provide condensate pump as required by the manufacturer. Drain condensate in accordance with manufacturer's printed instructions and NYS Codes.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install boiler in accordance with manufacturer's printed instructions.

B. Arrange to allow sufficient room for cleaning and servicing all components.

C. Connect to gas piping.

D. Install venting in accordance with manufacturer's printed instructions.

E. Install condensate pump in accordance with manufacturer's printed instructions. Provide all piping and electrical service and connections to make a complete installation.

3.02 FIELD QUALITY CONTROL

A. Boiler Start Up:
   1. Fire the boiler and conduct a preliminary test for the purpose of checking general operations of the boiler, proving mechanical and electrical controls and making necessary adjustments. Fire boiler for a minimum of 4 hours cycling the boiler through the full operation range.

END OF SECTION

SECTION 238126 - SPLIT-SYSTEM AIR-CONDITIONERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes split-system air-conditioning and heat-pump units consisting of separate evaporator-fan and compressor-condenser components.

1.2 SUBMITTALS

A. Product Data: For each type of product indicated.

1.3 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2011 (NEC), by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Fabricate and label refrigeration system to comply with ASHRAE 15-2010, "Safety Standard for Refrigeration Systems."

C. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.2-2007.

1.5 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of split-system air-conditioning units that fail in materials or workmanship within specified warranty period.

1. Warranty Period:

a. For Compressor: 5 years from date of Substantial Completion.
b. For Parts: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide a product by one of the following:

1. Carrier Corporation; Home Comfort and HVAC Building & Industrial Systems.
2. Friedrich Air Conditioning Company.
3. Lennox International Inc.
4. Mitsubishi Electric & Electronics USA, Inc.; HVAC Advanced Products Division.
5. Mitsubishi Heavy Industries America, Inc.
6. SANYO North America Corporation; SANYO Fisher Company.
7. Trane; a business of American Standard companies.
8. YORK; a Johnson Controls company.
9. Approved equal.

2.2 INDOOR UNITS (5 TONS (18 kW) OR LESS)

A. Concealed Evaporator-Fan Components:

1. Chassis: Galvanized steel with flanged edges, removable panels for servicing, and insulation on back of panel.
2. Insulation: Faced, glass-fiber duct liner.
3. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
4. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
5. Fan: Forward-curved, double-width wheel of galvanized steel; directly connected to motor.
6. Fan Motors:

    a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements.
    b. Multitapped, multispeed with internal thermal protection and permanent lubrication.
    c. Wiring Terminations: Connect motor to chassis wiring with plug connection.

7. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.2-2013..
8. Filters: Permanent, cleanable, antimicrobial.
9. Condensate Drain Pans:

    a. Fabricated with two percent slope in at least two planes to collect condensate from cooling coils (including coil piping connections, coil headers, and return bends) and humidifiers, and to direct water toward drain connection.

b. Single-wall, galvanized steel sheet.
c. Double-wall, galvanized-steel sheet with space between walls filled with foam insulation and moisture-tight seal.
d. Drain Connection: Located at lowest point of pan and sized to prevent overflow. Terminate with threaded nipple on pan.
e. Pan-Top Surface Coating: Asphaltic waterproofing compound.
f. Units with stacked coils shall have an intermediate drain pan to collect condensate from top coil.

B. Floor-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Owner.

   a. Discharge Grille: Steel with surface-mounted frame.
   b. Insulation: Faced, glass-fiber duct liner.
   c. Drain Pans: Galvanized steel, with connection for drain; insulated.

2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
4. Fan: Direct drive, centrifugal.
5. Fan Motors:

   a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
   b. Multitapped, multispeed with internal thermal protection and permanent lubrication.

6. Filters: Permanent, cleanable, antimicrobial.

C. Wall-Mounted, Evaporator-Fan Components:

1. Cabinet: Enameled steel with removable panels on front and ends in color selected by Architect, and discharge drain pans with drain connection.
2. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and thermal-expansion valve. Comply with ARI 206/110.
3. Electric Coil: Helical, nickel-chrome, resistance-wire heating elements; with refractory ceramic support bushings, automatic-reset thermal cutout, built-in magnetic contactors, manual-reset thermal cutout, airflow proving device, and one-time fuses in terminal box for overcurrent protection.
4. Fan: Direct drive, centrifugal.
5. Fan Motors:

   a. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements
   b. Multi-tapped, multispeed with internal thermal protection and permanent lubrication.

c. NEMA Premium (TM) efficient motors as defined in NEMA MG 1.
d. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in electrical Sections.
e. Mount unit-mounted disconnect switches on interior of unit.

6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.2.2013.
7. Filters: Permanent, cleanable, antimicrobial.

2.3 OUTDOOR UNITS (5 TONS (18 kW) OR LESS)

A. Air-Cooled, Compressor-Condenser Components:

1. Casing: Steel, finished with baked enamel in color selected by Architect, with removable panels for access to controls, weep holes for water drainage, and mounting holes in base. Provide brass service valves, fittings, and gage ports on exterior of casing.
2. Compressor: Hermetically sealed with crankcase heater and mounted on vibration isolation device. Compressor motor shall have thermal- and current-sensitive overload devices, start capacitor, relay, and contactor.

   a. Compressor Type: Scroll.
   b. Refrigerant Charge: R-407C or R-410A.
   c. Refrigerant Coil: Copper tube, with mechanically bonded aluminum fins and liquid subcooler. Comply with ARI 206/110.

3. Heat-Pump Components: Reversing valve and low-temperature-air cutoff thermostat.
4. Fan: Aluminum-propeller type, directly connected to motor.
5. Motor: Permanently lubricated, with integral thermal-overload protection.
6. Mounting Base: Polyethylene.

2.4 ACCESSORIES

A. Thermostat: Wireless infrared functioning to remotely control compressor and evaporator fan, with the following features:

1. Compressor time delay.
2. 24-hour time control of system stop and start.
3. Liquid-crystal display indicating temperature, set-point temperature, time setting, operating mode, and fan speed.
4. Fan-speed selection including auto setting.

B. Automatic-reset timer to prevent rapid cycling of compressor.

C. Refrigerant Line Kits: Soft-annealed copper suction and liquid lines factory cleaned, dried, pressurized, and sealed; factory-insulated suction line with flared fittings at both ends.

D. Drain Hose: For condensate.

2.5 CAPACITIES AND CHARACTERISTICS

A. Cooling Capacity Rating :
   1. SEER: Minimum 16.0.

B. Heating and Cooling Capacities:
   1. Match building load in accordance with size heating and cooling equipment in accordance with the Air Conditioning Contractors of America (ACCA) Manuals, Parts J and S, or 2012 ASHRAE Handbook--HVAC Systems and Equipment or most recent edition.

C. Indoor Unit:

   1. Fan Motor Electrical Characteristics:

      a. Volts: 120
      b. Phase: Single.
      c. Hertz: 60.

D. Outdoor Unit:

   1. Type: Air cooled.
   2. Electrical Characteristics:

      a. Volts: 120 or 208 or 230.
      b. Phase: Single.
      c. Hertz: 60.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install units level and plumb.

B. Install evaporator-fan components using manufacturer's standard mounting devices securely fastened to building structure.

C. Equipment Mounting:
   1. Install ground-mounted, compressor-condenser components on polyethylene mounting base.

D. Install and connect pre-charged refrigerant tubing to component's quick-connect fittings. Install tubing to allow access to unit.

3.2 CONNECTIONS

A. Make all piping connections required to make a complete and functional installation.

B. Where piping is installed adjacent to unit, allow space for service and maintenance of unit.

3.3 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION

SECTION 238237 - BASEBOARD FINNED TUBE RADIATORS

PART 1 GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Valves: Section 230523.

1.02 SUBMITTALS

A. Product Data: Manufacturer's catalog sheets, brochures, performance charts, specifications and installation instructions for the baseboard radiators.

B. Quality Control Submittals:
1. IBR Directory: Submit one current copy.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Ratings of radiation shall be IBR approved, and listed in the current IBR Directory.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sheet metal (For fabricating radiation enclosures and accessories):
1. Galvanized sheet steel: ASTM A 653, coating designation G90.
2. Cold rolled steel: Carbon steel, commercial quality - ASTM A 366. Sheet steel shall be degreased, cleaned and phosphatized in the factory of the radiation manufacturer or mill phosphatized.

2.02 BASEBOARD RADIATORS

A. General Design: Furnish wall hung type, each consisting of a finned type heating element properly supported, an enclosure with a continuous backplate and a full length damper assembly.

B. Heating Elements: Fabricate heating elements from seamless copper tubing, 3/4" or 1" nominal size as indicated, with aluminum fins securely bonded to the tubing by mechanical expansion of the tubing, or equivalent method as approved by the Owner. Furnish copper tube with a minimum wall thickness of .032" for 3/4" tube and .035" for 1" tube. Provide fins a minimum of .010" thick, of size and in number per lineal foot of element, as indicated. Furnish fins with an integral finned collar and a stamped pattern for strength and rigidity. Furnish tube ends suitable for use with solder fittings. Do not utilize welding, brazing or soldering in the fabrication of heating elements.

C. Enclosures: Fabricate front panels from a minimum of No. 20 USS gage sheet steel, firmly supported at the top and bottom on enclosure brackets. Furnish enclosures complete with continuous back panels, top panels, end caps, corner pieces and wall-to-wall trim strips fabricated from a minimum of No. 20 USS gage steel. Furnish all exposed enclosure panels, accessories and trim strips free of sharp corners or edges.

Front panels shall snap-on to support brackets and shall be easily removable for cleaning. Enclosure height and width shall not exceed the dimensions indicated.

D. Support Brackets: Fabricate brackets from a minimum of No. 18 USS gage sheet steel; installed on maximum 3'-0" centers, of design to allow free and noiseless movement of element. Secure brackets to back panel for use in supporting heating elements and front panels. Consideration will be given to element hangers, not incorporated with support brackets, providing the spacing and free movement of the heating element is complied with.

E. Dampers: Fabricate dampers from a minimum of No. 20 USS gage sheet steel, located directly above heating elements, providing full control of air through the length of the enclosure. Operate dampers by means of a knob or lever arrangement, located at the center of each damper section, of such design that can be permanently set in any position from fully open to fully closed.

F. Accessories: Provide inside and outside corner pieces, wall-to-wall trim strips, joiner strips, access doors at all valve and vent locations, and other miscellaneous trim pieces of the same manufacture, gage and finish as the enclosures. Furnish gasketing between wall and enclosure back.

G. Factory Finish:
1. Furnish all surfaces of enclosures and accessories with a factory applied minimum two coat baked enamel finish. Colors shall be as selected by the Owner, from the manufacturer's standard color chart.
2. Furnish all surfaces of enclosures and accessories with a factory applied baked prime coat finish.

PART 3 EXECUTION

3.01 INSTALLATION

A. Secure baseboard radiators to wall construction with fastening devices, as required by the particular type of construction. Install fasteners on maximum 2'-0" centers.

END OF SECTION

SECTION 261000 - ELECTRICAL

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish materials, accessories, fittings, fixtures, and equipment; perform work required to place the electrical systems in a complete, proper and legal operating condition including:

1. Power Transmission.
2. Electrical Service.
3. Miscellaneous Devices and Switches.
4. Miscellaneous Electrical Fixtures.
5. Heater/Vents.
6. Electronic Safety and Security.

B. Electrical work and appliances, fixtures, panels and devices installed in this work shall be in strict conformance with the National Electrical Code (NEC 2011). All fixtures, devices, panels, and appliances shall bear the Underwriters Label. All conductors shall be copper. The electrical contractor will coordinate with the Utility Company to provide temporary poles for construction and for the timely hook-up of power to the building and arrange for the same. All breakers in the electrical panel shall be labeled (typewritten). Electrical services shall consist of a minimum 150 amp single phase
110/220 volts, 3 wire overhead service to a weather head and meter can. Service entry will be connected to a minimum 12 circuit 1 phase with a 150 amp MLO and 150 amp feed from line.

C. Coordination with Utilities: Make any necessary arrangement with the utility service company for service or work required on its equipment or system.

D. Abandoned Wiring

1. Disconnect and remove existing electrical equipment and exposed wiring not in use.

2. Dispose of equipment and wiring off-site.

E. Temporary Electric Service

1. The electrical contractor shall make provisions for a temporary service connection for light and power as may be required by the various trades.

F. Cutting and Patching

1. Do not cut structural framing members, piping, or duct work.

2. Restore cut or damaged surfaces to original finish to match surrounding surfaces.

G. SUBMITTALS

1. Product data/catalog cut sheets: For each type of product provided.

1.02 REPAIR OF ELECTRICAL SERVICE

A. Remove all illegal, knob and tube, and cloth wiring, and replace as required by code.

B. At room locations where water inundation was 3-foot , 0-inches or more, all electrical distribution equipment, motor circuits, power equipment, transformers, wire, cable, flexible cords, wiring devices, ground fault circuit interrupters, surge protectors, molded case circuit breakers, low-voltage fuses, luminaries, ballasts, motors and electric control, signaling and communication equipment that have been exposed to salt water shall be replaced in accordance with the provisions of the current version of International Building Code.

C. At room locations where water inundation was less than 3-foot, 0-inches only those electrical components including but not limited to the wiring and wiring devices exposed to water shall be replaced in accordance with the provisions of the current version of the International Building Code.

D. Replace any and all knob and tube, and fabric-covered wire. Any aluminum wiring that has been flooded by salt water should be replaced.

E. At room locations where water inundation was 3-foot , 0-inches or more, all electrical distribution equipment, motor circuits, power equipment, transformers, wire, cable, flexible cords, wiring devices, ground fault circuit interrupters, surge protectors, molded case circuit breakers, low-voltage fuses, luminaries, ballasts, motors and electric control, signaling and communication equipment that have been exposed to water shall be replaced in accordance with the provisions of the International Building Code.

F. At room locations where water inundation was less than 3-foot, 0-inches only those electrical components including but not limited to the wiring and wiring devices exposed to water shall be replaced in accordance with the provisions of the International Building Code.

G. Replace any and all knob and tube, and fabric-covered wire. Any aluminum wiring that has been flooded by salt water should be replaced.

H. Replace all receptacles and switches. Replace all cracked or damaged outlet cover plates and switch cover plates. Replace any dried and cracked wiring. Install circuit

protection device(s) of proper size. GFCI receptacles shall be installed in all wet areas (i.e. kitchen, baths, wash rooms, garages, outside outlets).

I. Check and seal service mast through a roof or exterior wall. Inspect mast and weather- head and replace where damage has occurred or to meet the requirements of State and amended local government Ordinances.

J. Replace all push button switches with toggle type.

K. Floor receptacle boxes listed specifically for this application shall be used for receptacles located in the floor. Install screw in brass outlet covers on all floor receptacle boxes.

L. Rewire of electrical service.

1. Furnish and install all wiring, cable, phone, devices, panel box, and mast and weather head as required by the National Electric Code 2011. This is to include materials, accessories, housings, and equipment to perform work required to replace the complete electrical system. Electrical service shall be a minimum of 150 amp service. Homes with all electric appliances (i.e. furnace, heat pump, stove or cook top) shall be a minimum 200 amp service installed by a licensed electrician.
2. Remove all deficient wiring and panel box and replace as required by local electrical code.

1.03 QUALITY ASSURANCE

A. The Contractor shall obtain all inspections required by all laws, ordinances, rules, regulations, or public authority having jurisdiction. He shall obtain certificates of such inspections and shall submit same to the AHC and ACHS before final payment is made and shall pay all fees, charges, and other expenses in connection therewith.

1.04 WARRANTY

A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace fixtures or components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 PANELS

A. Panel boxes shall be UL equivalent listed and installed to local code.

B. Subject to compliance with requirements, provide product indicated or

comparable product by one of the following:

1. Square D
2. General Electric
3. Cutler-Hammer
4. Westinghouse
5. ITE
6. Approved equal

C. Furnish and install where indicated a deadfront panelboard incorporating switching and protective devices of the number, rating, and type noted herein or shown on the drawings. Panelboards shall have NEMA 1 general purpose enclosures and shall be surface or recess mounted as noted. All panelboards shall be rated for the intended voltage and shall be in accordance with the Underwriter's Laboratories, Inc., "Standard for Panelboards," and "Standard for Cabinets and Boxes," shall be so labeled where procedures exist. Panelboards shall also comply with NEMA Standard for Panelboards, National Electric Code (Power Distribution Panels) where applicable.

2.02 ELECTRONIC SAFETY AND SECURITY

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

1. Kidde.
2. First Alert.
3. Honeywell.
4. System Sensor.
5. Approved equal.

B. Carbon Monoxide Detector: Basis of Design:

1. Kidde 21006407, Hardwire Digital Carbon Monoxide Alarm with DC back-up.

2. Approved equal.

C. Combination Carbon Monoxide and Smoke Detector: Basis of Design:

1. Kidde KN COSM-B, Hardwire Smoke and Carbon Monoxide Alarm with DC backup.

2. Approved equal.

D. Smoke Detector: Basis of Design:

1. Kidde 12040 Wire in Smoke Alarm with Battery Back-up and Smart Hush

2. Approved equal.

2.03 WIRE MATERIAL

A. Wire and Cable shall be in accordance with the latest edition of NEC or the IRC code as amended by the STATE and its local government Ordinances. 600 volt conductors.

B. All conductors shall be delivered to the site in their original packages, plainly marked as follows: Underwriter's Label: Size, type, and insulation of the wire every four feet of length: Name of the manufacturing company and the trade name of the wire.

C. All branch circuit wiring may be 2/C and 3/C Romex with common ground.

D. Conductors smaller than #8 shall be copper; #6 and larger shall be aluminum stranded; #8 may be either solid or stranded.

E. Wire sizes shall be American Wire Gauge (AWG). Minimum copper wire sizes shall be #14 unless noted or specified otherwise.

2.04 DEVICES

A. Outlets and Junction Boxes

1. Switch and receptacle outlet boxes and junction boxes shall be galvanized, or sherardized, or plastic, one piece pressed steel, Knock--out-type, UL or equivalent lab approved. The size of each box shall be determined by the number or wires or conduits, or size of conduits entering the box in accordance with NEC.

B. One Piece Device Plates shall be provided for all outlets.

1. Plates on unfinished walls or on fittings shall be of zinc-coated sheet metal having rounded or beveled edges.

2. Plates on finished walls shall be provided with beveled edges, and baked ivory enamel finish. Screws shall be of metal with oval heads, colored to match finish of plate.

3. Section type device plates will not be permitted.

4. Plates within reach of bathtub shall be non-conducting type including screws.

5. Plates for weatherproof duplex receptacles shall be cast aluminum.

C. Switches

1. Toggle switches white handle, totally enclosed switches, rated 125V, 15 amps.

D. Receptacles

1. 15 ampere, 125 volt, duplex, NEMA, 2-pole, 3-wire, grounding type. White, Tamper Resistant.

2. 20 ampere, 125 volt, duplex, NEMA, 2-pole, 3-wire, grounding type. White, Tamper Resistant.

3. Telephone Company Receptacles 15 amperes, 125 volt, duplex, 2-pole, 3-wire, grounding type, locking device.

4. Washer Receptacle 20 ampere, 125 volt, single, 2-pole, 3-wire, grounding type, White, Tamper resistant.

5. Dryer receptacle - 40 ampere, 125/250 volt, 3-pole, 3-wire, single. White, Tamper resistant.

PART 3 - EXECUTION

3.01 INSTALLATION OF PANEL

A. 150 Amp Panel

1. Install a new 150 Amp 110/220 Volt single phase electrical service complete with circuit breaker panel box and circuit breakers. Replace service entry cable caulk entry to building. Replace all cracked or dried circuit wires. Panel box to have main 150 Amp breaker.

3.02 INSTALLATION OF WIRE AND CONDUCTORS

A. Conductors

1. Comply with the manufacturer's printed instruction except where more stringent requirements are shown or specified and except where manufacturer's technical representative directs otherwise.

   a. Before installation, units shall be coordinated with all associated trades.

2. Installation of Conductors:

   a. Conductors shall be continuous between outlets or junction boxes and no splices shall be made except in outlet boxes, panelboard gutters, or handholes.

   b. Aluminum conductors are not allowed.

   c. Oil or grease shall not be used when pulling conductors. Appropriate cable lubricants only.

   d. Arrange conductors neatly in panels, cabinets, and equipment.

   e. Tighten pressure type lugs on panels and equipment, and then retighten 24 hours or more later.

   f. Homeruns longer than 75-feet from the panel shall be not less than No. 10 AWG, copper.

B. Wire Mold

1. Exposed raceway devices or equal will be permitted when concealed wiring is not practical as specified by Agency. Raceways shall be of sufficient size to contain wiring required for circuiting. All devices shall be securely attached in a neat level manner. All boxes shall be at least 3-inch off floor. No floor boxes will be permitted. Do not conceal wire-mold.

3.03 INSTALLATION OUTLETS

A. Duplex Convenience Outlets

1. Install new Duplex convenience outlets as indicated. Conceal all wiring in walls, ceiling, or floor.

B. Additional Outlets as Required by the 2011 National Electrical Code

1. Install 15 amp or 20 amp copper circuit in room with duplex ivory outlets to bring room to electrical code, 18-inch off floor. All work to be fished in existing walls, plaster patch by this contractor.

C. Ground Fault Outlets

1. All new bathroom, kitchen, and exterior outlets are to have a ground fault interrupter on separate 15-amp circuit to code.

D. Weatherproof Outlets

1. Weatherproof Outlets shall consist of a duplex 15 ampere, 125 volt, 2-pole, 3-wire grounded fault interrupt type receptacle in a cast metal box with a gasketed, weatherproof, nonferrous metal cover plate with cap. The third pole shall be grounded to raceway system or separate ground conductor. Cap shall be permanently attached to cover plate by a short length of bead chain or shall be provided with spring-hinge.

3.04 INSTALLATION OF DEDICATED CIRCUITS

A. Refrigerator Outlet

1. Provide 20 amp refrigerator outlet with cover and box to be connected to individual circuit.

B. Range Outlet

1. Convenience outlet for Gas Range.

2. Provide 40 Amp/240 Volt Circuit with outlet.

C. Washer Outlet

1. Provide 20 Amp clothes washer outlet with cover and box, to be connected to individual circuit.

D. Dryer Outlet

1. Provide 40 Amp/220 Volt Dryer Circuit with outlet, cover, and box.

E. Room AC Outlet/Circuit

1. Wiring for window or wall mounted air conditioners. Interior wiring for 110 volt A.C. units is to be 12/2 Romex with bond using a 20 Amp single pole breaker. Interior wiring for 220 volt A.C. unit is to be 10/3 Romex with bond using a 30 Amp double pole breaker. Use only one A.C. unit for each circuit. Circuit to include box, outlet and cover plate to be brown or ivory per homeowner request.

F. Water Heater Circuit

1. Provide labor and material for 30 Amp/230 Volt Circuit connection to the electric hot water heater.

3.05 INSTALLATION OF SAFETY AND SECURITY DEVICES

A. Wire in Smoke Alarm

1. Provide and install smoke detector; 120 Vpermanently connected to electric supply contractor to provide electric junction box where detector is to be installed.

B. Carbon Monoxide Detector: Basis of Design

1. Provide and install carbon monoxide detector; 120 V permanently connected to electric supply contractor to provide electric junction box where detector is to be installed. Battery back-up is required.

C. Combination Carbon Monoxide and Smoke Detector: Basis of Design:

1. Provide and install combination carbon monoxide and smoke detector; 120 V permanently connected to electric supply contractor to provide electric junction box where detector is to be installed. Battery back-up is required.

3.06 INSTALLATION OF ATTIC FANS

A. Gable End Attic Fan

1. Contractor shall furnish and install all necessary equipment for the installation of a gable mounted attic ventilator. The ventilator fan shall contain an adjustable thermostat and self-lubricating bearings. The size fan should be calculated as follows:

a. For roofs with pitch of 8/12 or less required CFM can be calculated by multiplying square feet of attic floor area by 0.7.

b. For dark colored roofs, add 15% to calculated CFM.

2. All ventilation fans shall be contained on a separate 15 amp circuit with an on/off override switch conveniently located in living space.

B. Roof Mounted Attic Fan

1. Contractor shall furnish and install all necessary equipment for the installation of a roof mounted power attic ventilator, the fan shall be located on the rear center area of the roof and shall be self-lubricating with an adjustable

thermostat. The size fan should be calculated as follows:

a. For roofs with pitch of 8/12 or less required CFM can be calculated by multiplying square feet of attic floor area by 0.7.

b. For dark colored roofs, add 16% to calculated CFM.

2. All ventilation fans shall be contained on a separate 15 Amp circuit with a non/off override switch conveniently located in living space.

3.07 INSTALLATION OF BATHROOM EXHAUST FANS

A. Install Nutone ceiling exhaust fan, or approved equal with ventilator assembly kit ducted through roof or through wall. Include new switch to code. Patch disturbed areas to match existing.

B. Bathroom Ceiling Heater Fan Exhaust: Install 1430 watt combination heater/fan in bathroom ceiling with switch on bathroom wall; Broan Model #149, or approved equal. Vent exhaust fan to outside. Patch disturbed areas to match existing.

3.08 REPAIR OF ELECTRICAL SERVICE

A. Remove all illegal wiring and replace as required by Code.

B. Make operable or replace all faulty, cracked, or damaged convenience outlets switches, and cover plates. Replace any dried and cracked wiring. Install circuit protection device of proper size.

C. Check and seal service riser through roof or exterior wall. Inspect weather cap and replace if cracked.

D. Replace all push button switches with toggle type. Install screw in brass covers on all floor convenience outlet boxes.

3.09 REPAIR OF LOW VOLTAGE WIRING

A. Install or Replace Door Bell

1. Install or replace all door bell buttons, chimes, low voltage wire and low voltage transformers as required to have working system.

B. Install or Replace Thermostat and switching devices

1. Install or replace any low voltage wiring, thermostats and switching devices required to have a working system.

3.10 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, power connections, and other conditions affecting installation and performance of residential appliances.

3.11 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written instructions.

B. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

C. Utilities: Comply with plumbing and electrical requirements.

END OF SECTION

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SECTION 265101 - LIGHTING

PART 1 - GENERAL

1.01 SUMMARY

A. Furnish materials, accessories, fittings, fixtures, and equipment necessary to perform work required to install or replace electrical fixtures in a complete, proper and legal operating condition as designated in the work write-up including:

1. Interior lighting fixtures, and lamping;

2. Exterior lighting fixtures attached to home.

B. The Contractor shall obtain all inspections required by all laws, ordinances, rules, regulations, or public authority having jurisdiction. He shall obtain certificates of such inspections and shall submit same to the AHC and ACHS before final payment is made and shall pay all fees, charges, and other expenses in connection therewith.

C. All work shall be done in conformance with accepted standards and practices and shall be in conformance with the National Electrical Code, (2011), and all State and local codes applicable.

D. ALL light fixtures are to be ENERGY STAR Qualified.

E. Incandescent lamps shall be inside frosted except for decorative type lighting, where lamps shall match existing.

F. Fluorescent lamps shall be cool white.

G. Exterior exposed lamps shall be PAR type.

H. Size of lamps: incandescent lamps shall not exceed fixture rating.

1.02 COORDINATION

A. Coordination: Reflected ceiling plan(s) and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved or here rehabilitation work is occurring coordinate and verify existing conditions:

1. Lighting fixtures.

2. Suspended ceiling components.

3. Partitions and millwork that penetrate the ceiling or extends to within 12-inches

(305-mm) of the plane of the luminaires.

4. Ceiling-Mounted projectors

5. Structural members to which suspension systems for lighting fixtures will be attached.

6. Other items in finished ceiling including the following:

   a. Air outlets and inlets.

   b. Smoke and fire detectors.

   c. Access panels.

   d. Attic stair.

7. Perimeter moldings.

1.03 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70-2011 (NEC), by a qualified testing agency, and marked for intended location and application.

B. All products shall be an ENERGY STAR rated.

C. Comply with NFPA 70-2011 (NEC).

1.04 COORDINATION

A. Coordinate layout and installation of lighting fixtures and suspension system with other construction that penetrates ceilings or is supported by them, including HVAC equipment, fire-suppression system, and partition assemblies.

1.05 WARRANTY

A. Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

   1. Warranty Period: One year from date of Substantial Completion.

1.06 SUBMITTALS

A. Product data/catalog cut sheets: For each type of product provided.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, product(s) indicated.

B. Basis of design manufacturer is Sea Gull Lighting or approved equal and for ceiling fan units, Concord or approved equal:

1.	Kitchen Ceiling	Sea Gull Lighting 79158BLE-962
2.	Kitchen Over Sink	Sea Gull Lighting 11082LE w/ trim Ring 1162A-14
3.	Bedroom	Concord Fan 42HEH5EWH w/ Light Kit
4.	Hallway Ceilings	Sea Gull Lighting 75940BLE-962
5.	Dining Room	Sea Gull Lighting 75943BLE-962
6.	Living Room	Concord Fan 42HEH5EWH +42CT5AP w/ Light Kit
7.	Basement	Sea Gull Lighting 5997BLE-15
8.	Bedroom/Hall-Wall Mount	Sea Gull Lighting 49036BLE-99
9.	Porch Wall Mount	Sea Gull Lighting 89060BLE-755
10.	Porch Ceiling Mounted	Sea Gull Lighting 79039BLE-57
11.	Bathroom Ceiling	Sea Gull Lighting 75942BLE-962
12.	Bathroom over Mirror	Sea Gull Lighting 44318BLE-965
13.	Bathroom side of Mirror.	Sea Gull Lighting 44316BLE-965
14.	Utility Room Keyless or Pullchain Porcelain	Sea Gull Lighting 5997BLE-15
15.	Under Stairs and Closets	Sea Gull Lighting FS-5990BLE15
16.	Recessed Down lights	Sea Gull Lighting 11082LE w/ trim Ring 1162A-14

2.02 LIGHTING FIXTURE SUPPORT COMPONENTS

A. Wires: ASTM A641/A641M, Class 3, soft temper, zinc-coated steel, 12 gage (2.68- mm).

B. Wires for Humid Spaces: ASTM A580/A580M, Composition 302 or 304, annealed stainless steel, 12 gage (2.68-mm).

C. Rod Hangers: 3/16-inches (5-mm) minimum diameter, cadmium-plated, threaded steel rod.

D. Hook Hangers: Integrated assembly matched to fixture and line voltage and equipped with threaded attachment, cord, and locking-type plug.

E. Compact Fluorescent Lamps: 4-Pin, CRI 80 (minimum), color temperature 3500K, average rated life of 10,000 hours at three hours operation per start and suitable for use with dimming ballasts unless otherwise indicated.

1. 13 W: T4, double or triple tube, rated 900 initial lumens (minimum).
2. 18 W: T4, double or triple tube, rated 1200 initial lumens (minimum).
3. 26 W: T4, double or triple tube, rated 1800 initial lumens (minimum).
4. 32 W: T4, triple tube, rated 2400 initial lumens (minimum).
5. 42 W: T4, triple tube, rated 3200 initial lumens (minimum).
6. 57 W: T4, triple tube, rated 4300 initial lumens (minimum).
7. 70 W: T4, triple tube, rated 5200 initial lumens (minimum).

PART 3 - EXECUTION

3.01 INSTALLATION

A. Lighting fixtures:

1. Set level, plumb, and square with ceilings and walls unless otherwise indicated.

2. Install Compact Fluorescent Lamps in all fixtures.

B. NFPA 70-2011 (NEC) requires minimum support for fixtures.

C. Suspended Lighting Fixture Support:

1. Pendants and Rods: Where longer than 48-inches (1200-mm), brace to limit swinging.

2. Stem-Mounted, Single-Unit Fixtures: Suspend with twin-stem hangers.

3. Continuous Rows: Use tubing or stem for wiring at one point and tubing or

rod for suspension for each unit length of fixture chassis, including one at each end.

4. Do not use grid as support for pendant luminaires. Connect support wires or rods to building structure.

D. Furnish and install lamps for all lights at completion of work. Size of lamps shall not exceed fixture rating.

3.02 IDENTIFICATION

A. Install labels with panel and circuit numbers on concealed junction and outlet boxes.

END OF SECTION

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APPENDIX A – HISTORIC PRESERVATION

ARTICLE I REHABILITATION or REPAIR

A. Houses/buildings listed in the National and/or State Registers of Historic Places (N/SR) or deemed eligible for listing in the N/SR by the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) State Historic Preservation Office (SHPO) will be required to be rehabilitated or repaired within the standards governing historic preservation (see "http://www.nps.gov/history/hps/tps/standguide/"Secretary of Interior's Guidelines for Rehabilitation). Building less than 45 years old may be excluded from review.

B. Houses requiring Historic Rehabilitation shall be designated as such in the Work Write-Up for each property.

C. Historic Rehabilitation is the repair and/or replacement of a building system utilizing like materials (in-kind) and maintaining existing forms in a way that preserves the visual appearance of the existing building while providing for modern use.

D. Historic Rehabilitation mainly consists of exterior elements of the building however, interior rehabilitation/repair may be required depending the age of the building and the quality of the interior design. Intact original floor plans, flooring, moldings, doors and surviving undamaged plaster should be carefully assessed. Questions should be discussed with the SHPO.

E. The "Standards" should be applied when rehabilitation, repair or replacement is proposed for the following exterior building elements and materials:
   1. Roofing
   2. Siding
   3. Exterior Doors
   4. Windows
   5. Architectural Details
   6. Porches
   7. Stairs
   8. ADA Compliant Ramps and Lifts
   9. Unit Masonry

F. All exterior exposed wood should be painted.

ARTICLE II BUILDING ELEMENTS

A. Roofing

   1. If damage to roof is less than 50% the existing roof is to be repaired, except for Asbestos Shingle roofs.

a. Slate Roof: Slate Roofs are to be repaired with matching slate roofing in size and gauge of existing material utilizing a copper tab or hook repair method.

b. Asphalt Shingles: Asphalt shingles are to be repaired with matching roofing material in size, color and tab configuration

i. See Section 073113- Asphalt Shingles.

c. Asbestos Shingle Roofs: Asbestos Shingle roofs are not to be repaired. Abatement of all of the roofing material in conformance with EPA and state guidelines for abatement and disposal is to occur. Inspection of roofing felt and substrate are to occur. If substrate is satisfactory replace roofing felt as per specifications and install Architectural Tab Shingle Roof. Reference manufactures' specifications for installation. If substrate is not satisfactory install substrate as designated in specifications and proceed with installation of felt and building material

d. Architectural Tab Shingles: Architectural tab shingles are repaired with matching roofing material in size, color and tab configuration. Refer to specifications for installation.

i. Section 073113 - Asphalt Shingles.

2. If the roof is a total replacement then Architectural Tab Shingle roof is to be provided. Reference specifications for proper removal and disposal of existing roof, inspection of existing substrate and installation of roofing felt and architectural tab shingle roof assembly.

B. Siding

1. If siding damage is less than 50% of the total surface and Lead Paint Abatement does not prevent repairs, than the siding is to be repaired in the following manner:

a. Vinyl Siding: If vinyl siding exists then the vinyl siding is to be repaired with like material in size profile and color. Painting of entire wall surface of siding may be required to match existing and is included in work. Refer to specifications for installation requirements. THIS IS THE ONLY CONDITION WHERE VINYL SIDING IS ALLOWED IN N/SR LISTED OR ELIGIBLE FOR LISTING HOMES.

i. See Section 074600- Siding.

b. Wood Siding: Wood siding is to be replaced in kind with like material in size and profile. Refer to specification for installation requirements.

i. See Section 074600- Siding.

c. Cement Siding: If cement siding is existing then the siding is to be repaired with like material in size and profile and color. CEMENT SIDING IS NOT ALLOWED IN THE PATCHING OR REPAIR OF EXISTING WOOD SIDING.

i. See Section 074600- Siding.

2. If siding is more than 50% damaged and/or Lead Paint Abatement requires the removal of siding, than the following applies:
    a. Vinyl Siding: Vinyl Siding is to be removed. The substrate is to be examined. If wood siding is present it is to be refurbished and repaired. If wood siding is not repairable, wood siding is to be installed, refer to specifications. The size and profile is to match the existing. Trim profiles are to match existing.
        i. See Section 074600- Siding.
    b. Wood Siding: Existing siding is to be removed. New wood siding is to be replaced in kind, refer to specifications. The size and profile is to match the existing. Trim profiles are to match existing.
        i. See Section 074600- Siding.
    c. Cement Siding: CEMENT SIDING IS NOT ALLOWED, except as a skirting material in a board and batten pattern for homes elevated more than four feet.
        i. See Section 062000 - Finish Carpentry.

C. Exterior Doors

1. Maintain Size and shape of original door openings.
2. Where possible, repair existing wood doors.
3. Replacement Doors should be wood and match as close as possible the original at all publicly visible façades.
4. DOORS WITH FAN OR OVAL LITES ARE NOT ALLOWED.
5. METAL DOORS ARE NOT ALLOWED ON ANY PUBLICLY VISIBLE FAÇADE.
6. Paneled wood door replacements are allowed
    a. See section 082110 - Doors.
7. A historic door from another non-publicly visible façade location may be used.
8. Existing transoms and side lights must be maintained and repaired if required.
    a. If replacement is required see Section 085500 - Windows.

D. Windows

1. Maintain size and shape of existing window openings.
2. Repair existing wood frame windows and sashes at all publicly visible facades.
3. If repair of wood windows at publicly visible facades is not possible, provide wood window in profile as close as possible to match existing removed windows.
    a. See Section 085500 - Windows.
4. Replace vinyl or aluminum windows located in visible facades with wood windows.
    a. Match existing windows, most historic windows are double hung sash.
5. If existing window units are damaged beyond practical repair, the option is given to use full applied grids (interior/spacer/ exterior) in the same light pattern and

proportion as original units. Window profiles will be as close to the original units as possible.

6. Replacement windows at non-visible facades are to be fiberglass or vinyl windows with approval by SHPO.
   a. Window replacement should be done, when window repair is not feasible.
   b. Window repair must include repair of the locking mechanism and the window must be able to close and open and stay open when opened.

7 TINTED GLASS OR REFLECTIVE FINISHES IN WINDOWS IS NOT ALLOWED

E. Shutters.

1. Replacing or repairing of shutters is not part of the program scope. Program scope includes painting of shutters.

F. Architectural Details

1. Architectural details are typically found on the front façade and are commonly made of wood. The following are all considered architectural details: fish turned columns and newel posts, sawn and turned balusters, bracket details at eaves or spanning porch posts/columns, patterned shingle work, door and window hoods, or decorative cornice moldings, broad frieze bands and corner posts.
2. Repair architectural details where possible.
3. The replacements of architectural details are to be as close as possible to the material, size and scale of the originals.
4. If a replacement of a missing or inappropriate architectural detail is required, match detail of similar type on house of similar appearance as approved by SHPO.
5. Inappropriate architectural details added at a later date are to be replaced with appropriate details.
   a. Examples are inappropriate handrails, or metal decorative trim and columns. Replacements of inappropriate details are included in the Work Order.
6. DO NOT ADD ARCHITECTURAL DETAILS TO A HOUSE, WHERE NONE EXISTED.
7. See Section 062000 - Finish Carpentry for detail Elements.

G. Porches & Exterior Stairs

1. Original process and galleries are to be repaired in kind.
2. If replacement of porch or gallery is necessary duplicate details and utilize same materials. Retain as much of the original ornament as possible.
3. Material other than wood is acceptable only if it is documented that it was used on the house originally.
4. See Section 061000 - Rough Carpentry.

H. ADA Compliant Lifts and Ramps

1. Ramps
   a. The installation of ramps or lifts per the specifications must comply with the Rehabilitation Standards for Historic Properties.
   b. Ramps shall be located at the side or rear of the house so as not to obscure the view of the house from the street if possible.
   c. Ramps are to be designed in such a way that the original house material is not removed. The ramp construction and attachment to the house shall be reversible.
   d. Ramps of wood construction must be of a simple design configured to match the original porch railings in materials, dimensions and detailing.
   e. Ramps are to be painted to match color of porch rail or overall house paint color.
   f. See Section 061000 - Rough Carpentry.
   g. See Section 144210 - Lifts.
2. Lifts
   a. Lifts are to be located at the side or rear of the house so as not to obscure the view of the house from the street if possible.
   b. Lifts and the associated pad and landing are to be designed in such a way that the original house material is not removed. The ramp construction and attachment to the house shall be reversible.
   c. Associated landings required for lifts shall be of a matching design to original house and be painted to match color of porch rails or overall house paint color.
   d. See Section 144210 - Lifts.

I. Unit Masonry Restoration and Cleaning

1. Salvaged Brick: Use salvaged brick that is sound, crack free, clean brick without face chips larger than 1/2 inch, salvaged from removal of removed face brick work of same type.
2. Replacement Brick (if required): Maintain Size and shape of original unit masonry units.
3. Mortar to match existing.
4. Lime Mortar: Use lime mortar for repointing of unit masonry in historic structures.
5. See Section 040501 – Unit Masonry, Restoration and Cleaning.

END OF SECTION

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HUD CPD Green Building Retrofit Checklist

The CPD Green Retrofit Checklist promotes energy efficiency and green building practices for residential retrofit projects. Grantees must follow the checklist in its entirety and apply all measures within the Checklist to the extent applicable to the particular building type being retrofitted. The phrase "when replacing" in the Checklist refers to the mandatory replacement with specified green improvements, products, and fixtures only when replacing those systems during the normal course of the retrofit.

WATER AND ENERGY CONSERVATION MEASURES

☐ **Water-Conserving Fixtures**
Install or retrofit water conserving fixtures in any unit and common facility, use the following specifications: Toilets-- 1.28 gpf; Urinals-- 0.5 gpf; Showerheads-- 2.0 gpm; Kitchen faucets-- 2.0 gpm; and Bathroom faucets-- 1.5gpm. [gpf = gallons per flush; gpm = gallons per minute]

☐ **ENERGY STAR Appliances**
Install ENERGY STAR-labeled clothes washers, dishwashers, and refrigerators, if these appliance categories are provided in units or common areas.

☐ **Air Sealing: Building Envelope**
Seal all accessible gaps and penetrations in the building envelope. If applicable, use low VOC caulk or foam.

☐ **Insulation: Attic** (if applicable to building type)

For attics with closed floor cavities directly above the conditioned space, blow in insulation per manufacturer's specifications to a minimum density of 3.5 Lbs. per cubic foot (CF). For attics with open floor cavities directly above the conditioned space, install insulation to meet or exceed IECC levels.

☐ **Insulation: Flooring** (if applicable to building type)
Install ≥ R-19 insulation in contact with the subfloor in buildings with floor systems over vented crawl spaces. Install a 6-mil vapor barrier in contact with 100% of the floor of the crawl space (the ground), overlapping seams and piers at least 6 inches.

☐ **Duct Sealing** (if applicable to building type)

In buildings with ducted forced-air heating and cooling systems, seal all penetrations of the air distribution system to reduce leakage in order to meet or exceed ENERGY STAR for Homes' duct leakage standard.

☐ **Air Barrier System**
Ensure continuous unbroken air barrier surrounding all conditioned space and dwelling units. Align insulation completely and continuously with the air barrier.

☐ **Radiant Barriers: Roofing**
When replacing or making a substantial repair to the roof, use radiant barrier sheathing or other radiant barrier material; if economically feasible,also use cool roofing materials.

☐ **Windows**
When replacing windows, install geographically appropriate ENERGY STAR rated windows.

☐ **Sizing of Heating and Cooling Equipment**
When replacing, size heating and cooling equipment in accordance with the Air Conditioning Contractors of America (ACCA) Manuals, Parts J and S, or 2012 ASHRAE Handbook--HVAC Systems and Equipment or most recent edition.

☐ **Domestic Hot Water Systems**
When replacing domestic water heating system(s), ensure the system(s) meet or exceed the efficiency requirements of ENERGY STAR for Homes' Reference Design. Insulate pipes by at least R-4.

☐ **Efficient Lighting: Interior Units**
Follow the guidance appropriate for the project type: install the ENERGY STAR Advanced Lighting Package (ALP); ***OR*** follow the ENERGY STAR MFHR program guidelines, which require that 80% of installed lighting fixtures within units must be ENERGY STAR-qualified or have ENERGY STAR-qualified lamps installed; ***OR*** when replacing, new fixtures and ceiling fans must meet or exceed ENERGY STAR efficiency levels.

☐ **Efficient Lighting: Common Areas and Emergency Lighting** (if applicable to building type) Follow the guidance appropriate for the project type: use ENERGY STAR-labeled fixtures or any equivalent high-performance lighting fixtures and bulbs in all common areas; ***OR*** when replacing, new common space and emergency lighting fixtures must meet or exceed ENERGY STAR efficiency levels. For emergency lighting, if installing new or replacing, all exist signs shall meet or exceed LED efficiency levels and conform to local building codes.

☐ **Efficient Lighting: Exterior**
Follow the guidance appropriate for the project type: install ENERGY STAR-qualified fixtures or LEDs with a minimum efficacy of 45 lumens/watt; ***OR*** follow the ENERGY STAR MFHR program guidelines, which require that 80% of outdoor lighting fixtures must be ENERGY STAR-qualified or have ENERGY STAR-qualified lamps installed; ***OR*** when replacing, install ENERGY STAR compact fluorescents or LEDs with a minimum efficacy of 45 lumens/watt.

INDOOR AIR QUALITY

☐ **Air Ventilation: Single Family and Multifamily** (three stories or fewer)
Install an in-unit ventilation system capable of providing adequate fresh air per ASHRAE 62.2 requirements.

☐ **Air Ventilation: Multifamily** (four stories or more)
Install apartment ventilation systems that satisfy ASHRAE 62.2 for all dwelling units and common area ventilation systems that satisfy ASHRAE 62.1 requirements. If economically feasible, consider heat/energy recovery for 100% of corridor air supply.

☐ **Composite Wood Products that Emit Low/No Formaldehyde**
Composite wood products must be certified compliant with California 93120. If using a composite wood product that does not comply with California 93120, all exposed edges and sides must be sealed with low-VOC sealants.

☐ **Environmentally Preferable Flooring**
When replacing flooring, use environmentally preferable flooring, including the FloorScore certification. Any carpet products used must meet the Carpet and Rug Institute's Green Label or Green Label Plus certification for carpet, pad, and carpet adhesives.

☐ **Low/No VOC Paints and Primers**All interior paints and primers must be less than or equal to the following VOC levels: Flats--50 g/L; Non- flats--50 g/L; Floor--100 g/L. [g/L = grams per liter; levels are based on a combination of the Master Painters Institute (MPI) and GreenSeal standards.]

☐ **Low/No VOC Adhesives and Sealants**
All adhesives must comply with Rule 1168 of the South Coast Air Quality Management District. All caulks and sealants must comply with regulation 8, rule 51, of the Bay Area Air Quality Management District.

☐ **Clothes Dryer Exhaust**
Vent clothes dryers directly to the outdoors using rigid-type duct work.

☐ **Mold Inspection and Remediation**
Inspect the interior and exterior of the building for evidence of moisture problems. Document the extent and location of the problems, and implement the proposed repairs according to the Moisture section of the EPA Healthy Indoor Environment Protocols for Home Energy Upgrades.

☐ **Combustion Equipment**
When installing new space and water-heating equipment, specify power-vented or direct vent combustion equipment.

☐ **Mold Prevention: Water Heaters**
Provide adequate drainage for water heaters that includes drains or catch pans with drains piped to the exterior of the dwelling.

☐ **Mold Prevention: Surfaces**
When replacing or repairing bathrooms, kitchens, and laundry rooms, use materials that have durable, cleanable surfaces.

☐ **Mold Prevention: Tub and Shower Enclosures**
When replacing or repairing tub and/or shower enclosures, use non-paper-faced backing materials such as cement board, fiber cement board, or equivalent in bathrooms.

☐ **Integrated Pest Management**
Seal all wall, floor, and joint penetrations with low-VOC caulking or other appropriate sealing methods to prevent pest entry. [If applicable, provide training to multifamily buildings staff.]

☐ **Lead-Safe Work Practices**
For properties built before 1978, if the project will involve disturbing painted surfaces or cleaning up lead contaminated dust or soil, use certified renovation or lead abatement contractors and workers using lead-safe work practices and clearance examinations consistent with the more stringent of EPA's Renovation, Repair, and Painting Rule and HUD's Lead Safe Housing Rule.

☐ **Radon Testing and Mitigation** (if applicable based on building location)

For buildings in EPA Radon Zone 1 or 2, test for radon using the current edition of American Association of Radon Scientists and Technologists (AARST)'s Protocols for Radon Measurement in Homes Standard for Single-Family Housing or Duplexes, or AARST's Protocol for Conducting Radon and Radon Decay Product Measurements in Multifamily Buildings. To install radon mitigation systems in buildings with radon level of 4 pCi/L or more, use ASTM E 2121 for single-family housing or duplexes, or AARST's Radon Mitigation Standards for Multifamily Buildings. For new construction, use AARST's Reducing Radon in New Construction of 1 & 2 Family Dwellings and Townhouses, or ASTM E 1465.

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RESILIENCE GUIDELINES

A. Elevate Structure

Elevating a home to prevent floodwaters from reaching living areas is an effective retrofitting method. The goal of the elevation process is to raise the lowest floor to or above the Design Flood elevation (DFE). For substantially damaged buildings the lowest floor must be at least 2 feet above the DFE. You can do this by elevating the entire home, including the floor, or by leaving the home in its existing position and constructing a new raised floor within the home. The method used depends largely on construction type, foundation type, and flooding conditions.

During the elevation process, most homes are separated from their foundations, raised on hydraulic jacks, and held by temporary supports while a new or extended foundation is constructed below. This method works well for homes originally built on basements, crawlspaces, and open foundations. The new or extended foundations can consist of continuous walls or separate piers, posts, columns, or piles.

For homes with slab-on-grade foundations, elevation can be done in one of two ways. One approach is to leave the home attached to the slab foundation and lift both together. After the home and slab are lifted, a new foundation is constructed below the slab. The other approach is to detach the home from the slab and elevate the home, leaving the slab foundation in place. After the home is lifted, a new, elevated floor is constructed.

Alternative techniques are available for masonry homes on slab-on-grade foundations. These techniques do not require lifting the home. Instead, they involve raising the floor within the home or moving the living space to an upper story.

Although elevating a home can help protect it from floodwaters, other hazards should be considered before choosing this method. Elevating the home may cause it to become “top heavy” and, therefore, more susceptible to the overturning from other forces. Individuals should consult a design professional to determine the best available option for their particular situation.

The decision to elevate a building will depend on the location of the building and the extent of the damage. The following criteria can help determine if elevating the building is “required”, “highly recommended” or “recommended”. When either “highly recommended” or “recommended” a design professional should be consulted to determine if that option is cost effective.

If Building is within the 100 yr floodplain:

- **Building has *Substantial Damage*:**
  - **Required**
- **Building has Non-substantial Damage:**
  - **Highly Recommended if:**
    - Foundation type is basement, crawlspace or open foundation
  - **Recommended if:**
    - Foundation type is slab-on-grade

If Building is outside the 100 yr floodplain:

- **Building has Substantial Damage:**
  - **Highly Recommended if:**
    - Foundation type is basement, crawlspace or open foundation and lowest floor is below DFE
  - **Recommended if:**
    - Foundation is slab-on-grade and if cost effective (See table 1.0)

- **Building has Non-substantial Damage**
  - **Highly Recommended if:**
    - Foundation type is basement, crawlspace or open foundation and lowest floor is below DFE and cost effective – See table 1.0
  - **Recommended if:**
    - Foundation is Slab-on-grade and if cost effective – See table 1.0

Construction Type	Existing Foundation	Retrofit	Relative Cost
Frame	Basement, crawlspace or open foundation	Elevate on continuous foundation walls or open foundation	Lowest
Frame with masonry veneer		Elevate on continuous foundation walls or open foundation	
Load bearing masonry		Extend existing walls and create new elevated living area	
Frame	Slab-on-grade	Elevate on continuous foundation walls or open foundation	
Frame with masonry veneer		Elevate on continuous foundation walls or open foundation	
Load bearing masonry		Elevate on continuous foundation walls or open foundation	Highest

Elevating Structure Cost Effectiveness Comparison – Table 1.0

Construction Type	Existing Foundation	Retrofit	Cost (per square foot of house footprint)
Frame (for frame house with brick veneer on walls, add 10 percent)	Basement or Crawlspace	Elevate 2 Feet on Continuous Foundation Walls or Open Foundation	$29
		Elevate 4 Feet on Continuous Foundation Walls or Open Foundation	$32
		Elevate 8 Feet on Continuous Foundation Walls or Open Foundation	$37
	Slab-on-Grade	Elevate 2 Feet on Continuous Foundation Walls or Open Foundation[1]	$80
		Elevate 4 Feet on Continuous Foundation Walls or Open Foundation[1]	$83
		Elevate 8 Feet on Continuous Foundation Walls or Open Foundation[1]	$88
Masonry	Basement or Crawlspace	Elevate 2 Feet on Continuous Foundation Walls or Open Foundation	$60
		Elevate 4 Feet on Continuous Foundation Walls or Open Foundation	$63
		Elevate 8 Feet on Continuous Foundation Walls or Open Foundation	$68
	Slab-on-Grade	Elevate 2 Feet on Continuous Foundation Walls or Open Foundation[1]	$88
		Elevate 4 Feet on Continuous Foundation Walls or Open Foundation[1]	$91
		Elevate 8 Feet on Continuous Foundation Walls or Open Foundation[1]	$96

[1]Price shown is for raising the house with the slab attached.

Elevating Structure Estimated Cost – 2009 National Averages Table 1.1 (Source FEMA). The approximate costs are provided only as examples of what to expect when choosing a retrofitting method. They are based on past experience and 2009 national averages that may need to be adjusted for local economic conditions.

B. Elevate Electrical Systems and Components

Electrical system components such as the electric meter, fuse and circuit breaker box, wiring, switches and outlets are easily damaged by flood water. If these items are under water, even for a short period of time, they will need to be replaced. It is not possible to repair them. By continuing to use them after a flood you run the risk of a short circuit and the possibility of a fire occurring. Raising the electrical system can help you to avoid this problem in a future flood. This can also reduce the time and cost of repairing your home should another flood occur. Following a flood it may be appropriate to elevate the electrical system since it is possible that you will need to replace the wall board and insulation. This means you will have already exposed the wiring and will have easy access to the wall cavity.

The decision to elevate the electrical systems and components will depend on the location of the building and the extent of the damage. The following criteria can help determine if elevating the electrical systems and components is "required", "highly recommended" or "recommended." When either "highly recommended" or "recommended" a design professional should be consulted to determine if that option is cost effective.

If Building is within the 100 yr floodplain:

- **Building has Substantial Damage**
  - **Required**
- **Building has Non-substantial Damage**
  - **Required If:**
    - Replacing or altering damaged portion of system
  - **Highly Recommended based on the following considerations:**

a. System equipment (meter, main service panel, breaker and fuse boxes, and transformer):

- Is all system equipment located above the DFE?
- If not, can all of the equipment be relocated above the DFE, is a room above the DFE available?
- If not, move the equipment as high as possible, even if the equipment elevation remains below the DFE.

b. Distribution system (wiring, receptacles, outlets and switches):

- Are all system components located above the DFE?
- If not, can all receptacles, outlets and switches below the DFE be elevated or removed?
- If not, place the receptacles remaining below the DFE on one or two separate circuits. Install and clearly identify ground fault circuit interrupter breakers on those circuits. (Note: receptacles and switches below the DFE should be installed in non-corrosive boxes with holes punched in the bottom to facilitate drying. The receptacles will have to be replaced after inundation by floodwaters.)

If Building is outside the 100 yr floodplain:

- **Building has Substantial Damage**
  - **Highly Recommended if:**
    - Electrical system or components are below DFE

- **Building has Non-substantial Damage**
  - **Recommended if:**
    - Electrical system or components are below DFE and if cost effective based on the following considerations:

      a. System equipment (meter, main service panel, breaker and fuse boxes, and transformer):

      - Is all system equipment located above the DFE?
      - If not, can all of the equipment be relocated above the DFE, is a room above the DFE available?
      - If not, move the equipment as high as possible, even if the equipment elevation remains below the DFE.

      b. Distribution system (wiring, receptacles, outlets and switches):

      - Are all system components located above the DFE?
      - If not, can all receptacles, outlets and switches below the DFE be elevated or removed?
      - If not, place the receptacles remaining below the DFE on one or two separate circuits. Install and clearly identify ground fault circuit interrupter breakers on those circuits. (Note: receptacles and switches below the DFE should be installed in non-corrosive boxes with holes punched in the bottom to facilitate drying. The receptacles will have to be replaced after inundation by floodwaters.

C. Secure Fuel Tanks

Many homes are heated by fuel oil or propane which are stored in unsecured above ground tanks. These tanks are typically found in the yard outside the home, or in the basement. Both locations pose a serious problem during a disaster. An unanchored tank outside of the your home can be driven into the outside of your home causing structural damage, or swept downstream to strike other homes.

The following items should be considered with respect to fuel supply/storage systems:

- extension of fuel supply lines to relocated equipment;
- use of flexible connections;
- Adequate support and anchorage to resist hydrostatic and hydrodynamic forces that act on tanks. This can be accomplished by:
    - elevating tanks on structural fill;
    - elevating tanks on a braced platform;
- anchoring tanks to properly install and use designed ground anchors ;
- anchoring supply lines to the downstream side of structural members;
- relocating fuel tank because of equipment relocation; and
- using automatic cut-off valves.

The decision to secure fuel tanks and components will depend on the location of the building and the extent of the damage. The following criteria can help determine if securing fuel tanks and components is "required", "highly recommended" or "recommended." When either "highly recommended" or "recommended" a design professional should be consulted to determine if that option is cost effective.

If Building is within the 100 yr floodplain:

- **Building has Substantial Damage**
    - **Required**
- **Building has Non-substantial Damage**
    - **Required if:**
        - Replacing or altering the fuel system or tank
    - **Highly Recommended otherwise**

If Building is outside the 100 yr floodplain:

- **Building has Substantial Damage**
    - **Highly Recommended**
- **Building has Non-substantial Damage**
    - **Highly Recommended**

D. Use Flood Resistant Building Materials

All materials exposed to floodwater must be durable, resistant to flood forces, and retardant to deterioration caused by repeated exposure to floodwater. Interior building elements such as wall finishes, floors, ceilings, roofs, and building envelope openings can also suffer considerable damage from inundation by floodwater, which can lead to failure or an unclean situation. The exterior cladding of a structure subject to flooding should be non-porous, resistant to chemical corrosion or debris deposits, and conducive to easy cleaning. Interior cladding should be easy to clean and not susceptible to damage from inundation. Likewise, floors, ceilings, roofs, fasteners, gaskets, connectors, and building envelope openings should be constructed of flood-resistant materials to minimize damage during and after floodwater inundation. Generally, these performance requirements indicate that masonry construction is the most suited to wet flood proofing in terms of damage resistance. In some cases, wood or steel structures may be candidates, provided that the wood is pressure treated or naturally decay-resistant and steel is galvanized or protected with rust-retardant paint. A detailed list of appropriate materials can be found in NFIP Technical Bulletin2-08, Flood-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas in Accordance with the National Flood Insurance Program (http://www.fema.gov/library/viewRecord.do?id=1580). Table 2 of Technical Bulletin 2-08 can be used as a guide for selecting structural (framing and some sheathing) and nonstructural (coverings finishes, insulation, cabinets, doors, partitions, and windows) building components for use below the DFE. Some combinations of acceptable materials may result in unacceptable conditions; always refer to the manufacturer's specifications for more information.

The decision to replace and/or use flood resistant building materials will depend on the location of the building and the extent of the damage. The following criteria can help determine when flood resistant building material is "required", "highly recommended" or "recommended." When either "highly recommended" or "recommended" a design professional should be consulted to determine if that option is cost effective.

If Building is within the 100 yr floodplain:

- **Building has Substantial Damage**
  - **Required per the Residential Code of New York State**
- **Building has Non-substantial Damage**
  - **Required if:**
    - Replacing or altering materials
  - **Highly Recommended if:**
    - Building material is below DFE and replacement is cost effective

If Building is outside the 100 yr floodplain:

- **Building has Substantial Damage**
  - **Highly Recommended if:**
    - Building material is below DFE
- **Building has Non-substantial Damage**
  - **Highly Recommended if:**
    - Building material is below DFE and replacement is cost effective

E. Install Flood Vents

If basement and crawlspace walls are not designed with openings to relieve the pressure of standing water or moving water against them during a flood, the walls can be damaged or fail. If the walls are "load bearing" walls that support the upper floors of the building there is the risk of partial or total collapse of the building. To address this problem, installation of flood vents will allow flood waters to enter and exit the space automatically. By allowing the space to fill with water, the pressure being exerted on the interior and exterior surfaces of the wall is equal and thereby lessens the potential for damage from hydrostatic pressure.

The decision to install flood vents will depend on the location of the building and the extent of the damage. The following criteria can help determine if installing flood vents in basement and crawlspace walls is "required", "highly recommended" or "recommended." When either "highly recommended" or "recommended" a design professional should be consulted to determine if that option is cost effective.

If Building is within the 100 yr floodplain:

- **Building has Substantial Damage**
  - **Required:**
    - in flood-resistant design for enclosed areas below DFE when allowed
- **Building has Non-substantial Damage**
  - **Highly Recommended if:**
    - Enclosed areas is altered, or repaired and below DFE
  - **Highly Recommended if:**
    - Enclosed areas is below DFE

If Building is outside the 100 yr floodplain:

- **Building has Substantial Damage**
  - **Required if:**
    - Building is in A or Z zone or enclosed area is below DFE
- **Building has Non-substantial Damage**
  - **Recommended if:**
    - Cost effective

F. Install Backflow Valves

Backflow valves can help prevent backflow through the sanitary sewer and/or drainage systems into the house. They should be considered for sanitary sewer drainage systems that have fixtures below the DFE. In some instances, combined sewers (sanitary and storm) present the greatest need for backflow valves because they can prevent both a health and flooding hazard. Backflow valves are not foolproof; their effectiveness can be reduced because of fouling of the internal mechanism by soil or debris. Periodic maintenance is required.

The decision to install a backflow valves will depend on the location of the building and the extent of the damage. The following criteria can help determine if installing a backflow valve is "required", "highly recommended" or "recommended." When either highly recommended or recommended a design professional should be consulted to determine if that option is cost effective.

If Building is within the 100 yr floodplain:

- **Building has Substantial Damage**
  - **Required if:**
    - Flood level rim of fixtures are below the elevation of the manhole cover of the next upstream manhole of public sewer
- **Building has Non-substantial Damage**
  - **Required if:**
    - Replacing or altering the *Building Drain* when flood level rim of fixtures are below the elevation of the manhole cover of the next upstream manhole of public sewer
  - **Recommended if:**
    - Cost Effective

If Building is outside the 100 yr floodplain:

- **Building has Substantial Damage**
  - **Required if:**
    - Flood level rim of fixtures are below the elevation of the manhole cover of the next upstream manhole of public sewer
- **Building has Non-substantial Damage**
  - **Recommended if:**
    - Cost effective

G. Install Roof Strapping

The connection between your roof structure and the walls is an important structural connection for a home in some wind regions. It is also one of the things that you may be able to strengthen without too much disruption to the interior of the house. If it is possible to gain access to the connection along the eave, either because there is no soffit (and consequently access is easy) or through the soffit area, it may be possible to install straps or clips that will anchor the roof structure to the top of the wall and preferably directly to the wall studs. A good opportunity presents itself when the house is being reroofed to strengthen the roof-to-wall connection. At that time, the removal or partial removal of roof deck sheathing at the eaves, exposes the roof-to-wall connection, allowing the installation of brackets, clips, or straps that will reinforce the connection.

The decision to install roof strapping will depend on the location of the building (based on wind speed region) and the extent of the damage. The following criteria can help determine if installing roof strapping is "required", "highly recommended" or "recommended." When either highly recommended or recommended a design professional should be consulted to determine if that option is cost effective.

If Building is within a wind speed region equal to or greater than 110 mph:

- **Building has Substantial Damage**
  - **Highly Recommended**:
    - in wind speed regions equal to or greater than 110 as per Figure R301.2(4) of the Residential Code of New York State
- **Building has Non-substantial Damage**
  - **Recommended:**
    - in wind speed regions greater than 110 as per Figure R301.2(4) of the Residential Code of New York State

If Building is within a wind speed region less than 110 mph:

- **Building has Substantial Damage**
  - **Not required**
- **Building has Non-substantial Damage**
  - **Not required**

END OF SECTION

Flood Damage–Resistant Materials Requirements

for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program

Technical Bulletin 2 / August 2008

FEMA

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Revision to Table 2 footnote (*) made in October 2010.

Comments on the Technical Bulletins should be directed to:

Department of Homeland Security
FEMA Federal Insurance and Mitigation Administration
500 C Street, SW.
Washington, D.C. 20472

Technical Bulletin 2-08 replaces Technical Bulletin 2-93, *Flood-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas in accordance with the National Flood Insurance Program*.

Introduction

Protecting buildings that are constructed in special flood hazard areas (SFHAs) from damage caused by flood forces is an important objective of the National Flood Insurance Program (NFIP). In support of this objective, the NFIP regulations include minimum building design criteria that apply to new construction, repair of substantially damaged buildings, and substantial improvement of existing buildings in SFHAs. The base flood is used to delineate SFHAs on Flood Insurance Rate Maps (FIRMs) prepared by the NFIP. The base flood is the flood that has a 1-percent chance of being equaled or exceeded in any given year (commonly called the "100-year" flood). Certain terms used in this Technical Bulletin are defined in the Glossary.

Under the NFIP, the "lowest floor" is the floor of the lowest enclosed area of a building. An unfinished or flood-resistant enclosure that is used solely for parking of vehicles, building access, or storage is not the lowest floor, provided the enclosure is built in compliance with applicable requirements.

As used by the NFIP, an "enclosure" is an area that is enclosed on all sides by walls.

The NFIP defines a "basement" as any area that is below-grade on all sides. The regulations do not allow basements to extend below the BFE.

The NFIP regulations require the use of construction materials that are resistant to flood damage. The lowest floor of a residential building must be elevated to or above the base flood elevation (BFE), while the lowest floor of a non-residential building must be elevated to or above the BFE or dry floodproofed to the BFE.

All construction below the BFE is susceptible to flooding and must consist of flood damage-resistant building materials. The purpose of this Technical Bulletin is to provide current guidance on what constitute "materials resistant to flood damage" and how and when these materials must be used to improve a building's ability to withstand flooding.

Table 1 describes five classes of materials ranging from those that are highly resistant to floodwater damage, to those that have no resistance to flooding. Materials are broadly described as structural materials and finish materials based on how they are used in normal construction practices. Table 2 lists materials by generic names, and notes whether the materials are acceptable or unacceptable for use below the BFE. All building materials are in some way fastened or connected to the structure. Fasteners and connectors, as described in this Technical Bulletin, also must be resistant to flood damage.

A brief description of the process used to identify or determine whether the materials listed are flood damage-resistant is provided, followed by some simplified examples with diagrams to illustrate the use of these materials below the BFE. Three additional circumstances where flood damage-resistant materials are used or recommended are described: accessory structures, limited use of wet floodproofing, and buildings outside of SFHAs.

Questions about use of flood damage-resistant materials should be directed to the appropriate local official, NFIP State Coordinating Office, or one of the Federal Emergency Management Agency's (FEMA's) Regional Offices.

NFIP Regulations

The NFIP regulations for flood damage-resistant materials are codified in Title 44 of the Code of Federal Regulations, in Section 60.3(a)(3), which states that a community shall:

> *"Review all permit applications to determine whether proposed building sites will be reasonably safe from flooding. If a proposed building site is in a floodprone area, all new construction and substantial improvements shall...(ii) be constructed with materials resistant to flood damage..."*

Proposals for substantial improvement of existing buildings in SFHAs, and proposals to repair those that have sustained substantial damage, must comply with the requirements for new construction. As part of issuing permits, community officials must review such proposals to determine whether they comply with the requirements, including the use of flood damage-resistant materials. Refer to the "Classification of Flood Damage-Resistant Materials" section of this Technical Bulletin for additional details. Further information on substantial improvement and substantial damage is found in *Answers to Questions About Substantially Damaged Buildings* (FEMA 213).

The NFIP Technical Bulletins provide guidance on the minimum requirements of the NFIP regulations. Community or State requirements that exceed those of the NFIP take precedence. Design professionals should contact the community to determine whether more restrictive provisions apply to the building or site in question. All other applicable requirements of the State or local building codes must also be met for buildings in all flood hazard areas.

Required Use of Flood Damage-Resistant Materials

Flood Damage-Resistant Material

"Flood [damage]-resistant material" is defined by the NFIP as "any building product [material, component or system] capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage." The term "prolonged contact" means at least 72 hours, and the term "significant damage" means any damage requiring more than cosmetic repair. "Cosmetic repair" includes cleaning, sanitizing, and resurfacing (e.g., sanding, repair of joints, repainting) of the material. The cost of cosmetic repair should also be less than the cost of replacement of affected materials and systems. In addition to these requirements, individual materials that are considered flood damage-resistant must not cause degradation of adjacent materials or the systems of which the material is a part.

The *International Building Code*® (IBC®), by reference to ASCE 24 *Flood Resistant Design and Construction*, and the *International Residential Code*® (IRC®), require the use of flood damage-resistant materials.

All building materials below the BFE must be flood damage-resistant, regardless of the expected or historic flood duration. For example, buildings in coastal areas that experience relatively short-duration flooding (generally, flooding with a duration of less than 24 hours) must be constructed with flood damage-resistant materials below the BFE. As noted in Table 2, **only Class 4 and Class 5 materials are acceptable for areas below the BFE in buildings in SFHAs**.

In some instances, materials that are not flood damage-resistant materials, such as wiring for fire alarms and emergency lighting, are allowed below the BFE if specifically required to address life safety and electric code requirements for building access and storage areas.

How Flood Damage-Resistant Materials Affect Flood Insurance Rates

Careful attention to compliance with the NFIP regulations for flood damage-resistant materials is important during design, plan review, construction, and inspection. Compliance influences both the building's vulnerability to flood damage and the cost of NFIP flood insurance. Flood insurance will not pay a claim for finish materials located in basements or in enclosed areas below the lowest floor of elevated buildings, even if such materials are considered to be flood damage-resistant. NFIP claims for damage below the BFE are limited to utilities and equipment, such as furnaces and water heaters.

Classification of Flood Damage-Resistant Materials

The information in this Technical Bulletin was initially developed based on information in the U.S. Army Corps of Engineers' *Flood Proofing Regulations* (1995), and has been updated based on additional information from FEMA-funded studies and reports, technical experts, and industry and trade groups. Table 1 classifies building materials according to their ability to resist flood damage.

Table 1. Class Descriptions of Materials

NFIP	Class	Class Description
ACCEPTABLE	5	Highly resistant to floodwater[1] damage, including damage caused by moving water.[2] These materials can survive wetting and drying and may be successfully cleaned after a flood to render them free of most harmful pollutants.[3] Materials in this class are permitted for partially enclosed or outside uses with essentially unmitigated flood exposure.
	4	Resistant to floodwater[1] damage from wetting and drying, but less durable when exposed to moving water.[2] These materials can survive wetting and drying and may be successfully cleaned after a flood to render them free of most harmful pollutants.[3] Materials in this class may be exposed to and/or submerged in floodwaters in interior spaces and do not require special waterproofing protection.
UNACCEPTABLE	3	Resistant to clean water[4] damage, but not floodwater damage. Materials in this class may be submerged in clean water during periods of flooding. These materials can survive wetting and drying, but may not be able to be successfully cleaned after floods to render them free of most[3] harmful pollutants.
	2	Not resistant to clean water[4] damage. Materials in this class are used in predominantly dry spaces that may be subject to occasional water vapor and/or slight seepage. These materials cannot survive the wetting and drying associated with floods.
	1	Not resistant to clean water[4] damage or moisture damage. Materials in this class are used in spaces with conditions of complete dryness. These materials cannot survive the wetting and drying associated with floods.

Notes:

1. Floodwater is assumed to be considered "black" water; black water contains pollutants such as sewage, chemicals, heavy metals, or other toxic substances that are potentially hazardous to humans.

2. Moving water is defined as water moving at low velocities of 5 feet per second (fps) or less. Water moving at velocities greater than 5 fps may cause structural damage to building materials.

3. Some materials can be successfully cleaned of most of the pollutants typically found in floodwater. However, some individual pollutants such as heating oil can be extremely difficult to remove from uncoated concrete. These materials are flood damage-resistant except when exposed to individual pollutants that cannot be successfully cleaned.

4. Clean water includes potable water as well as "gray" water; gray water is wastewater collected from normal uses (laundry, bathing, food preparation, etc.).

MODIFIED FROM: USACE 1995 *Flood Proofing Regulations*

Table 2 lists structural materials and finish materials commonly used in construction of floors, walls, and ceilings. For the purpose of this Technical Bulletin, structural materials and finish materials are defined as follows:

- **Structural materials** include all elements necessary to provide structural support, rigidity, and integrity to a building or building component. Structural materials include floor slabs, beams, subfloors, framing, and structural building components such as trusses, wall panels, I-joists and headers, and interior/exterior sheathing.

- **Finish materials** include all coverings, finishes, and elements that do not provide structural support or rigidity to a building or building component. Finish materials include floor coverings, wall and ceiling surface treatments, insulation, cabinets, doors, partitions, and windows.

Notes Regarding Classification of Materials

The classifications in Table 2 are based on the best information available at the time of publication. However, flood damage-resistance is determined by factors that may be a function of the specific application and by the characteristics of the floodwaters. Each situation requires sound judgment and knowledge of probable contaminants in local floodwaters to select materials that are required to resist flood damage. For materials and products that are listed in Table 2, manufacturers' use and installation instructions must be followed to ensure maximum performance. Masonry and wood products used below the BFE must comply with the applicable standards published by the American Society for Testing and Materials (ASTM), the American Concrete Institute (ACI), the Truss Plate Institute (TPI), the American Forest & Paper Association (AF&PA), and other appropriate organizations.

1. **Materials Not Listed:** Table 2 does not list all available structural materials and finish materials. For materials and products not listed, manufacturers' literature (i.e., specifications, materials safety data sheets, test reports) should be evaluated to determine if the product meets flood damage-resistance requirements. Materials and products that are not listed in Table 2 may be used if accepted by the local official. Acceptance should be based on sufficient evidence, provided by the applicant, that the materials proposed to be used below the BFE will resist flood damage without requiring more than cosmetic repair and cleaning.

2. **Unacceptable Materials:** Class 1, 2, and 3 materials are unacceptable for below-BFE applications for one or more of the following reasons:

   - Normal adhesives specified for above-grade use are water soluble or are not resistant to alkali or acid in water, including groundwater seepage and vapor.

   - The materials contain wood or paper products, or other materials that dissolve or deteriorate, lose structural integrity, or are adversely affected by water.

   - Sheet-type floor coverings (linoleum, rubber tile) or wall coverings (wallpaper) restrict drying of the materials they cover.

   - Materials are dimensionally unstable.

   - Materials absorb or retain excessive water after submergence.

3. **Impact of Material Combinations:** In some cases, the combination of acceptable structural and finish materials can negatively impact the classification of individual materials. This is illustrated by the following examples:

- Vinyl tile with chemical-set adhesives is an acceptable finish flooring material when placed on a concrete structural floor. However, when the same vinyl tile is applied over a plywood structural floor, it is no longer considered acceptable because the vinyl tile must be removed to allow the plywood to dry.

- Polyester-epoxy or oil-based paints are acceptable wall finishes when applied to a concrete structural wall. However, when the same paint is applied to a wood wall, it is no longer considered acceptable. Recent FEMA-supported studies by Oak Ridge National Laboratory have found that low-permeability paint can inhibit drying of the wood wall.

4. **Impact of Long-Duration Exposure and/or Contaminants:** The classifications of materials listed in Table 2 do not take into account the effects of long-duration exposure to floodwaters or contaminants carried by floodwaters. This is illustrated by the following examples:

- Following Hurricane Katrina, FEMA deployed a Mitigation Assessment Team (MAT) to examine how building materials performed after long-duration exposure (2 to 3 weeks) to floodwaters (FEMA 549). The field survey revealed that some materials absorbed floodborne biological and chemical contaminants. However, it is not known at this time if a shorter duration flood event would have significantly altered the absorption rates of those contaminants.

- Building owners, design professionals, and local officials should consider potential exposure to floodborne contaminants when selecting flood damage-resistant materials. For example, Table 2 lists cast-in-place concrete, concrete block, and solid structural wood (2x4s, etc.), as acceptable flood damage-resistant materials. However, experience has shown that buildings with those materials can be rendered unacceptable for habitation after being subjected to floodwaters with significant quantities of petroleum-based products such as home heating oil. Commonly used cleaning and remediation practices do not reduce the "off-gassing" of volatile hydrocarbons from embedded oil residues to acceptable levels that are established by the U.S. Environmental Protection Agency. Other materials, when exposed to these types of contaminants, may also not perform acceptably as flood damage-resistant materials.

Table 2. Types, Uses, and Classifications of Materials

Types of Building Materials	Uses of Building Materials		Classes of Building Materials				
			Acceptable		Unacceptable		
	Floors	Walls/ Ceilings	5	4	3	2	1
Structural Materials (floor slabs, beams, subfloors, framing, and interior/exterior sheathing)							
Asbestos-cement board		■	■				
Brick							
Face or glazed		■	■				
Common (clay)		■		■			
Cast stone (in waterproof mortar)		■	■				
Cement board/fiber-cement board		■	■				
Cement/latex, formed-in-place	■			■			
Clay tile, structural glazed		■	■				
Concrete, precast or cast-in-place	■	■	■				
Concrete block[1]		■	■				
Gypsum products							
Paper-faced gypsum board		■			■		
Non-paper-faced gypsum board		■		■			
Greenboard		■				■	
Keene's cement or plaster		■			■		
Plaster, otherwise, including acoustical		■				■	
Sheathing panels, exterior grade		■			■		
Water-resistant, fiber-reinforced gypsum exterior sheathing		■		■			
Hardboard (high-density fiberboard)							
Tempered, enamel or plastic coated		■				■	
All other types		■					■
Mineral fiberboard		■					■
Oriented-strand board (OSB)							
Exterior grade	■	■				■	
Edge swell-resistant OSB	■	■				■	
All other types	■	■					■
Particle board	■						■
Plywood							
Marine grade	■	■	■				
Preservative-treated, alkaline copper quaternary (ACQ) or copper azole (C-A)	■	■		■			

Table 2. Types, Uses, and Classifications of Materials (continued)

Types of Building Materials	Uses of Building Materials		Classes of Building Materials				
			Acceptable		Unacceptable		
	Floors	Walls/ Ceilings	5	4	3	2	1
Structural Materials (floor slabs, beams, subfloors, framing, and interior/exterior sheathing)							
Preservative-treated, Borate[2]	■	■	■				
Exterior grade/Exposure1 (WBP – weather and boil proof)	■	■		■			
All other types	■	■					■
Recycled plastic lumber (RPL)							
Commingled, with 80-90% polyethylene (PE)	■		■				
Fiber-reinforced, with glass fiber strands	■		■				
High-density polyethylene (HDPE), up to 95%	■		■				
Wood-filled, with 50% sawdust or wood fiber	■				■		
Stone							
Natural or artificial non-absorbent solid or veneer, waterproof grout	■	■	■				
All other applications		■				■	
Structural Building Components							
Floor trusses, wood, solid (2x4s), decay-resistant or preservative-treated	■	■		■			
Floor trusses, steel[3]	■		■				
Headers and beams, solid (2x4s) or plywood, exterior grade or preservative-treated		■		■			
Headers and beams, OSB, exterior grade or edge-swell resistant		■				■	
Headers and beams, steel[3]		■	■				
I-joists	■					■	
Wall panels, plywood, exterior grade or preservative-treated		■		■			
Wall panels, OSB, exterior grade or edge-swell resistant		■				■	
Wall panels, steel[3]		■		■			

Table 2. Types, Uses, and Classifications of Materials (continued)

Types of Building Materials	Uses of Building Materials		Classes of Building Materials				
			Acceptable		Unacceptable		
	Floors	Walls/ Ceilings	5	4	3	2	1
Structural Materials (floor slabs, beams, subfloors, framing, and interior/exterior sheathing)							
Wood							
Solid, standard, structural (2x4s)		■		■			
Solid, standard, finish/trim		■			■		
Solid, decay-resistant[4]	■	■	■				
Solid, preservative-treated, ACQ or C-A		■		■			
Solid, preservative-treated, Borate[2]		■		■			
Finish Materials (floor coverings, wall and ceiling finishes, insulation, cabi- nets, doors, partitions, and windows)							
Asphalt tile[5]							
With asphaltic adhesives	■				■		
All other types	■						■
Cabinets, built-in							
Wood		■				■	
Particle board		■					■
Metal[3]		■		■			
Carpeting	■						■
Ceramic and porcelain tile							
With mortar set	■	■		■			
With organic adhesives	■	■				■	
Concrete tile, with mortar set	■		■				
Corkboard		■				■	
Doors							
Wood, hollow		■				■	
Wood, lightweight panel construction		■				■	
Wood, solid		■				■	
Metal, hollow[3]		■		■			
Metal, wood core[3]		■		■			
Metal, foam-filled core[3]		■		■			
Fiberglass, wood core		■		■			
Epoxy, formed-in-place	■		■				

Table 2. Types, Uses, and Classifications of Materials (continued)

Types of Building Materials	Uses of Building Materials		Classes of Building Materials				
			Acceptable		Unacceptable		
	Floors	Walls/ Ceilings	5	4	3	2	1
Finish Materials (floor coverings, wall and ceiling finishes, insulation, cabi- nets, doors, partitions, and windows)							
Glass (sheets, colored tiles, panels)		■		■			
Glass blocks		■	■				
Insulation							
Sprayed polyurethane foam (SPUF) or closed-cell plastic foams	■	■	■				
Inorganic – fiberglass, mineral wool: batts, blankets, or blown	■	■			■		
All other types (cellulose, cotton, open-cell plastic foams, etc.)	■	■				■	
Linoleum	■						■
Magnesite (magnesium oxychloride)	■						■
Mastic felt-base floor covering	■						■
Mastic flooring, formed-in-place	■		■				
Metals, non-ferrous (aluminum, copper, or zinc tiles)		■			■		
Metals							
Non-ferrous (aluminum, copper, or zinc tiles)		■			■		
Metals, ferrous[3]		■		■			
Paint							
Polyester-epoxy and other oil-based waterproof types		■		■			
Latex		■		■			
Partitions, folding							
Wood		■				■	
Metal[3]		■		■			
Fabric-covered		■					■
Partitions, stationary (free-standing)							
Wood frame		■		■			
Metal[3]		■		■			
Glass, unreinforced		■		■			
Glass, reinforced		■		■			
Gypsum, solid or block		■					■

Table 2. Types, Uses, and Classifications of Materials (continued)

Types of Building Materials	Uses of Building Materials		Classes of Building Materials				
			Acceptable		Unacceptable		
	Floors	Walls/ Ceilings	5	4	3	2	1
Finish Materials (floor coverings, wall and ceiling finishes, insulation, cabinets, doors, partitions, and windows)							
Polyurethane, formed-in-place	■		■				
Polyvinyl acetate (PVA) emulsion cement	■						■
Rubber							
Moldings and trim with epoxy poly-amide adhesive or latex-hydraulic cement		■		■			
All other applications		■					■
Rubber sheets or tiles[5]							
With chemical-set adhesives[6]	■		■				
All other applications	■						■
Silicone floor, formed-in-place	■		■				
Steel (panels, trim, tile)							
With waterproof adhesives[3]		■	■				
With non-waterproof adhesives		■				■	
Terrazzo	■			■			
Vinyl asbestos tile (semi-flexible vinyl)[5]							
With asphaltic adhesives	■		■				
All other applications	■						■
Vinyl sheets or tiles (coated on cork or wood product backings)	■						■
Vinyl sheets or tiles (homogeneous)[5]							
With chemical-set adhesives[6]	■			■			
All other applications	■						■
Wall coverings							
Paper, burlap, cloth types		■					■
Vinyl, plastic, wall paper		■					■
Wood floor coverings							
Wood (solid)	■						■
Engineered wood flooring	■					■	
Plastic laminate flooring	■					■	
Wood composition blocks, laid in cement mortar	■					■	
Wood composition blocks, dipped and laid in hot pitch or bitumen	■					■	

Notes*:

1 Unfilled concrete block cells can create a reservoir that can hold water following a flood, which can make the blocks difficult or impossible to clean if the floodwaters are contaminated.

2 Borate preservative-treated wood meets the NFIP requirements for flood damge-resistantce; however, the borate can leach out of the wood if the material is continuously exposed to standing or moving water.

3 Not recommended in areas subject to salt-water flooding.

4 Examples of decay-resistant lumber include heart wood of redwood, cedar, and black locust. Refer to Section 2302 of the International Building Code® (IBC®) and Section R202 of the International Residential Code® (IRC®) for guidance.

5 Using normally specified suspended flooring (i.e., above-grade) adhesives, including sulfite liquor (lignin or "linoleum paste"), rubber/asphaltic dispersions, or "alcohol" type resinous adhesives (culmar, oleoresin).

6 Examples include epoxy-polyamide adhesives or latex-hydraulic cement.

* In addition to the requirements of TB 2 for flood damage resistance, building materials must also comply with any additional requirements of applicable building codes. For example, for wood products such as solid 2x4s and plywood, applicable building code requirements typically include protection against decay and termites and will specify use of preservative-treated or decay-resistant wood for certain applications. Applications that require preservative-treated or decay-resistant species include wood in contact with the ground, wood exposed to weather, wood on exterior foundation walls, or wood members close to the exposed ground. In some cases, applicable building code requirements (such as those in ASCE 24-05 and IRC 2006) do not reflect updated guidance in TB 2 and specify that all wood used below the design flood elevation be preservative-treated or naturally decay-resistant regardless of proximity to ground or exposure to weather. (Revision made in October 2010)

Fasteners and Connectors

The term "fasteners" typically refers to nails, screws, bolts, and anchors. The term "connectors" typically refers to manufactured devices used to connect two or more building components. Joist hangers, post bases, hurricane ties and clips, and mud-sill anchors are examples of connectors. Fasteners and connectors are materials and thus must be made of flood damage-resistant materials in order to comply with the NFIP requirements.

Specifications for fasteners and connectors used in buildings in SFHAs are in ASCE 24, a standard referenced by the IBC. Chapter 23 of the IBC has specific requirements for connections and fasteners used with wood, including preservative-treated wood. Similar specifications are in Chapter 3 of the IRC.

Table 2 does not specifically address fasteners and connectors. However, it is clear that the performance of buildings that are exposed to flooding is, at least in part, a function of the fasteners and connectors used to put the components together. When preservative-treated woods are used, particular attention is required for fasteners and connectors because some treatments are more corrosive than others, which could shorten the service life of the fasteners and connectors. For example, alkaline copper quaternary (ACQ) treatments are more corrosive than traditional acid copper chromate (ACC) treatments. If corrosion occurs, buildings are less likely to withstand flood loads and other loads. Fasteners and connectors made of stainless steel, hot-dipped zinc-coated galvanized steel, silicon bronze, or copper are recommended for use with preservative-treated wood.

This Technical Bulletin, consistent with ASCE 24 and the International Code Series, recommends that stainless steel or hot-dip galvanized fasteners and connectors be used below the BFE in both inland (noncorrosive) and coastal (corrosive) areas. In coastal environments where airborne salts contribute to corrosion, it is recommended that corrosion-resistant fasteners and connectors be used throughout the building where they may be exposed. For

additional guidance, see Technical Bulletin 8, *Corrosion Protection for Metal Connectors in Coastal Areas*. Also see TPI/WTCA *Guidelines for Use of Alternative Preservative Treatments with Metal Connector Plates* for further guidance on metal plate connected wood trusses manufactured with preservative treated lumber (http://www.sbcindustry.com/images/PTWGuidelines.pdf).

Construction Examples

Buildings in Zones A, AE, A1-A30, AR, AO, and AH

Figure 1 illustrates a solid foundation wall (crawlspace) elevated to meet the minimum requirement that the lowest floor be at the BFE. Figure 2 illustrates framed walls that may be used for enclosures below the BFE that are used for parking of vehicles, building access, and storage.

To maximize allowable use of enclosures below the BFE, it is a common practice to extend the foundation a full story, even though that puts the lowest floor well above the BFE. In such cases, while the NFIP requirement is that flood damage-resistant materials be used only below the BFE, it is strongly recommended that such materials be used for all construction below the lowest floor. This will reduce flood damage to the enclosed area in the event flooding exceeds the BFE. For additional guidance on enclosures in A zones, see Technical Bulletin 1, *Openings in Foundation Walls and Walls of Enclosures Below Elevated Buildings in Special Flood Hazard Areas*.

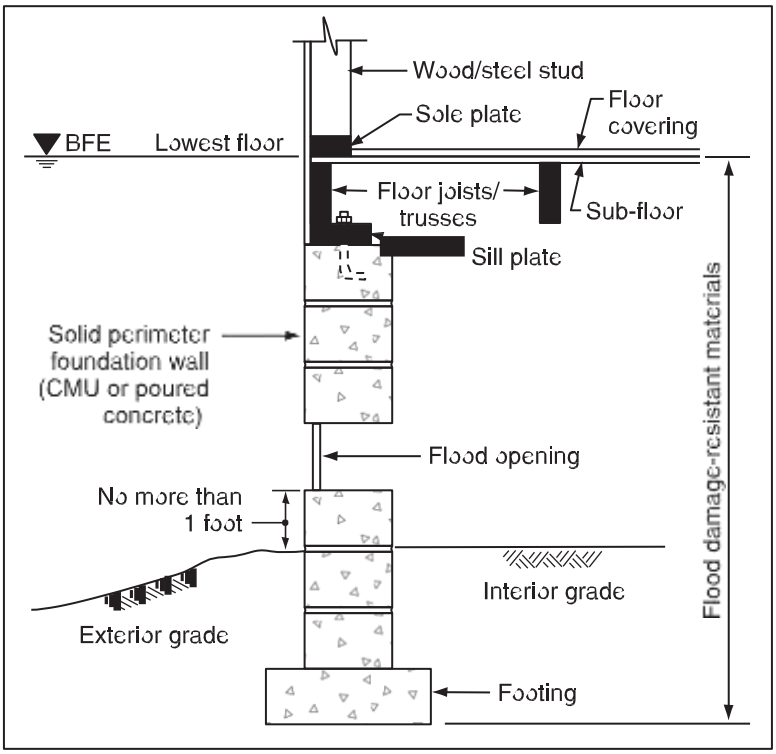

Figure 1. Building elevated on solid foundation walls meeting the minimum NFIP requirements for Zones A, AE, A1-A30, AR, AO, and AH

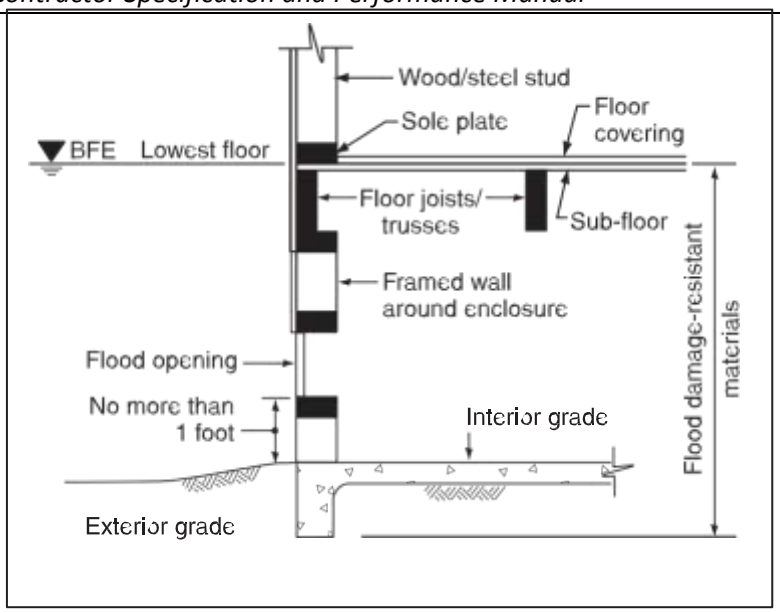

Figure 2. Framed enclosure under building elevated in accordance with NFIP requirements for Zones A, AE, A1-A30, AO, and AH

Buildings in Zones V, VE, and V1-V30

The NFIP regulations require that the bottom of the lowest horizontal structural member of the lowest floor (usually the floor beam or girder) of buildings in Zones V, VE, and Vl-V30 be at or above the BFE. Therefore, all materials below the bottom of those members must be flood damage-resistant materials. This requirement applies to lattice work and screening, and also to materials used to construct breakaway walls that enclose areas below the lowest floor. Depending on the design parameters selected, breakaway walls may remain in place during low-level floods and must be flood damage-resistant so that they can be readily cleaned and not deteriorate over time due to wetting. Figure 3 illustrates the requirement. For additional guidance on breakaway walls used to enclose areas under buildings in V zones, see Technical Bulletin 9, *Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings*.

Additional Uses of Flood Damage-Resistant Materials

Accessory Structures

Accessory structures may be allowed in SFHAs provided they are located, installed, and constructed in ways that comply with NFIP requirements. Some communities allow accessory structures that are limited to the uses specified for enclosures below the BFE: parking of vehicles and storage. As with other buildings, accessory structures below the BFE are required to be constructed with flood damage-resistant materials. In addition, accessory structures must be anchored to resist flotation, collapse, and lateral movement and comply with other requirements based on the flood zone. For additional information and requirements, contact the appropriate community permitting office.

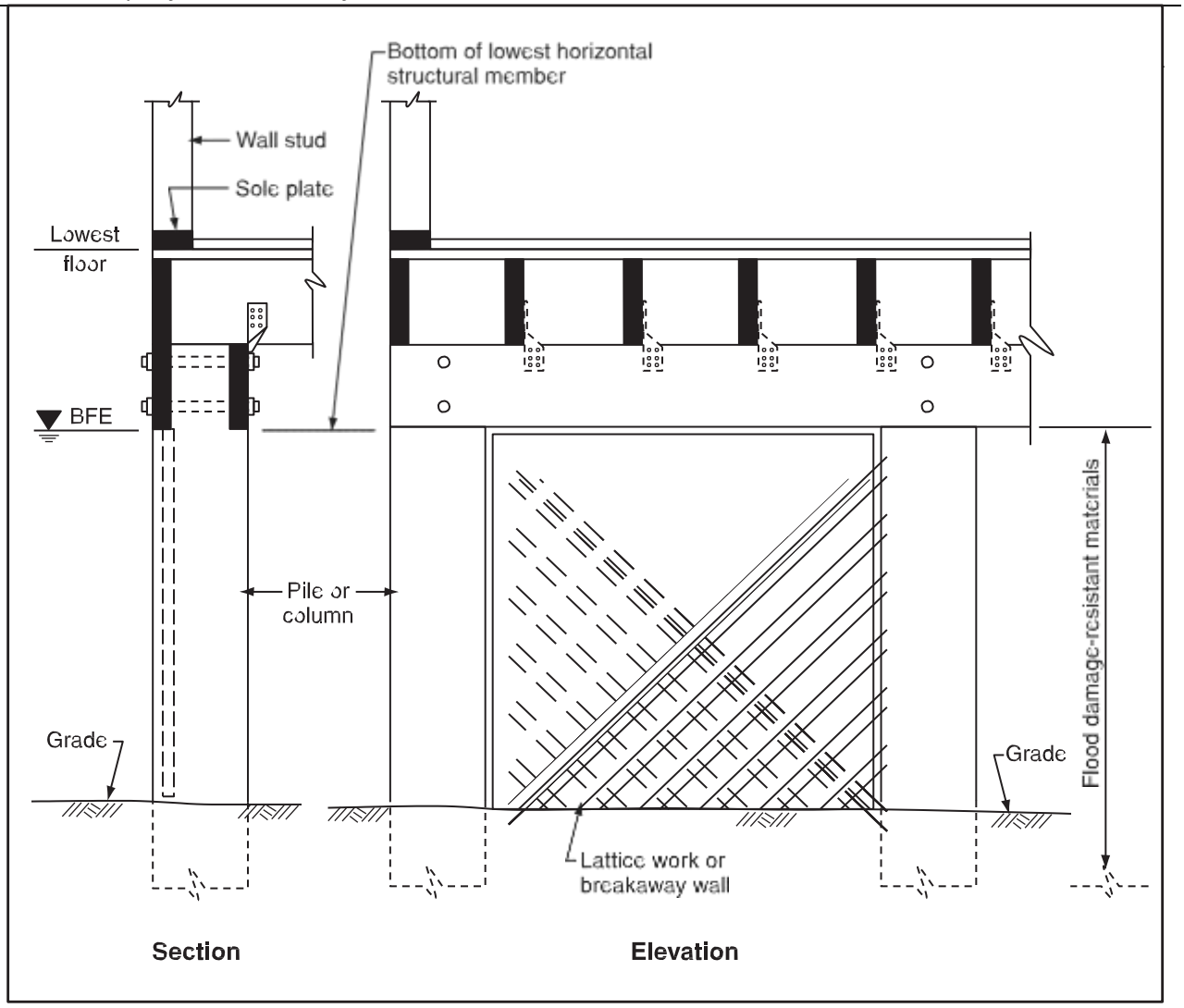

Figure 3. Flood damage-resistant building material requirements for buildings elevated in accordance with NFIP requirements for Zones V, VE, and V1-V30

Wet Floodproofing

Wet floodproofing is a method to reduce damage that typically involves three elements: allowing floodwaters to enter and exit to minimize structural damage, using flood damage-resistant materials, and elevating utility service and equipment. When a building is retrofitted to be wet floodproofed, non-flood damage-resistant materials that are below the BFE should be removed and replaced with flood damage-resistant materials. This will reduce the costs of repair and facilitate faster recovery.

Wet floodproofing is not allowed in lieu of complying with the lowest floor elevation requirements for new residential buildings (or dry floodproofing of nonresidential buildings in A zones). The exception is accessory structures, as noted on the previous page. Wet floodproofing may also be used to voluntarily retrofit buildings that are older than the date of the community's first FIRM (commonly referred to as "pre-FIRM"), provided the requirement to

bring such buildings into compliance is not triggered (called "substantial improvement"). Figure 4 illustrates some suggested retrofitting of interior walls in a pre-FIRM building. However, please note that the techniques illustrated in Figure 4 cannot be used to bring a substantially damaged or substantially improved building into compliance with the NFIP. For additional information on wet floodproofing, see Technical Bulletin 7, *Wet Floodproofing Requirements*.

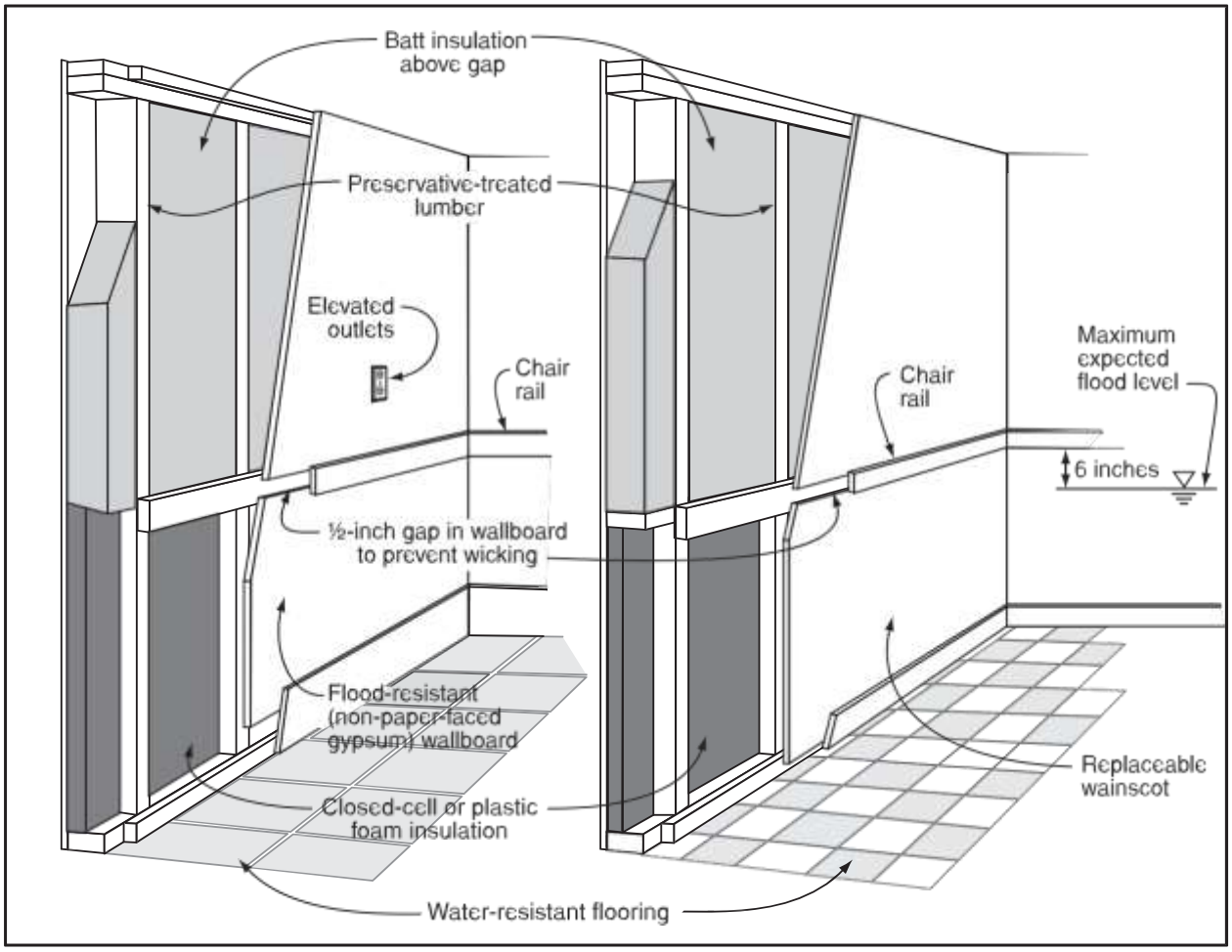

Figure 4. Partial wet floodproofing technique using flood damage-resistant materials for finished wall construction.

Buildings Outside of SFHAs

FEMA reports that up to 25 percent of NFIP flood insurance claims are paid on buildings that are outside of the mapped SFHA. This occurs for many reasons, including out-of-date maps and local drainage problems. In areas known to be prone to flooding that are not subject to the NFIP requirements, it is recommended that flood damage-resistant materials be used for construction of new buildings and for repair or renovation of existing buildings. Figure 4 illustrates some options.

The NFIP

The U.S. Congress established the NFIP with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as protection against flood losses, in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces adequate floodplain management regulations, FEMA will make flood insurance available within the community.

Title 44 of the U.S. Code of Federal Regulations contains the NFIP criteria for floodplain management, including design and construction standards for new and substantially improved buildings located in SFHAs identified on the NFIP's FIRMs. FEMA encourages communities to adopt floodplain management regulations that exceed the NFIP criteria. As an insurance alternative to disaster assistance, the NFIP reduces the escalating costs of repairing damage to buildings and their contents caused by floods.

NFIP Technical Bulletins

This is one of a series of Technical Bulletins that FEMA has produced to provide guidance concerning the building performance requirements of the NFIP. These requirements are contained in Title 44 of the U.S. Code of Federal Regulations at Section 60.3. The bulletins are intended for use by State and local officials responsible for interpreting and enforcing the requirements in their floodplain management regulations and building codes, and by members of the development community, such as design professionals and builders. New bulletins, as well as updates of existing bulletins, are issued periodically, as necessary. The bulletins do not create regulations; rather, they provide specific guidance for complying with the requirements of existing NFIP regulations. Users of the Technical Bulletins who need additional guidance should contact their NFIP State Coordinator or the appropriate FEMA regional office. *The User's Guide to Technical Bulletins* (http://www.fema.gov/pdf/fima/guide01.pdf) lists the bulletins issued to date.

Ordering Technical Bulletins

The quickest and easiest way to acquire copies of FEMA's Technical Bulletins is to download them from the FEMA website (http://www.fema.gov/plan/prevent/floodplain/techbul.shtm).

Technical Bulletins also may be ordered free of charge from the FEMA Distribution Center by calling 1-800-480-2520, or by faxing a request to 1-240-699-0525, Monday through Friday between 8 a.m. and 5 p.m. EST. Please provide the FEMA publication number, title, and quantity of each publication requested, along with your name, address, zip code, and daytime telephone number. Written requests may be submitted by email to: FEMA-Publications-Warehouse@dhs.gov

Further Information

The following publications provide further information concerning the use of flood damage-resistant materials.

Algan, H. and Wendt, R. 2005. *Pre-Standard Development for the Testing of Flood-Damage-Resistant Residential Envelope Systems, Comparison of Field and Laboratory Results - Summary Report*, Oak Ridge National Laboratory, June 2005.

American Red Cross, FEMA. 1992. *Repairing Your Flooded Home*, FEMA 232, ARC 4477.

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American Society of Civil Engineers, Structural Engineering Institute. 2005. *Minimum Design Loads for Buildings and Other Structures*, ASCE/SEI 7-05.

Brick Institute of America, n.d. *Technical Notes for Brick Construction*, Brick Institute of America, McLean, Virginia.

California Integrated Waste Management Board. 2004. "Recycled Plastic Lumber," California Integrated Waste Management Board, web page, last updated June 22, 2004 (http://www.ciwmb.ca.gov/Plastic/Recycled/Lumber).

Department of Energy. 2005. *Energy-Efficient Flood-Damage-Resistant Home Reconstruction*, (http://www.ornl.gov/sci/res_buildings/FEMA-attachments/Flood_damage-reconstruction.pdf).

FEMA. 1991. *Answers to Questions About Substantially Damaged Buildings*, FEMA 213.

FEMA. 1993. *Wet Floodproofing Requirements*, Technical Bulletin 7-93, FIA-TB-7.

FEMA. 1996. *Corrosion Protection for Metal Connectors in Coastal Areas*, Technical Bulletin 8-96, FIA-TB-8.

FEMA. 2000. *Coastal Construction Manual*, FEMA 55CD (3rd edition).

FEMA. 2005. *Home Builder's Guide to Coastal Construction: Technical Fact Sheet Series*, FEMA 499.

FEMA. 2006. *Mitigation Assessment Team Report: Hurricane Katrina in the Gulf Coast*, FEMA 549.

FEMA. 2007. *National Flood Insurance Program: Flood Insurance Manual*, Revised October 2007.

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International Code Council, Inc. 2006. International Residential Code®, IRC® 2006.

Simpson Strong-Tie. 2008. *Technical Bulletin: Preservative-Treated Wood*, Simpson Strong-Tie T-PTWOOD08-R, July 2008 (http://www.strongtie.com/ftp/bulletins/T-PTWOOD08-R.pdf).

TPI/WTCA. 2004. TPI/WTCA *Guidelines for Use of Alternative Preservative Treatments with Metal Connector Plates*, updated June 4, 2007, (http://www.sbcindustry.com/images/PTWGuidelines.pdf).

U.S. Army Corps of Engineers. 1984. *Flood Proofing Systems and Techniques*, U.S. Army Corps of Engineers, December 1984.

U.S. Army Corps of Engineers. 1995. *Flood Proofing Regulations*, Chapters 9 and 10, U.S. Army Corps of Engineers, EP 1165-2-314.

Wood Truss Council of America (WTCA). 2005. *The Load Guide: Guide to Good Practice for Specifying and Applying Loads to Structural Building Components*, (http://www.sbcindustry.com/loads.php).

World Floor Covering Association (WFCA). n.d., Anaheim, California (http://www.wfca.org/index.html).

Glossary

Accessory structure — A structure that is on the same parcel of property as a principal structure, the use of which is incidental to the use of the principal structure.

Base flood — The flood having a 1-percent chance of being equaled or exceeded in any given year, commonly referred to as the "100-year flood." The base flood is the national standard used by the NFIP and all Federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development.

Base flood elevation (BFE) — The height of the base (1-percent annual chance or 100-year) flood in relation to a specified datum, usually the National Geodetic Vertical Datum of 1929, or the North American Vertical Datum of 1988.

Basement — Any area of a building having its floor subgrade (below ground level) on all sides.

Enclosure or enclosed area — Areas created by a crawlspace or solid walls that fully enclose areas below the BFE.

Federal Emergency Management Agency (FEMA) — The Federal agency that, in addition to carrying out other activities, administers the National Flood Insurance Program.

Federal Insurance and Mitigation Administration (FIMA) — The component of FEMA directly responsible for administering the flood hazard identification and floodplain management aspects of the NFIP.

Flood Insurance Rate Map (FIRM) — The official map of a community on which FEMA has delineated both the special flood hazard areas (SFHAs) and the risk premium zones applicable to the community.

Floodprone area — Any land area susceptible to being inundated by floodwater from any source.

Lowest floor — The lowest floor of the lowest enclosed area of a building, including a basement. Any NFIP-compliant unfinished or flood-resistant enclosure usable solely for parking of vehicles, building access, or storage (in an area other than a basement) is not considered a building's lowest floor, provided the enclosure does not render the structure in violation of the applicable design requirements of the NFIP.

Registered Design Professional — An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the State or jurisdiction in which the project is to be constructed.

Special Flood Hazard Area (SFHA) — An area delineated on a FIRM as being subject to inundation by the base flood and designated as Zone A, AE, A1-A30, AR, AO, AH, A99, V, VE, or V1-V30.

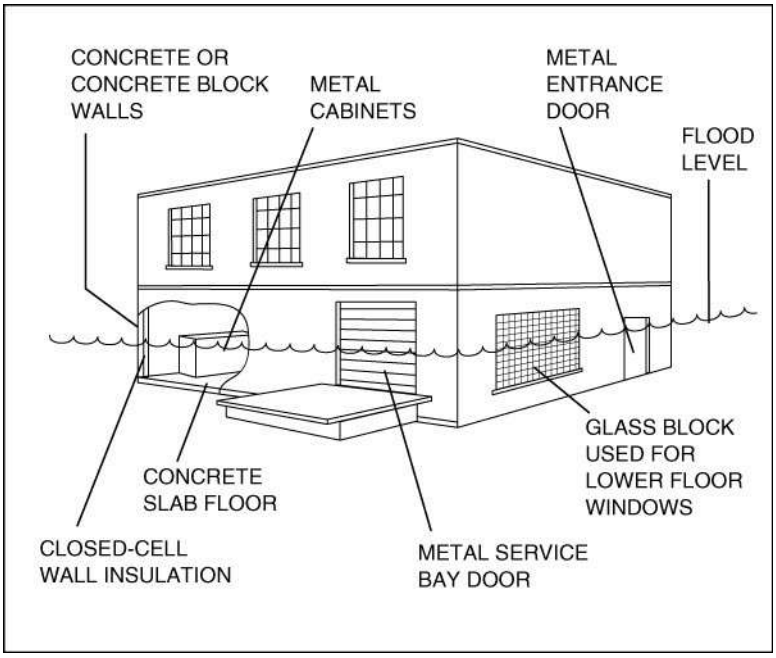
Substantial damage — Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. Structures that are determined to be substantially damaged are considered to be substantial improvements, regardless of the actual repair work performed.

Substantial improvement — Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds 50 percent of the market value of the structure (or smaller percentage if established by the community) before the "start of construction" of the improvement. This term includes structures that have incurred "substantial damage," regardless of the actual repair work performed.

Build with Flood Damage Resistant Materials

PROTECTING YOUR PROPERTY FROM FLOODING

If your property is in a flood hazard area, you can reduce the damage caused by flood waters and make cleanup easier by using flood damage resistant building materials. Building materials are considered flood resistant if they can withstand direct contact with flood waters for at least 72 hours without being significantly damaged. “Significant damage” means any damage that requires more than low cost, cosmetic repair
(such as painting). As shown in the figure, flood damage resistant materials should be used for walls, floors, and other parts of a building that are below the base flood elevation (BFE). Both FEMA and the U.S. Army Corps of Engineers have published lists of these materials (see “Other Sources of Information” section). Commonly available flood damage resistant materials include the following:



Flooring Materials

- concrete, concrete tile, and pre-cast concrete
- latex or bituminous, ceramic, clay, terrazzo, vinyl, and rubber sheets and tiles
- pressure-treated (PT) or decay resistant lumber
- PT wood and cold-formed steel

Wall and Ceiling Materials

- brick, metal, concrete, concrete block, porcelain, slate, glass block, stone, and ceramic and clay tile
- cement board, cold-formed steel, and reinforced concrete
- polyester epoxy paint
- PT and decay resistant lumber
- PT and marine grade plywood
- foam and closed-cell insulation
- decay resistant wood

Other

- hollow metal doors, cabinets, foam or closed-cell insulation

BENEFITS OF UTILIZING THIS MITIGATION STRATEGY

- ✓ Helps to prevent damage to a structure and make cleanup easier

TIPS

Keep these points in mind when you build with flood damage resistant materials:

- ✓ Remember that as long as your structure remains exposed to flooding, it will likely be damaged, even when you use flood damage resistant materials. Some amount of cleanup and cosmetic repair will usually be necessary. Although using flood damage resistant materials can reduce the amount and severity of water damage, it does not protect your buildings from other flood hazards, such as the impact of floodborne debris.
- ✓ All hardware used in areas below the flood level should be made of stainless or galvanized steel.
- ✓ Flood insurance will not pay a claim for damaged finishing materials below the BFE, even if those materials are considered flood damage resistant.
- ✓ If your property is in a coastal flood hazard area, installing flood damage resistant materials in areas below the BFE may create an obstruction, in violation of National Flood Insurance Program (NFIP) regulations. Check with your local building official or floodplain manager before making any modifications to your buildings.
- ✓ Areas of a structure that are below the BFE should be used only for parking, storage, and access.
- ✓ Flood damage resistant materials are also required by the International Building Code (IBC). See your local building code official for additional information.

ESTIMATED COST

The cost of using flood damage resistant materials will vary, depending on the size of the project you undertake. Your local building official and contractors can provide cost estimates for materials and installation.

OTHER SOURCES OF INFORMATION

FEMA Technical Bulletin 2, *Flood Damage-Resistant Materials Requirements for Buildings Located in Special Flood Hazard Areas*, August 2008, http://www.fema.gov/library/viewRecord.do?id=1580.

FEMA Technical Bulletin 3-93, *Non-Residential Floodproofing - Requirements and Certification for Buildings Located in Special Flood Hazard Areas*, April 1993, http://www.fema.gov/library/viewRecord.do?id=1716.

Flood Resistant Design and Construction, ASCE/SEI 24-05, American Society of Civil Engineers (ASCE), https://www.asce.org/bookstore/book.cfm?book=5661 or http://pubs.asce.org/books/standards.

Floodproofing Regulations, EP 1165-2-314, U.S. Army Corps of Engineers, December 15, 1995, http://www.usace.army.mil/publications/eng-pamphlets/ep1165-2-314/toc.htm.

International Residential Code® (IRC®), Chapter 5, “Floors”; Chapter 6, “Wall Construction,” 2009.

To view and download FEMA publications visit the FEMA Library at http://www.fema.gov/library. To obtain FEMA publications please call 1-800-480-2520 or fax 1-240-699-0525 Monday through Friday 8 a.m. – 5 p.m. EST. You may also email your request to FEMA-Publications-Warehouse@dhs.gov. Please provide the title, item number, short number, and quantity of each publication, along with your name, address, zip code, and daytime telephone number.

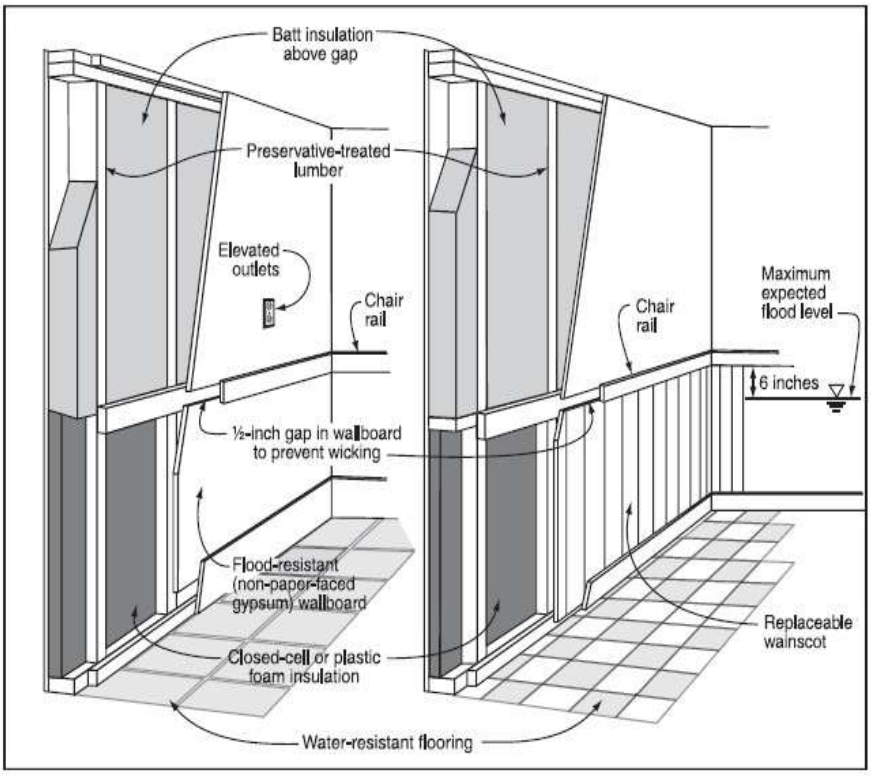
Homeowner Advisory: *the value of storm-proofing*

What you do or don't do to a storm-impacted house will be reflected in insurance rates, property value and mortgage accessibility.

Changes in the Flood Insurance Program - FEMA
Preliminary Considerations for Rebuilding

"Under the new law (7/6/12), flood insurance rates on many properties in special hazard areas will increase.... Save money on flood insurance by reducing your flood risk: One specific way is to raise your building above required elevation standards or to floodproof.... Other ways to reduce premiums could include adding vents to enclosures or installing breakaway walls.... Home and business owners would be missing out on a significant opportunity to mitigate their future flood risk and thereby lower their future insurance premiums."

FEMA: "Flood Damage-Resistant Material Requirements"



- ✓ Remove compromised material, dry out and sanitize.
- ✓ Outlets, mechanicals, appliances should be replaced well above flood line, out of basements and crawl spaces.
- ✓ Consider efficient mechanicals, like on-demand hot water unit.
- ✓ Replacement floor & wainscoting should be impermeable material.
- ✓ Use waterproof, moisture-proof, fire retardant construction board, instead of drywall.
- ✓ Insulate with closed-cell or high-density foam.
- ✓ Install back-flow valves on sewer lines.
- ✓ Oil tanks should be secured to ground and bottled gas contained in cages.
- ✓ Seek sign-off from municipal building officials and determine whether contractors heed FEMA best practices & local guidelines.

http://www.fema.gov/library/viewRecord.do?fromSearch=fromsearch&id=1580

FEMA's Building Science Helpline: (866) 927-2104 or FEMA-Buildingsciencehelp@dhs.gov

HOMEOWNERS GUIDE TO RETROFITTING http://www.fema.gov/library/viewRecord.do?id=1420
{The following are in ascending order of cost}

Making uninhabited portions of home resistant to flood damage, allowing flooding to flow through, & using flood damage-resistant materials, sealants, and shields to protect the part of your home below the design flood elevation (DFE) or other specified elevation.

Wet Floodproofing

Prevent floodwaters from entering by making home watertight which requires sealing walls with waterproof coatings, impermeable membranes, or supplemental layers of masonry or concrete. Equip openings below DFE with permanent or removable shields.

Dry Floodproofing

Floodwalls are built of manmade materials, such as concrete & masonry which can be designed proportionally to complement the home. Requiring more land, levees are embankments of compacted soil that can be blended into the landscape.

Floodwalls & Levees

Elevation

Two Primary Approaches: (1) lifting the structure and extending the existing foundation or building a new one; (2) leaving in place and either building an elevated "false" floor within the home or adding a new upper story and converting the ground level to a compliant enclosure.
Design Stage: Evaluate condition, stability, and strength of the existing foundation to determine whether it can support the increased load of the elevated home, including any wind and seismic loads or designing a new foundation.
Contract Stage: Disconnect utilities; jack home up; increase height of the foundation or build new one; reconnect utilities.

Relocation

Demolition

Tips for New Construction:

- Build above the design or base flood elevation; space below flood stage would be unconditioned without any services.
- Rebuild back from the water edge and provide marsh grass and/or other "buffers".
- The most efficient form of reconstruction will be system-based, providing within structure moisture air and thermal control in one onsite step. Consider modular-type construction using insulated concrete forms (ICF) or structural insulated panel system (SIPS), made with impermeable board. SIPS & ICF yield weather tight and livable structures in rapid turn-around time.
- Modular offers the opportunity to erect an on-site shell that could be livable in a short period of time; it should, of course, be constructed in a manner anticipating possible future flooding.

These pointers are based on sources from FEMA and input from local building inspectors and contractors.
Caveat: retrofitting or rebuilding 'as is' may be a lower first cost, but outweighed by subsequent costs.

Integrated Pest Management
A Guide for Affordable Housing
STOP
Pests
in housing

We hope you will use this guide to implement integrated pest management (IPM) at your property. While the materials are designed for public housing authority (PHA) management and owners/agents of affordable housing, anyone can use the principles outlined here to integrate IPM practices into a residential pest management strategy. The complete guide and additional resources are at www.stoppests.org.

This guide

- provides the basic knowledge of pests and pesticides needed to make informed pest control decisions with a pest management professional;
- describes the parts of IPM and how to implement them in housing; and
- can be used to orient staff to their role on the IPM team using the certificate of completion in the appendix.

The materials in this guide are adapted from the *Delivery of IPM Training to PHAs* project, run by the Northeastern IPM Center through an interagency agreement between the U.S. Department of Agriculture's National Institute of Food and Agriculture and the U.S. Department of Housing and Urban Development's Office of Healthy Homes and Lead Hazard Control.

The training curriculum on which this guide is based was reviewed and supported by the National Center for Healthy Housing (NCHH), National Pest Management Association (NPMA), Pennsylvania IPM Program, Centers for Disease Control and Prevention (CDC), U.S. Department of Housing and Urban Development (HUD), U.S. Department of Agriculture (USDA), and U.S. Environmental Protection Agency (EPA).

Please direct questions and comments to stoppests@cornell.edu or 607-254-8990.

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Integrated Pest Management at Residential Properties: A Better Way

WHAT IS IPM?

Integrated pest management (IPM) is the coordinated use of information about pests, the environment, and evidence-based pest control methods to prevent and manage pest infestations. Pests need food, water, and a place to hide. Take these away and you begin to solve the pest problem in a sustainable way.

How IPM differs from calendar-based extermination

IPM	Calendar-Based Extermination
Inspection with a flashlight and monitoring are used to identify priority areas (where infestation exists or pest risk is high) for the best use of resources and staff time	Calendar-based use of pesticides throughout the building with quick inspection
Solves the infestation and prevents future occurrences	Results last only as long as the pesticide remains active
Takes into account pest behavior and life cycles and uses solutions that prevent pest population growth	Success depends on each pest coming in contact with a pesticide
Protects sensitive individuals from exposure to chemicals	Limited notification and posting about pesticides; alternatives rarely offered to sensitive individuals

Five basic steps of IPM

1. **Inspect and monitor**
   Thoroughly inspect and monitor all areas of the building for insect activity. Monitoring, even if no pests are present, is essential to IPM. In each dwelling unit, pay particular attention to areas that might provide pests with food, water, or shelter. Look at monitoring devices to determine the extent of the problem and circumstances that might influence control efforts. No pests or prevention recommendations? No action is needed—just record that there were no pests, make sure the monitor is working, and you are done.

2. **Identify pests**
   Identify any pest on a monitor or evidence found during inspection. Knowing which pests are present and how many there are helps focus treatments on what will work best, rather than using a "one size fits all" approach.

3. **Compare your observations to action thresholds**
   The action threshold is the maximum pest population that can be tolerated at a particular time and place without harming people, property, and the environment. You and your Pest Management Professional (PMP) should decide on action thresholds for pests that are found on your property and define a high-, medium-, and low-level of infestation. When the action threshold is reached, proceed with IPM step 4—take control. Scale control efforts to the level of infestation.

4. **Take control**
   Limiting access to food, water, and shelter is key. Good maintenance and housekeeping are the first line of defense in IPM. To eliminate an infestation and prevent another one, use two or more control measures that work together.
   - Cultural: changing behaviors (i.e., take garbage out frequently; don't leave dishes in the sink overnight).
   - Physical: physically removing or blocking pests.
   - Mechanical: using traps or other mechanical devices.
   - Chemical: using least-risk (in terms of toxicity and risk of exposure) EPA-registered products that will get the job done.
     > *Using only pesticides—even low-toxic choices—is* ***not*** *IPM.*
     > Make sure the pesticide you use will work. Pests may be resistant to or avoid certain products.

5. **Evaluate effectiveness**
   Did your control efforts work? Documentation, monitoring, and follow-up inspection including interviews with residents will confirm your success. After the infestation is gone and contributing problems are fixed, the area can return to the regular inspection and monitoring schedule.

   Documentation is essential in IPM. Use an IPM log to record observations, evidence of pests, and any actions taken, including repairs, maintenance, and chemicals used. State law often requires pesticide records. Find information about IPM logs, with an example, on pages 16–17 of this guide. In addition, a log could include notes on resident housekeeping and contact with management relative to lease compliance. Keeping and using a log that includes the complete service history on each unit or area helps identify trends and keeps everyone on the same page. Individual building logs should be customized to each site for maximum effectiveness.

Integrated Pest Management at Residential Properties: A Better Way

How to transition to IPM

Most properties find that choosing a pilot site is a good way to get started with an IPM program. Set up an IPM log. Place monitors in every area (including dwelling units). Check the monitors after a week. Then, focus efforts where pests are caught or observed. Continue to monitor in areas where no evidence was found. Staff, residents, and pest control professionals will need to make exclusion, monitoring, housekeeping, and communication a priority. Once systems are in place and working well, they can be rolled out to other sites.

WHY USE IPM?

IPM uses the most economical methods and with the least possible hazard to people, property, and the environment (U.S. Environmental Protection Agency, 2000). IPM programs focus on preventive measures—getting at the root of the problem before an infestation occurs. IPM should be part of weatherization and healthy housing initiatives. Fixing ways that pests get into buildings keeps the pests out, weatherizes buildings, and keeps buildings dry. IPM does more than control pests. Educating residents about their role in the battle against bugs empowers them to improve their housekeeping. The U.S. Department of Housing and Urban Development (HUD) suggests housing agencies manage pests using IPM according to PIH Notice 2011-22, located in appendix A of this guide.

Limit exposure to public health pests

Pests and pesticides can each create health risks for people. IPM helps reduce exposure to both. Cockroaches and rodents have been identified as allergens and asthma triggers. They are public health pests because of the risks they can cause for building staff and residents, especially children and the elderly. Exposure to pesticides can also be problematic, particularly for those with chemical sensitivities.

Learn More
For more information on the health and safety issues associated with pesticides, visit www.epa.gov/pesticides/health/reducing.htm

Reduce costs

Repairing your property can cut energy bills, reduce moisture, and minimize future pest infestations. Focusing on pests in a targeted way may increase costs and labor time at first, but when the underlying causes of pest problems are fixed, overall expenses will decrease. You will save time when infestations are limited to periodic introductions. You will also minimize the cost of pest damage and can prevent the secondary problems that occur when residents try to control pests on their own.

Integrated Pest Management: A Guide for Affordable Housing

Follow HUD recommendations

IPM is part of a nationwide healthy homes movement to reduce housing-based health hazards by focusing on them in a coordinated fashion, rather than by addressing a single hazard at a time. HUD has identified seven qualities for healthy homes, all of which are addressed by IPM:

1. Dry
2. Clean
3. Well ventilated
4. Safe
5. Contaminant-free
6. Well maintained
7. Pest-free

HOW ARE PESTICIDES USED IN IPM?

Calendar-based pesticide application is not part of IPM in multifamily housing. Remember—take action only when inspection and monitoring show evidence of pest infestation or when an area is at high risk for pest infestation. Apply pesticides only as a preventative measure when the risk of the potential pest infestation outweighs the risk of having the pesticide present. Routine, preventative pesticide application is not IPM. Pesticides kill pests most of the time, but they do not solve the ongoing problem and may pose unnecessary risk.

While the judicious use of pesticides can be part of IPM, there are several important considerations:

- Risk from pesticide exposure may outweigh the benefit of killing pests.
- Pesticides might harm pets and wildlife.
- Certain people may be especially sensitive to some pesticides.
- Pests may become tolerant of or avoid misapplied pesticide products.

If action thresholds indicate that pesticide use is appropriate, it is important for your pest management professional (PMP) to follow these key steps:

1. Choose the right product for the targeted pest.
2. Read the label and follow instructions for use, storage, and disposal.
3. Notify residents as required by the label or state/local law.
4. Use application methods that limit exposure.
5. Follow up to make sure the treatment worked.

Generally, PMPs should not be using liquid residual sprays as the primary control method for cockroaches. If they still rely on them, it might be partly because they think the customers (you and the residents) expect to see spraying as part of their service. Educate yourself about the pesticide options for pests by reading the sections below and have a discussion about pesticide product choice with your PMP.

Integrated Pest Management at Residential Properties: A Better Way

- Baits and "botanicals": Pesticide technology is always changing. In recent years, baits and botanicals have become popular. These products are still pesticides and must be used judiciously and according to label directions.
  - Research has proven baits to be the most effective method for eliminating cockroaches. Effective bait is also available for ants, rodents, and other pests.
    - Baits come in many formulations, including granular, gel, and liquid.
  - "Botanical" products may be exempt from EPA testing. Check for efficacy data before using.
- Insecticidal dusts: These products are applied as a very light coating in protected areas to serve as a chemical barrier.
  - Most dusts have a long residual efficacy.
  - Diatomaceous earth (DE) and boric acid are least toxic active ingredients.
  - Mixing insecticidal dust with food does not enhance its efficacy—follow the label instructions.
- Sprays and foggers: In general, these pesticides repel or kill the pest on contact. Some items to note:
  - Repellents may chase pests into another unit.
  - Fogs and sprays may not reach the majority of pests, which hide deep in cracks and crevices.
  - Sprays and foggers do not always kill eggs. With German cockroaches, egg cases protected in the mother's body may still hatch even after the mother has died.
  - Sprays may contaminate baits. If strong-smelling sprays (pesticides or cleaners) contaminate the bait, the target pest will not take the bait.
  - Spray and fog applications often result in pesticide exposure to people. Given the high effectiveness of properly applied baits, this exposure and the related health risks may be unnecessary.
  - Residents should be discouraged from using or storing their own pesticides.

Protect people, pets, and the environment

When talking about pesticides, risk is measured by multiplying the risk of exposure times the toxicity of the product.

The elderly, pregnant women, and children may be particularly vulnerable to adverse health effects associated with exposure to pesticides. Use reduced risk practices, follow label instructions, and practice prevention-based approaches that reduce reliance on chemical control measures. Know who in your community may be sensitive to pesticides and work with these residents and the PMP to assure effective control without risking their health.

Give special attention to people with chemical sensitivities so that they receive pest management services that meet their needs. Under the Fair Housing Act, chemical

sensitivities can constitute a handicap. Both the dwelling unit and common areas that the resident may use should be considered.

Reduce risk

The total risk of harm is determined by multiplying a person's exposure to a chemical by its toxicity.

Exposure

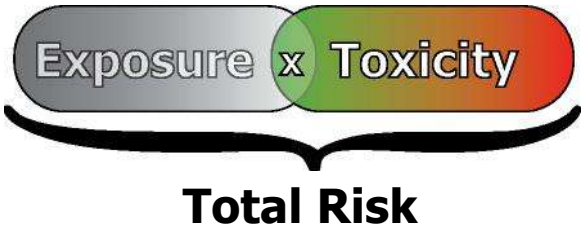
The risk of exposure increases when you come in contact with a pesticide. Touching a pesticide that can be seen is not the only way to be exposed to pesticides. Pesticides can get into the air and remain on surfaces for a long time even when you can't see or smell them. Application methods determine the risk of exposure. Putting bait in tamper-resistant stations or applying pesticides into cracks, crevices, and sealed wall voids can reduce the risk of exposure.

One example of a type of pesticide product with a high risk of exposure is a total-release fogger. Over-the-counter foggers *should **not** be used* to manage pests as part of an IPM program. Foggers release a very fine mist of pesticides into the air from pressurized cans. The mist lands on all exposed surfaces. In addition to posing the risk of chemical exposure, foggers can also be hazardous when misused because the propellant that spreads the insecticide through the air is flammable and can create an explosion.

Toxicity

Pesticide labels have "signal" words that indicate the level of toxicity. If you have any questions about the storage, use, or disposal of a pesticide or cleaning product, read the label. The label will tell you the product name and the active ingredients, but it can also help you compare different products.

Signal words



CAUTION = slightly toxic

WARNING = moderately toxic

DANGER = severe skin or eye irritation

DANGER or *DANGER—POISON* means the pesticide product is highly toxic by at least one route of exposure. It may be corrosive, causing irreversible damage to the skin or eyes. It may be highly toxic if eaten, absorbed through the skin, or inhaled. If this is the case, then the word "POISON" must also be included in red letters.

With IPM, almost all infestations can be managed with pesticides that say "CAUTION" on the label. The signal word is a better indicator of toxicity than a manufacturer's claims. No pesticide is nontoxic or completely safe.

Address illegal pesticide use

EPA takes great care to review pesticides to avoid impacts to people or the environment. Pesticide manufacturers write instructions for the label that ensure the product will work as intended. EPA mandates that people read the label and follow all instructions carefully. Labels list where and how the chemical can be legally applied. Labels are the law.

A pesticide is illegal when the EPA (or the state where it is used) has not registered it, or it is used against the label directions. The following unapproved or "off-label" uses are not only dangerous, they are illegal:

- Using higher (stronger) concentrations
- Using the pesticide in places not listed or against pests not listed
- Not using prescribed personal protective equipment
- Applying the pesticide in a way not listed in the instructions on the label
- Improperly disposing of the pesticide

For More Information	In an Emergency
National Pesticide Information Center 800-858-7378 www.npic.orst.edu	Poison Control Center National Hotline 800-222-1222 www.aapcc.org

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An IPM Plan for Your Property

IPM BASICS

Taking control of pest problems with IPM requires setting up a property-wide system that finds, identifies, documents, and responds to a pest before an infestation has time to grow and spread. To get started, you will need to know the answers to the following questions:

- Which pests live at the property or are a threat in the area?
- What changes to the building or landscaping could be made to prevent these pests?
- Where is each active infestation located?
- For each area of infestation: What has been done? Did it work? And if not, what else can be tried?

The property manager and head of maintenance should know the answers to these questions so that time and resources for the nonpesticide control methods can be approved and staff can be directed to do their part. That coordination will be part of an overall IPM plan for your property. Developing such a plan will guide the operating procedure for pest control. Your PMP can be a great resource to help you write an IPM plan using the guidelines in appendix E.

Learn More
For IPM training opportunities, visit www.stoppests.org/ipm-training/

THE IPM TEAM

The IPM team consists of an IPM coordinator, property manager, pest management professional, maintenance and custodial staff, landscapers, residents, and resident support staff (who may be from another organization). These are the people who will make IPM work at a property. Buy-in at the executive level is essential for long-term adoption.

Everyone on the IPM team needs to understand IPM basics and receive documented training on their role in IPM. Use the certificate in appendix G for employees who have completed this training. Materials for training residents, staff, and housing leaders are available at www.stoppests.org/ipm-training/. At least once a year, everyone on the IPM team should come together, review the IPM program at the site and trends from the log, and set goals for improvement for the following year.

The IPM team approach is a switch from calendar-based pest control. Each member of the IPM team plays a role, working together to make buildings great for people and bad for

pests. With limited budgets, it's important for staff to do their jobs with a heightened awareness of how they impact pest control. If people do their part, IPM will manage pests in a sustainable and affordable way.

The results of a team approach:

- An inspection and monitoring system that helps find pests
- A reporting system that helps identify areas of improvement
- Units that are properly prepared for effective treatment
- Communication that empowers all
- Fewer pests and a healthier environment

IPM coordinator[1]

An IPM coordinator is the leader of the team. This model is different from turning all pest control over to an "exterminator" and expecting all problems to be solved. The coordinator makes sure all members of the IPM team (property manager, maintenance, resident support) are working together. The IPM coordinator will be the primary contact for all matters related to pest control and will act as a liaison between the building occupants, staff, and the PMP. In some cases the property manager takes on the role of IPM coordinator.

The IPM coordinator has the following responsibilities:

- Maintain records of all pest sightings by staff, visitors, and residents in the IPM log.
- Serve as the primary contact for the PMP to
  - communicate any pest problems
  - communicate the PMP's recommendations related to maintenance, housekeeping, and sanitation; and
  - ensure that pest management practices carried out by the PMP are consistent with the contract and any applicable policies.
- Maintain written records of all pesticide applications.
- Allocate time and resources to focus areas—where an infestation is active—until the problems are solved.
- Serve as a contact person to members of the community interested in pest management practices.
- Evaluate the IPM program using the IPM log and service records on a regular basis, and analyze it for successes and ways to make improvements.
- Write and update the site IPM Plan (with assistance from maintenance and the PMP).
- Keep up to date on the current pest management practices and guidelines.

[1] Adapted from Purdue Entomology Extension, 2000–2001. "IPM School Technical Resource Center." See extension.entm.purdue.edu/schoolipm/1pmp/pmpcoor.htm

The IPM coordinator must be given the administrative authority to carry out these tasks successfully. For example, if the pest manager recommends that a cluttered unit be cleaned up to prevent a pest infestation, the IPM coordinator should have the authority or the administrative support to work with the resident, issuing a violation notice as a last resort.

The IPM coordinator can prepare for IPM by

- reading this entire guide;
- reading the pest control contract (if any) in place;
- becoming familiar with training options at www.stoppests.org/ipm-training/; and
- subscribing to the StopPests blog (stoppests.typepad.com) for continuing education and training opportunities.

Property manager

Because they manage buildings and issue contracts, the ultimate responsibility for the IPM program often rests with the property managers. The manager may also act as the IPM coordinator for the property, as described above. The manager makes sure there is a good contract for professional pest management in place; that the maintenance staff is fixing holes, cracks, and leaks; and that landscapers are trimming bushes and eliminating hiding places for rodents. The property manager is also in charge of the resident lease signing, lease enforcement, and resident support and education.

At a PHA, the property manager should be sure to follow HUD's policy on IPM by developing and enforcing policies and procedures that support PIH 2011-22 (see appendix A). The property manager writes a request for proposals (RFP) for pest control that specifies the use of IPM practices and then hires a qualified PMP. The sample RFP describes this process in more detail: www.stoppests.org/file/Sample-RFP.

In addition, the manager

- initiates policy and lease changes to require IPM participation;
- enforces the lease and housekeeping standards;
- supports a building-wide inspection and monitoring plan;
- protects and assists vulnerable and sensitive populations; if unable to assist directly, he or she contacts family members, resident support services, or social services agencies as appropriate;
- records activities in focus units on the Focus Unit Tracking Log; and
- encourages a reporting system. Specifically, the manager
  - notifies staff and residents of upcoming PMP visits;
  - facilitates use of the IPM log (see page 16); and
  - tracks complaints and program performance.

Property managers should make sure pest inspection with a flashlight occurs at least

- at each pest control service by the PMP;
- at unit-turnover by maintenance staff;

- within 90 days of resident move-in by the property manager or housing inspector;
- annually (or more) during the housekeeping inspection by the property manager or housing inspector; and
- during preparation for the Real Estate Assessment Center (REAC) inspection by whoever is checking the property.

The property manager can be prepared for IPM by

- reading this entire guide;
- reading the pest control contract (if any) in place;
- becoming familiar with training options at www.stoppests.org/ipm-training/; and
- subscribing to the StopPests blog (stoppests.typepad.com) for continuing education and training opportunities.

Pest Management Professional (PMP)

A key partner in IPM, the PMP should notify the IPM coordinator of upcoming visits, inspect and monitor for pests, identify pests, recommend pest-proofing strategies, apply effective and appropriate pesticides necessary to gain control, and provide pesticide use notifications where appropriate/required. If property staff perform the function previously referred to as "extermination," their role is that of the PMP. The PMP must be licensed if required by the state, even when applying pesticides in vacant units.

PMPs document everything, including observations of building conditions, the results of monitoring, and pesticides or treatments used. The PMP should communicate with both staff and residents and follow up quickly when needed. Documenting in the Focus Unit Tracking Log and keeping service records accessible in the IPM log leaves a paper trail of what needs to be done and who followed up and did it. PMP qualifications to consider:

- GreenShield, QualityPro, or EcoWise (in CA) certified
- Association membership: National and/or State Pest Management Association
- PMP certification: Associate Certified Entomologist (ACE) or Board Certified Entomologist (BCE)

PMPs can be prepared for IPM by

- reading this guide;
- reading the pest control contract in place;
- reading and updating the IPM Plan;
- learning site safety protocols for work at the property;
- becoming familiar with the site IPM log; and
- maintaining an appropriate pesticide applicator license.

In addition, PMPs should be prepared to assist the IPM Coordinator with training the team in the proper identification of the various pest species, their habits, and control methods.

Maintenance and custodial staff

Maintenance and custodial staff members play a crucial role in IPM by maintaining a healthy building and working closely with the PMP to respond to maintenance problems documented in the IPM log. They also need to fix the sources of pest problems, such as leaks, cracks, and holes in structures and building components.

By making thorough repairs and renovations, maintenance staff can block pests from entering a building or unit and finding a place to hide. If trained in pest inspection and monitoring, maintenance staff can also alert the PMP to pest problems. They report observations, problems, and actions taken in the IPM log, follow up on PMP recommendations, accompany the PMP during his or her service, and might be asked to assist with unit preparation for some pest treatments.

Vacant units provide an excellent opportunity for staff to clean, repair leaks, and seal cracks and crevices. Unless it is a pesticide-free unit, if a pest problem has been identified in the unit or area adjacent to the unit, have a PMP apply insecticidal dusts behind cabinets before the cracks, crevices, and gaps are sealed.

If the property has separate custodians responsible for cleaning and upkeep of common areas such as hallways, stairways, trash management areas, and laundry facilities, they should be trained in inspection, monitoring, and proper cleaning (especially for trash chutes and dumpsters). They should submit work orders for needed repairs through the IPM log.

Maintenance/custodial staff can be prepared for IPM by

- reading this guide;
- becoming familiar with the site IPM log;
- reading through pertinent sections and frequently asked questions at www.stoppests.org/what-is-ipm/using-ipm/; and
- looking at each page of "A Guidebook on IPM and Structural Repairs" (from www.bphc.org/hpfhi/OwnersManagers/Pages/home.aspx).

Landscapers

The property landscape needs to be included in the IPM program because many pests come from outside. Those responsible for plant choice, placement, and maintenance should be familiar with IPM recommendations for the plants in the local area. IPM for grounds incorporates practices such as watering and fertilization, but the goal is the same: to keep pest populations at tolerable levels by using multiple, economical approaches that pose minimal risk to people, property, and the environment.

Lawn pesticides can make people with chemical sensitivities sick. Vulnerable populations such as infants and pregnant women are at greater risk for adverse health effects associated with exposure to pesticides. For this reason it makes sense to use reduced risk

practices, follow label instructions, and practice prevention-based approaches. In addition, landscapers should

- monitor for pests (especially rats);
- report any evidence of pests in the IPM log;
- minimize use of pesticides on grounds; and
- select appropriate foliage that
    - doesn't offer cover for rat travel and burrowing;
    - does not touch buildings; and
    - resists pests naturally, with few pesticides, waterings, or nutrients required.

Landscape crews can be prepared for IPM by

- ☐ reading this guide;
- ☐ becoming familiar with the site IPM log;
- ☐ visiting www.growinggreenlawns.org for lawn care tips; and
- ☐ visiting the Cooperative Extension website for planting guidelines at www.nifa.usda.gov/Extension/.

Residents

The residents' role in IPM is just as important as the PMP's and much of the IPM coordinator's time may be dedicated to getting residents to participate. Residents must be aware of the importance of housekeeping and letting the PMP in for pest monitoring and control. Residents should report evidence of pests, leaks, mold, or other maintenance concerns and participate in monitoring as directed by the PMP. Routine inspection will catch problems that residents don't report. It is critical that residents follow the lease regarding standards for housekeeping, sanitation, trash removal, and storage. An example of a residential lease that includes IPM housekeeping standards can be found in appendix F of this guide. Residents should

- prepare their units as instructed and let the PMP in to inspect, replace monitors, and treat (if necessary);
- notify the property manager of disabilities or when assistance is needed to participate in the IPM program;
- work with staff to find reasonable accommodations if sensitivities exist; and
- educate and support their neighbors in IPM.

Residents can be prepared for IPM by

- ☐ reading and acknowledging the housekeeping standards in the residential lease;
- ☐ becoming familiar with the site IPM log; and
- ☐ watching the Tenant's Role in IPM video at www.stoppests.org/working-with-residents/residents-briefing-video/.

Resident support staff

Resident support services can include housing staff, housing inspectors, local code enforcers, home health care professionals, translators, families, friends, faith-based organizations, and anyone working with residents in their homes. Support staff might also help find assistance for residents who are unable to prepare their unit for the PMP due to financial, physical, or mental limitations, including hoarding.

Resident support service staff should know the residents' role in IPM so they can make sure the homes in which they work are pest-free or prepared to receive effective pest control. They can also play a role in educating residents about pests, proper housekeeping, monitoring, and pest prevention.

Resident support staff can be prepared for IPM by

- reading and acknowledging the housekeeping standards in the residential lease;
- becoming familiar with the site IPM log;
- watching the Tenant's Role in IPM video at www.stoppests.org/working-with-residents/residents-briefing-video/; and
- knowing the common obstacles and suggested solutions when working with residents (see www.stoppests.org/working-with-residents/).

DAY-TO-DAY IPM

The roles of everyone on the IPM team are important in the day-to-day implementation of IPM in housing. Success depends on the following five components:

1. Everyone (residents, staff, and contractors) inspects for pests and checks monitors.
2. Whoever finds a pest calls in a work order, which is coded to be pest-specific. The work order is entered into the Focus Unit Tracking Log in the IPM log. This recordkeeping system is crucial for tracking problems so that property-wide trends can be identified and addressed.
3. A PMP or property staff member with pest-control knowledge inspects the area, identifies and verifies the problem, and makes a plan for action. The plan may come from the site IPM Plan and includes who will do what.
4. At least two IPM control options are used (for example, cleaning the kitchen and setting mouse traps). Pesticides are never the only control tactic. Unit-specific records are put in an IPM log every time a staff member or a PMP works on the problem.
5. Team members continue to inspect, monitor, record observations, and follow up. If the initial efforts don't work, team members reevaluate the plan and try a different set of control options. Learning where control was not successful helps an IPM program develop into a system that works for the site.

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The IPM log

The IPM log keeps all team members informed of key aspects of a successful IPM program. Information from the IPM log should inform decision-making. The log ties all the components of the program together and should be readily accessible and used by all members of the IPM team. The PMP may supply the majority of the contents. An IPM log is usually a binder with the following sections:

- Site-specific IPM plan (see appendix E)
- Focus unit tracking log (see appendix D)
- Service schedule
- Service log (containing the PMP's service forms)
- Applicator licenses
- Proof of insurance and business registration
- Contract/service agreement
- Potential notifications/preparation instructions
- A listing of the pesticide products that are used on the site and a link to, or printed copies of, the labels and Material Safety Data Sheets (MSDS) for each
- Educational materials for staff and residents

As long as everyone can see and contribute to the log and someone is following up on identified problems, it will be effective. Some properties use an electronic format, incorporating the work order system and/or service reports from the pest control company. Others report on paper to property managers, who integrate all inputs into a central document. More examples of IPM log materials can be found at www.stoppests.org/file/IPM-Log-Example.[2]

FOCUS UNIT TRACKING LOG

Name/Address of Property

The IPM team identifies areas or units of focus and coordinates IPM efforts. This sheet unites pest control, housing, and maintenance record-keeping systems. Keep it in the front of the IPM log.

Date	Unit / Location	Name of Staff Member / Technician	Pest Level	Repairs Needed		Recent or Current Focus Unit?	Housekeeping / Lease Compliance	
			Note any pests and circle the level of infestation. Involve your PMP.	Work order number or problem description	Check when completed	Yes or No	Housekeeping level* (circle one)	Action taken (e.g., met with tenant, sent violation notice)
			Type of Pest Light Moderate Heavy				G F P	
			Type of Pest Light Moderate Heavy				G F P	
			Type of Pest Light Moderate Heavy				G F P	
			Type of Pest Light Moderate Heavy				G F P	

* Housekeeping level:
G Good – little or no food or water accessible to pests, easy to move throughout the unit, and inspection in all areas is possible
F Fair – dishes left undone for more than one day, or greyness of food or water accessible to pests, or PMP has to step over or move items to inspect
P Poor – multiple days of dirty dishes, sloppy food storage methods, or PMP's inspection and service is limited by clutter

A focus unit tracking log should be easy to find at the front of your IPM log binder. This log ties everyone's work together while an infestation is being eliminated. See appendix D.

The more eyes that are trained to look for pests and pest-friendly conditions, the greater the chance the pests will be managed property-wide. Inspection will draw attention to problems that, if not addressed, will continue to grow until they cannot be overlooked. The Focus Unit Tracking Log helps ensure the recommendations get to the right people. For example, a PMP's pest inspection will identify the following in early stages:

[2] A note on the PMP's service forms: PMPs should inspect each home and provide recommendations for maintenance staff and residents on a unit-specific form. You pay for these expert recommendations, which are a valuable part of the service you receive.

- Water leaks (in roofs and pipes)
- Holes in walls (interior and exterior)
- Problems in wall voids
- Poor housekeeping (including suspected or diagnosed hoarding)
- Improper disposal of trash and garbage
- Pest infestation

Someone designated by the IPM coordinator must read the PMP's recommendations on the Focus Unit Tracking Log and service reports and assign tasks to complete them in a timely manner. Act promptly when a problem is noted to prevent pests, perform ongoing maintenance, and get help from residents before they take action on their own (such as using pesticide sprays that may negatively affect them and their neighbors).

AN RFP FOR PEST MANAGEMENT

Developing a strong request for proposal (RFP) is the best way to hire the right PMP for the job. The cost for IPM service may be greater than for calendar-based service, but you will be paying a professional to actually achieve your pest management goals. Write clearly into the RFP that you are seeking IPM services. That way, applicants who are not proposing IPM programs but who may be low bidders can be rejected. For guidance, see our sample RFP at www.stoppests.org/what-is-ipm/using-ipm/pesticide-applications/hiring-a-pestmanagement-firm/. These programs certify pest management firms on their professionalism and IPM service:

- GreenShield Certified: www.greenshieldcertified.org
- Quality Pro's GreenPro Service: www.npmagreenpro.org
- EcoWise Certified (California only): www.ecowisecertified.org

At a minimum, an IPM program must involve the following:

1. Inspection with a flashlight and monitoring in every unit at least once a year.
2. Identification of pests before treating, to target control.
3. Establishment of action threshold levels. The time spent in a unit and any management methods should be relative to the level of infestation.
4. Employment of two or more control measures (which may be cultural, mechanical, physical, or chemical). Relying on pesticides as a first or sole course of action is not IPM.
5. Evaluation of effectiveness. The pest management professional should keep unit-specific records for every inspection and service and provide reports to the property manager so that the IPM program can be tracked, evaluated for effectiveness, and changed, if need be.

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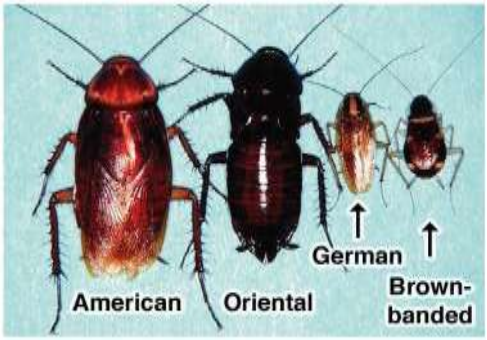
Focus Pests in Housing

Many pests are health hazards. In this guide, we focus on cockroaches, rodents, and bed bugs. These three pests are common, have health importance, and the IPM strategies we use to manage them will also work on many other pests. For more information on other pests and their control, see page 37 and www.stoppests.org/pest-solutions/.

COCKROACHES

Cockroaches live in areas where humans provide food, water, and shelter. They are most active at night. The four types of cockroaches that are most often found in housing are: German, Brown-banded, American, and Oriental. All cockroach nymphs (babies) look like smaller versions of the adults. Egg cases may hold 35–40 eggs.



Types of cockroaches. Photo: Department of Entomology, University of Nebraska-Lincoln.

Why focus on cockroaches?

For people with asthma, eight units of cockroach allergen per gram of dust can trigger a reaction. One female cockroach will produce 1,500 units of allergen per day[3]. One cockroach and its frass (feces and body parts) can trigger an asthma attack. An IPM program should work to kill cockroaches and clean up the bodies and frass. Cleaning up the frass using simple soap and water will remove the allergens and allow residents and staff to see when new evidence of cockroaches shows up. Use a vacuum with a HEPA filter when cleaning up cockroaches and frass. Responsibility for cleaning frass should be determined by the property manager and be made clear to all team members.

Types of cockroaches

It is important to know the different kinds of cockroaches because they have different preferences for food, water, and shelter, and control efforts will vary. Understanding what each kind eats and drinks and where it hides is the first step in controlling cockroaches.

German cockroaches are the highest priority because they can rapidly infest and have been associated with asthma. They are the most common kind of cockroach in housing. About 3/4 of an inch long, bronze, with two dark stripes behind the head, they can be found anywhere, but they especially like warmth, moisture, and darkness. If introduced into a home where they can find adequate food, water, and shelter, their populations may grow

[3] National Academies Press, 2000. *Clearing the Air: Asthma and Indoor Air Exposures*. Executive Summary Institute of Medicine. ISBN 0-309-06496-1. See www.nap.edu/books/0309064961/html

exponentially. They are difficult to eliminate because the female carries the egg case (with 35–40 eggs in it) to term. She protects the case until it is ready to hatch. But even if the mother cockroach dies from a pesticide, the eggs may still hatch. (This is another reason to clean up dead cockroaches.)

Brown-banded cockroaches are also infesters and like to be "high and dry." Brown-banded cockroaches are about 1/2 inch long with side-to-side stripes. They are found in warm, dry spots, often up high. They live in scattered locations, often behind pictures and appliances. Unlike German cockroaches, the female brown-banded cockroach does not carry the egg case to term. Instead, she will lay the egg capsule and glue it to a surface in a dark, secluded area.

The two other kinds of cockroaches (American and Oriental) are not usually found in large numbers in homes. In homes, American and Oriental cockroaches are usually invaders. They typically enter the home seeking food or water but do not remain in large numbers. If you see them in a home, inspect adjacent sewers, basements, or outside areas for an infestation. Focus efforts on blocking them out of the home while at the same time getting control of the infestation at its source.

American cockroaches are also called Palmetto Bugs or Water Bugs. They are large, about 11/2 inches long, like hot environments, and can glide in the air. They often live in sewers and basements where it is warm and damp. Sometimes they inhabit mulch or bushes. They may invade homes looking for water or warmth.

German cockroaches.

Brown-banded cockroaches.

American cockroaches.

Oriental cockroaches.

Photos: Department of Entomology, University of Nebraska-Lincoln.

Oriental cockroaches are also called Water Bugs.
They are about 1 inch long, wingless, and black in color. They prefer cool environments. They tend to live in sewers, basements, and mulch, and might be attracted inside when the weather is dry and they need water.

Signs of cockroaches

Cockroaches don't see buildings the same way we do. To them, any crack or hole is a door and the space between walls and floors is the safest place to travel and hide. Maintenance and repairs will disrupt cockroach travel and hiding, making them easier to find and kill. If a unit is being renovated, consider involving a PMP.

Cockroaches spend most of their time hiding. They like to hide in warm cracks and crevices where their bodies touch surfaces above and below. Nymphs and pregnant females don't travel much at all, but it's essential to kill them if you want to eliminate an infestation. Focus pest control efforts near where nymphs are found.

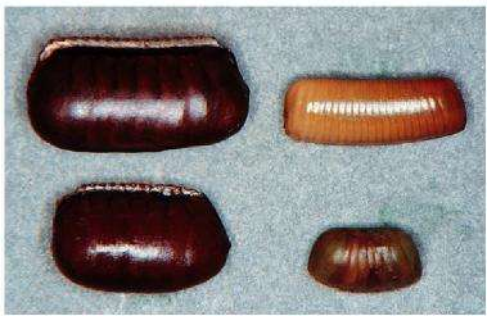
American cockroach hiding in a crevice. Photo: Department of Entomology, University of Nebraska-Lincoln.

If you see a live cockroach, especially during the day, it means that a good hiding area was disturbed or that all the good hiding places are taken and the infestation is severe. It is important to conduct a thorough inspection using a bright flashlight for evidence where cockroaches would find food, water, or a hiding spot. This means looking *up*, *down*, *behind* and *under* in target areas.

Signs to look for:

- Dead cockroaches and their parts
- Frass
- Egg cases
- Live cockroaches

Frass and dead cockroach parts. Photo: Allison Taisey, Northeastern IPM Center.



Cockroach egg cases. Photo: Department of Entomology, University of Nebraska-Lincoln.

Prevention

Cockroaches get in a new place by hitchhiking on objects (often cardboard or furniture from an infested area) or by crawling along pipes or ductwork. Monitors must be in place to catch these introductions.

Housekeeping (sanitation) and good maintenance (exclusion) are the first two steps in preventing an introduction from becoming an infestation. Housekeeping means cleaning up food and water sources that attract cockroaches. Housekeeping also means eliminating places for cockroaches to hide by cleaning up clutter and disposing of trash and recycling properly and regularly. Maintenance provides exclusion to keep cockroaches from crawling in by sealing cracks and holes and fixing any water leaks or other water sources.

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Control

IPM is tailored to each situation. Your PMP is the expert. While this section will give you a basic understanding of cockroach control, it is important to discuss your particular situation with residents, other staff, and your PMP.

For each infestation, inspect and monitor, identify the kind of cockroach, and determine exactly where and how bad the infestation is. Then use appropriate IPM control methods:

- Sanitation
- Exclusion
- Vacuuming up cockroaches and evidence
- Pesticides (bait, insecticidal dusts, and insect growth regulators)

Sticky trap with cockroaches. Photo: Don Rivard, Rivard's Resources: IPM.

Monitor at all times

Have staff or the PMP place sticky traps near areas where cockroaches might travel—at corners and near warmth, food, and water. There is no pesticide on these monitors. Sticky traps are information-gathering tools. They alert you to a growing infestation, allow the PMP to identify the type of cockroach, and help to locate the main source of the problem. To see changes that indicate a growing population, the traps must be checked and changed periodically. Write the date and specific location (e.g., 1/15/12, Unit 315, Bathroom) on the trap when placing it so that patterns and the time it took to catch the cockroaches will be known. Keep records of trap counts on the unit service records in the IPM log. "No cockroaches trapped" is evidence of successful pest control.

Clean up

Eliminating sources of food and water is an important part of cockroach control. Cockroaches eat almost anything, including crumbs, grease, trash, and cardboard glue. It doesn't take much to feed them. Cockroaches can get water from sink drains, spills, pet bowls, and condensation. All of these water sources can be eliminated with good housekeeping and maintenance. Cutting off access to food and water (especially at night, when pests are active) will help control cockroaches.

Keep them out

Seal or fix cracks or holes that cockroaches could get through. Take off peeling wallpaper or shelf liners. Young cockroaches want a crevice as thin as a dime. Adult males want a space the thickness of a quarter. Pregnant females want the most space of all to hide: two stacked nickels. All feel safe when wedged in a crevice.

To eliminate these hiding places, use

- silicone caulk;
- copper mesh (stuffed into cracks);
- screens; and
- door sweeps—always on boiler rooms and exterior doors to block out the crawling pests.

Making these types of repairs is good for the building and good for pest control. Although most expensive, silicone caulk will provide the longest lasting control since it adheres to surfaces and holds through the inevitable slight shifting of buildings.

Learn More
See "A Guidebook on IPM and Structural Repairs" at www.bphc.org/hpfhi/OwnersManagers/Pages/home.aspx

Targeted chemical use

Baits, insecticidal dusts, and insect growth regulators are chemical controls for cockroaches. But first, follow your PMP's advice to repair structural problems to keep pests out. Residents and maintenance staff without applicator licenses should not apply pesticides. Liquid residual sprays should be a last resort and applied only by a PMP.

Bait

Baits are the most common and effective pesticide for cockroach control. Cockroaches eat the pesticide in the bait, go back to where they like to hide, and die. They die more slowly than if they had been sprayed. Other cockroaches, including newly hatched nymphs, feed on the dying cockroach's frass and body and get poisoned, too.

Bait application using bait gun. Photo: Penn State IPM Program.

Baits can be applied by using bait stations or in cracks and crevices with a syringe or bait gun. Tamper-resistant bait stations reduce the risk of exposure to humans and pets. When using a syringe or bait gun, a PMP applies bait in small dots in a crack or crevice where there is evidence of cockroaches, as close to the infestation as possible. The amount of bait used will depend on the level of infestation. When the bait dries out, the cockroaches will not be attracted to it.

Cockroaches must want to eat the bait. If an appropriate amount is applied near the cockroach hiding spots, they should eat all of it. If baits are contaminated with chemicals

that the cockroaches recognize as poison or repellent, they will avoid them. This may happen if the resident applies aerosol cockroach killers in the same room. Strong-smelling cleaners can have the same effect. Nicotine from smoking may also contaminate the bait. Regular soap and water is effective for cleaning and won't ruin the bait's effectiveness.

Check to see if the bait is disappearing. If the cockroaches have not fed on the bait after a few days, place it in a different area. If that doesn't work, try a different kind of bait. Cockroaches may learn to avoid a type of bait. It is important to rotate the type of bait you use at least twice a year to keep them interested.

Key points about cockroach baits:

- The bait should ideally be the only food in the area (sanitation first).
- Use bait in every room with evidence of roaches.
- Baits are slow to kill; cockroaches feed on the bait and take it back to their hiding spots where other cockroaches live.
- Baits disrupt the life cycle because when newly hatched nymphs feed on the bodies of poisoned cockroaches, they ingest the poison and die.
- Some people don't trust baits because they do not see dead cockroaches. Baits do take a little longer to kill cockroaches than sprays or aerosols, but are more effective at eliminating an infestation.
- Baits are best used when there is an active infestation. Do not use as a prophylactic.

Insecticidal dusts

Insecticidal dusts will kill insects in one of two ways, depending on the active ingredient. Dusts that contain boric acid act as stomach poisons. The cockroach walks through the dust, picks some up on its body, and ingests the poison when cleaning itself. Boric acid is not something that is intentionally eaten by cockroaches. Mixing the dust with sugar or other food is illegal and not effective. Other dusts, such as diatomaceous earth (DE), contain silica, which are like tiny shards of glass. DE affects the cockroach's outer layer so that it can't retain enough water to stay alive.

Apply dusts correctly, according to label directions. If the dust can be seen, there's too much or it's in the wrong place. If there is a pile, the cockroach will avoid it. Because insecticidal dusts can become airborne easily, ventilation systems should be turned off during application. As always, documentation is key. If an inspector finds a white powder in a unit, a record of what it is and where it was applied should be available so that a narcotics or hazmat crew is not needed.

Key points about dusts:

- Least-toxic active ingredients are boric acid and diatomaceous earth
- Kill cockroaches in three different ways:
  - A stomach poison
  - Dries them out by damaging their outer shell

- Contact kill as a result of an active ingredient in the dust
- Long-lasting if dry, but dusts may become ineffective if they get wet
- Effective if used correctly: dust lightly, never in piles
- Can be used in walls before fixing cracks if infestation exists or unit location warrants this preventative application

Insect Growth Regulators (IGRs)

Insect Growth Regulators (IGRs) help finish off an almost-eliminated infestation. They prevent cockroaches from maturing, so they cannot reproduce. IGRs can come in many formulations, including sprays and baits. IGRs are slow-acting (it will take up to a month to see a change), but they are a good option when used in an IPM program. Using IGRs for German cockroaches may promote cockroaches feeding more heavily on bait until they die.

Key points about IGRs:

- Interfere with cockroach growth
- Available in many formulations
- Take a month to work
- Stay effective for a long time
- Compatible with other IPM methods; may enhance baits

RODENTS

Mice, rats, squirrels, chipmunks, and woodchucks are all examples of rodents. The term "rodent" comes from the word "rodentia," meaning gnawing animals. They gnaw wood, wires, and other rough materials and can cut through anything softer than steel. Rodents are not likely to start gnawing on a smooth surface. Making good repairs (no cracks, bumps, or uneven edges that promote gnawing) is essential to rodent control.

Mice and rats, the rodents we care most about in housing, reproduce quickly and are most active at night. They travel the same paths nightly, staying close to walls. Understanding rodent behavior is the key to planning a strategy to control them.

Rodents have teeth for gnawing. Photo: Bobby Corrigan, RMC Pest Management Consulting.

Why focus on rodents?

Rats and mice carry various infectious diseases, including Salmonella and Lymphocytic Choriomeningitis—a serious disease for pregnant women. Mice leave a trail of urine drops wherever they go. Mouse urine can trigger asthma attacks in sensitive people. Rats may bite people when threatened. Most rat bites happen to babies in cribs where a rat may be

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feeding on spilled milk or crumbs. Rodents damage property and can start fires by chewing on wires.

Signs of rodents

When there are only a few, mice and rats can be difficult to spot in a building. Know what evidence to look for:

- Sightings.
- Noise—of activity or gnawing at night.
- Gnaw marks or holes—damage caused by chewing, nesting, or seeking access to food.
- Nests or burrows—rodents look for good hiding places both inside and outside. They usually nest where it's warm.
- Droppings—feces are the most common evidence of rodents. Rodent feces will have one pointed end.
- Rub marks—rodents get around by feeling with their whiskers and keeping the sides of their bodies in contact with a wall. They memorize paths and repeat them, leaving a greasy trail in the areas where their bodies touch the wall (if you look carefully, you may see their trails).
- Indicator pests—some flies, moths, and beetles are attracted to dead rodents, food that rodents bring into the wall, or the trash associated with rodents.

Rats and mice—know the difference

Rats and mice have different habits. It is important to know the difference so you can plan your control.

- *Droppings:* The droppings (feces) of mice and rats are different. Mouse feces are about the size of ice cream sprinkles; rat droppings are larger— about the size of olive pits.
- *Size:* Adults can be distinguished by size, but it can be difficult to tell an adult mouse from a baby rat. The feet

Norway rat burrow (left) and mouse nest in a hat (right). Photos: Allison Taisey (left), stock (right).

Indian meal moth (left) and grain beetle (right), indicators of rodent food sources. Photos: Gary Alpert, Harvard University.

Blow flies (left) and hide beetles (right) may indicate unseen dead rodents. Photos: Gary Alpert, Harvard University (left) and Cornell Veterinary Entomology (right).

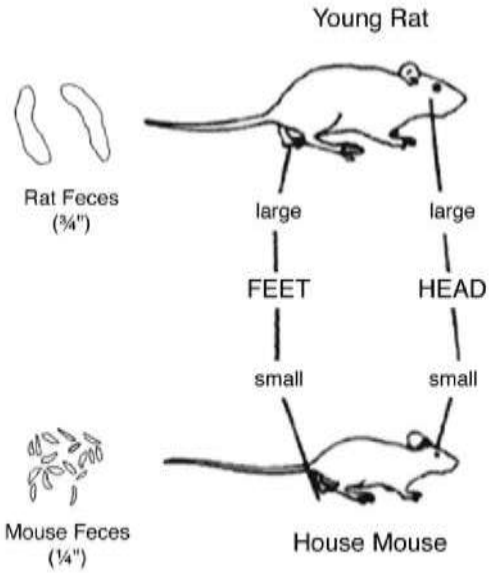

Illustration: CDC.

and head of mice seem in proportion to their bodies and their tails are thin and long. Rats have hind feet and heads that seem larger than they should be and their tails are thick at the base. Mice are not small rats and mice do not become rats when they go outdoors, but residents will often refer to both types of rodents as "mice."

Rats

Rats are usually outdoors and prefer to live in secluded areas. If there is plenty of food available, they will burrow and nest close to or inside buildings. In extreme cases, they will nest between walls. Rats can go 3–4 days without food but only 1–2 days without water. They may have preference for food that is easily found in their area. Rats will travel further than mice, but still prefer to stay within 450 feet of their burrow if possible. In general, rats are very smart, cautious, and afraid of new things. Keep these characteristics in mind when trying to trap rats. *Rats need a hole about the size of a quarter to enter a building.* Take action when evidence of one rat is seen.

Two of the most common types of rats are Norway rats and Roof rats.

- Norway rats (also known as Wharf, Sewer, and Brown rats) burrow in the ground and are found throughout the U.S. Their burrows are usually 1–3 feet deep and have at least two entrances. The main hole is 2–4 inches across and there will be one or more "bolt-holes" about three or more feet from the main entrance that may be small and well camouflaged. Burrows are often found under plantings and groundcover; near trash areas or outdoor trashcans; and under concrete slabs, tires, sheets of plywood, or other debris on the ground. Eliminating debris and trash is a crucial part of control. Doing so will make new burrows easier to spot and discourage rats from setting up shop. Do not stuff anything in a rat burrow or fill it in before the rats have been eliminated. Plugging a burrow hole will not control rats.
- Roof rats nest up high and are found in southern states and along the West Coast. They prefer to nest in secluded areas above ground, such as attics, soffits, overhead garage storage, in the vine cover of fences or buildings, and in woodpiles or other stored materials. They favor dense trees or trees with hollow cavities and the crowns of palm trees, especially when old fronds are not removed. Roof rats sometimes burrow in the ground, especially in hot, dry environments.

Mice

Mice are curious, but usually stay within 30 feet of their nest. They need a hole the size of a dime to get in and some can get through a gap as narrow as a pencil. Mice can mate when they are one month old, so an infestation can grow quickly. Mice get most of the water they need from food and will nest in insulation, old clothes, cars, boxes, or shoes—almost anything. Because they reproduce quickly, it is important to take action when evidence of even one mouse is seen or heard.

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Prevention

Rodents can hitchhike into a building, but they usually come in from outside. Rodent prevention starts with sanitation (inside and outside your property) and maintenance (exclusion). These are the same principles that were discussed in the section on cockroaches. The prevention efforts used can be effective for both cockroaches and rodents. For rodents, make sure the repair has a smooth surface and door sweeps go all the way to the edges of the door. Good sanitation eliminates food sources and hiding places. Maintenance efforts are focused on sealing cracks and holes and eliminating water sources, in addition to making sure doors and windows have screens in good condition and have close-fitting seals or sweeps at the openings. Trash handling is also very important for rodent control, so pay special attention to cans, dumpsters, and trash chutes.

Control

Tailor IPM to each situation. Your PMP is the expert. This section is intended to give you a basic understanding so that you can discuss rodent control with residents, other staff, and your PMP.

For each infestation, inspect, trap, identify the kind of rodent, and determine exactly where and how bad the infestation is. Then use the appropriate control methods discussed below:

- Limit access to food, water, and hiding places
- Exclude
- Trap
- Use rodenticides judiciously

Limit access to food, water, and hiding places

Limiting rodents' access to food is critical. Knowing where and when they are feeding will help when deciding where to put the traps and what bait to use to get them to the trap. Rodents eat human and pet food. Trash cans and dumpsters need to be free of holes, covered, and emptied regularly. Place dumpsters away from the building on concrete pads and screen drain holes. Discourage residents from feeding birds or other wildlife. Proper sanitation (inside and out) is essential to rodent control. Food should be cleaned up and stored in a sealed container. If rodents are present, consider covering or storing pet food between feedings.

Clutter and debris both inside and out can provide perfect hiding spaces for rodents. Get rid of cardboard boxes, if possible. Items in storage should be placed on shelving at least 6 inches off the floor and 6 inches away from walls. While 6 inches is not high enough to keep rodents from jumping up, it does allow for inspection and trapping. Maintain landscaping and clean up outdoor areas to make the property less attractive to rats.

Focus Pests in Housing

Exclude

Rodents travel along walls and pipes. Pay attention to where pipes and utilities go through walls. Exclude rodents by sealing cracks, repairing holes, making sure screens are in good shape and adding door sweeps to all exterior and apartment doors. For larger openings, fill with copper mesh (which discourages rodents from gnawing) then cover the mesh with sealant, putty, or spackle. Metal mesh may also be used, but avoid "steel wool," which will rust and deteriorate over time. All of these methods will exclude cockroaches, too, making these repairs and maintenance even more valuable over time.

Fill larger gaps with copper mesh (left). Seal gaps around pipes with caulk (right). Photos: Mary Maley, Northeastern IPM Center.

Set rodent traps so the trigger will snap towards the wall. Photo: Allison Taisey, Northeastern IPM Center.

Trap

Traps are an effective component of rodent control, but placement and timing are key. Rodents are likely to travel the same paths along walls every night. Setting traps where they already travel increases the chance of one running over the trap. Bait traps with nesting material (fabric, cotton balls, dental floss) or food. (Be conscious of people with nut allergies if you plan to use peanut butter). Always place snap traps against walls so they snap towards the wall. The more traps used, the more effective they will be. Have a PMP show you different orientations for effective trapping.

Rats must become familiar with the trap before they will go over it. Leave traps baited but unset for several days, so the rats get used to feeding from them. Then re-bait and set all the traps at once. An alternative for quicker (in one night) rat trapping is to place three traps next to each other, bait across all three, and set only the middle one.

Traps are very effective for mice because mice are curious. Mice will be trapped easily the first night, but then the ones that were not trapped will be a bit more shy. Set many traps the first night; remove them in the morning. Set them again a week later, in slightly different locations.

Traps come in several forms and sizes for mice and rats:

- Snap traps—cheap, easy and effective.
- Glue traps—cheap and easy, but the rodent takes a long time to die and makes noise that can be disturbing. Adult mice and rats will usually avoid glue traps. They can be made more effective by using box-style traps or putting the glue board inside short sections of PVC pipe; mice prefer tunnels and dark areas and will not detect the glue boards until they cannot get away.

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- Curiosity traps—can be very effective for mice. They come in many styles, but you must check them often and you may be left with a live animal that needs to be disposed of.
- Electronic traps—expensive. Electrocutes a mouse with a small electrical charge.
- Ultrasonic devices—have not been shown to be effective for any pests. Discourage residents from spending their money on these expensive devices.

Use rodenticides judiciously

Rodents are mammals, like us. The chemicals used to poison them are more likely to affect us than some of those used to target insects. Only certified pesticide applicators should apply rodenticide baits and all should be contained in secure, tamper-resistant stations according to EPA regulations. Using rodenticides indoors should be a last resort in exceptional circumstances. When rodent baits are used indoors, the rodents can die indoors in inaccessible areas, causing odors that are difficult to remove. Know where all bait is placed and check it often to make sure no pets or children are able to get to it. Good record keeping in an IPM log will help everyone keep track of bait on the property.

BED BUGS

Bed bugs are creating challenges for housing nationwide. One reason for the upswing in infestations is that as people travel, they carry bed bugs with them. Another reason is the change in availability and patterns of use of some pesticides. In addition, bed bugs have developed resistance to some pesticides.

Why focus on bed bugs?

Bed bugs do not transmit disease, but they are classified as "a pest of significant public health importance" by the EPA and CDC. They can cause secondary infections after people scratch the bites. Many people with bed bugs cannot sleep and suffer negative effects from the sleep deprivation and the stress.

Unlike cockroaches and rodents, bed bugs get both their food and water from blood. The baits intended for cockroaches or rodents will not work on bed bugs because they do not have chewing mouthparts to eat the bait. Boric acid, which is a stomach poison, will not work for bed bugs because they will not ingest it. Since it is impossible to remove their source of food, control bed bugs by minimizing places where they can hide and by carefully monitoring.

Signs of a bed bug infestation

- *Live bed bugs*

  A bed bug is a flat, blood-sucking insect ranging in size from a sesame seed (baby) to an apple seed (adult). It is light brown to mahogany red, depending on how recently it last fed.

  A recently fed bed bug will be plump, but after it digests, it is back to being flat. Like cockroaches, baby bed bugs look like the adults, only smaller.

  Bed bugs are often confused with other insects, such as ticks, fleas, and cockroach nymphs. Proper identification can save time, anxiety, and money. Remember: identification comes before control in IPM.

  The only way to confirm an active bed bug infestation is to find live bed bugs, collect a few, and have someone with experience identify them. Bed bugs will always be found crawling, never flying, jumping, or burrowing.

- *Bites*

  Seeing bites on a person may be the first indication that bed bugs are present and a thorough inspection is necessary. Bed bugs will come out of hiding to feed when they are hungry (usually once a week), feed until they are full, and then return to their hiding spots. Not everyone reacts to the bites and a person's reaction to bed bugs may change over time. A bed bug infestation cannot be confirmed by bites; live bed bugs must be found.

- *Fecal spots*

  These spots are the feces that the bugs leave after feeding. Sometimes they are called "blood spots." You may find blood spots on sheets where someone squished a recently-fed bed bug, but fecal spots are

Bed bug close up. Photo: Gary Alpert, Harvard University.

Left: unfed bed bugs; Right: after feeding. Photos: John Obermeyer, Rutgers University.

Often confused with bed bugs—ticks (left) and cockroach nymphs (right). Photos: Gary Alpert, Harvard University.

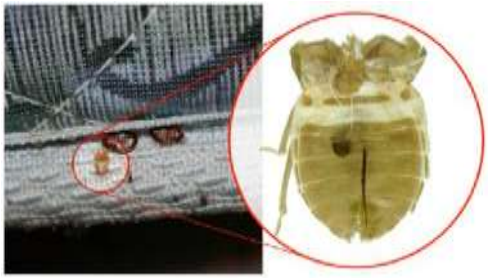
Bed bug bites. Photo: Bedbugger.com.

Fecal spots. Photo: Used with permission.

small dark dots. Fecal spots will be found around where bugs are hiding. Sometimes they will be present on bedding. Fecal spots are different from the frass left behind by cockroaches. Frass is gritty, like pepper, while fecal spots are smooth. A bed bug infestation cannot be confirmed by fecal spots; you must find live bed bugs.

- *Dead bed bugs*
  Dead bed bugs alone can't be used to confirm an infestation; find live bugs.
- *Shed skins*
  Bed bugs don't have stretchy skin. As they grow, they shed their outer layer, emerging as a larger version. They do this five times before they are fully grown. Shed skins look like hollow bed bugs and are the evidence of this growing process. A bed bug infestation cannot be confirmed by shed skins; live bed bugs must be found.

Two views of a bed bug. Photos: Gary Alpert, Harvard University.



Shed bed bug skin on mattress. Photo: Gary Alpert, Harvard University (inset).

Prevention

Prevention is key. Enact policies and procedures that limit bed bug introduction to new areas.
New infestations may start when

- infested items are moved through the building without being wrapped in plastic;
- infested items are rented, picked up, or purchased and brought home;
- staff or home visitors work in multiple units per day without taking precautions;
- residents travel or visit each other without taking precautions with their belongings;
- bed bugs crawl between people's belongings in common areas; or
- bed bugs travel along pipes or on wires from an infested adjacent unit.

For residents and those who work in units (e.g., staff, health aides and contractors):

- keep coats, backpacks, purses, and bags off beds, recliners, and sofas at home and while out;
- avoid bringing home used furniture;
- routinely inspect with a flashlight, launder bedding, vacuum, and meet housekeeping standards; and
- look for signs of bed bugs when sleeping away from home.

In units:

- avoid sitting or placing items on potentially infested surfaces;
- wear a protective layer (e.g., disposable coveralls) when moving infested items;
- wrap infested items before moving them through a building for proper disposal; and
- prepare before bed bugs are reported by minimizing clutter and installing encasements and monitors.

In the main office/community areas:

- replace fabric-covered furniture that has many crevices with plastic or metal items;
- have residents set their belongings in plastic totes during community meetings.

If you suspect bed bugs have crawled onto you or your belongings, change to a clean set of clothes and put the fabric item with bed bugs on it in a hot dryer for 30 minutes.

These precautions (protective layers, plastic totes, etc.) can be used community-wide to prevent spreading bed bugs among residents. Precautions should never be targeted at an individual resident; residents can get bed bugs through no fault of their own. When working in a resident's home while wearing protective layers, explain your precautions as standard operating procedures and that bed bugs are not caused by poor sanitation.

Introduction vs. infestation

The introduction of a bed bug into a new place does not have to lead to an infestation. Careful cleaning and monitoring will make it possible for newly introduced bed bugs to be spotted and removed before they can reproduce and create an infestation. Areas that are most likely spots for introduction of bed bugs are places where people frequently congregate, set down belongings, or sit or lie down for long periods of time. Infestation is likely to occur in these areas where bed bugs can crawl up on furniture or bedding and feed on a person for five minutes or more without being noticed.

Control

In multifamily housing, one infestation can quickly spread throughout the development. Inspect the reporting unit and adjacent areas as soon as possible. If bed bugs are identified, take action. Finding infestations and taking action before they grow and spread is how to manage bed bugs property-wide. Bed bug control requires a community response. Educate everyone about the importance of inspection, monitoring, and preventing the spread of bed bugs. Building staff and resident support specialists can help to identify people who may need support services for cleaning and inspection.

A bed bug control program may include the following:

- Inspection and monitoring
- Vacuuming
- Isolation
- Freezing

- Heat
- Pesticides

Inspection and monitoring

Bed bugs are small and very good at hiding. Most of the time they like to hide in cracks and crevices near where they last fed. Bed bugs will wedge into any crack that a credit card edge can fit into. Hiding spots can be in the furniture where people sleep, such as sofas, recliners, mattresses, box springs, and bed frames; the furniture next to the bed, such as nightstands, lamps, and alarm clocks; and picture frames on the walls, baseboards, the edges of the carpets, electrical outlets, and draperies.

Typical "hot spots" within the home.

Use a flashlight to look for evidence. Bed bugs often hide together, but not always. If bed bugs are found, keep a few for identification and inspect all adjacent units. Document all observations in the IPM log.

Some professionals use specially trained dogs to detect bed bugs. Inspection with canines is useful for detection, but as with inspection by humans, there is potential for error. You should be able to verify the presence of bed bugs where the dog "alerts" the majority of the time. The dog's effectiveness depends upon the quality of its training, the ability and consistency of its trainer, and the conditions in the area of inspection. If trained and handled properly, bed bug-sniffing dogs should inspect much more effectively and in a much shorter time than a human.

Prevention of bed bugs must include good monitoring. While monitors alone will not control a bed bug infestation, they will trap and kill some. More importantly, they help find bed bugs or confirm their presence so that management can take further action. Passive monitors do not have an attractant and must be placed where the bugs will walk over them. Active monitors have at least one attractant—heat, pheromone, or CO_2.

Vacuuming

Every bed bug treatment will likely involve some vacuuming, even if it's just the floors to make the PMP's job easier. Have a metal spatula or other tool available for dislodging bed bugs from crevices as you vacuum. After vacuuming, take the bag out, seal it in a plastic bag and throw it away. A canister vacuum can also be used. After every use, empty the canister into a bag, tie it off, throw it away and wash out the canister. Either way, if the

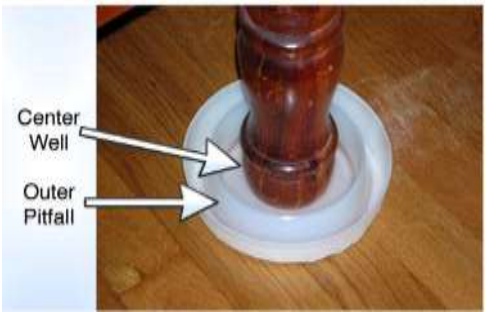
vacuum cleaner is turned off in the middle of a job, be sure to plug up the hose with a paper towel. This will prevent bed bugs from crawling back out the hose and the towel will wipe the inside of the hose when you turn the vacuum back on.

Another tool to use with vacuum cleaners is knee-high pantyhose. Stuff the toe down the vacuum hose at the sucking end. Keep pushing it down the hose until about 8 inches are sticking out. Fold the open end of the pantyhose over the vacuum nozzle (like folding a trash bag over the edge of a trash can) and secure it with a rubber band. Put the crevice tool on the vacuum hose over the pantyhose. The bugs will get trapped in the pantyhose and won't get inside the vacuum. When finished, remove the rubber band, tie off the pantyhose and throw it away. Note that vacuuming is also a great control method for cockroaches.

A vacuum attachment with nylon stocking inserted will trap bed bugs. Photos: Mary Maley, Northeastern IPM Center.

Isolation

Bed bugs can't claw or chew through anything. They're also not good at climbing up smooth metal, plastic, or glass. Use plastic totes, sealed bags, and fabric encasements designed for bed bug exclusion. The most common site of escape from encasements is through the zipper, so bed bug encasements should have special zipper backing.



Moat-style bed bug interceptor. Photo: Susan McKnight.

To isolate a bed with a frame, pull it away from the wall on all sides and away from any surrounding furniture. Put a bed bug interceptor (e.g., ClimbUp) under each bed frame leg.

Freezing

Although research is ongoing, it seems bed bugs and eggs must be frozen at 1iF for 10 hours to die. Household freezer temperatures vary too much to work effectively. PMPs may offer dry ice freezing treatments. The equipment is designed to spray the dry ice snow over objects, flash freezing the bed bugs and their eggs. Only a professional should use this method because dry ice can be dangerous. This system must be used with other methods, but may be a good option for sensitive objects, like art.

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Heat

Bed bugs and their eggs die when exposed to temperatures of 120iF for about 30 minutes. Some companies have equipment—including heaters, fans, monitors, and computer programs for tracking temperatures—to heat up an entire area. Not every area can be treated with heat. The key to any heat treatment is to expose every inch of every object to at least 120iF. Because the heat can't reach inside wall voids, the PMP will treat the voids with an insecticidal dust. Preparations for a heat treatment ensure all items are accessible; items that can't take the heat (candles, aerosol containers, and medications) are removed ahead of time.

Heat treatments are also available on a smaller scale. For luggage and other small items, try a portable heat chamber or steamer.

The hot setting on a dryer is one of the best options for bed bug management programs because it is accessible and easy. Bed bugs will die on dry fabric after 30 minutes on the hottest setting in a dryer. Even dry-clean-only items can go in a dryer (it's water that these fabrics can't tolerate). Check the lint trap for dead bed bugs.

Pesticides

When considering pesticide use for bed bugs, carefully research the available products to be sure to choose the least toxic method for the job. The EPA's bed bug website has a bed bug pesticide search tool at: cfpub.epa.gov/oppref/bedbug/. Remember that if you use pesticides, the label is the law. Read and follow the directions closely.

Note: If you suspect residents are putting pesticides on a mattress, have someone talk to them to make sure they are following label directions. Non chemical alternatives, like vacuuming and putting on an encasement, are preferred when possible.

PMPs should

- always thoroughly inspect the reporting unit and the adjacent areas;
- ask residents from reporting units about other units and areas in the building where they visit or spend time, to target inspection and monitoring there as well;
- provide site-specific preparation and follow-up instructions in multiple languages;
- follow the label on all products used; and
- return to verify elimination or treat if bed bugs are still present.

Learn More
For resources on bed bug control, including the most current HUD notices, see appendices A, B, and C and visit www.stoppests.org/pest-solutions/bed-bugs/ and www.epa.gov/bedbugs/

OTHER COMMON PESTS IN HOUSING

- Mosquitoes (transmit West Nile Virus—breed in standing water)
- Ticks (transmit Lyme Disease—get on people from bushes and rodents)
- Fleas (cause itchy welts—come into buildings on pets and wild animals)
- Bird and rodent mites (make us itch—may move into a unit when the wild host moves out)
- Lice (cause itching—spread on used or shared items and via person-to-person contact)
- Dust mites (cause asthma—flourish with high humidity and poor sanitation)

These pests are not covered in detail in this manual. Visit www.stoppests.org/pest-solutions/ for additional resources.

All pests need food, water, and shelter. IPM works by taking away the things pests need using sanitation, monitoring, and exclusion. Many of the control methods described for cockroaches, rodents, and bed bugs will also control these pests.

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Expand Your Program

FUNDING

You may be eligible for state, regional, and other funding opportunities that are specific to your situation. Universities, nonprofits, and city departments may be willing to fund projects related to healthy housing and local concerns where IPM plays a role. Search federal opportunities and apply for federal grants through Grants.gov. For guidance: www.grants.gov/applicants/find_grant_opportunities.jsp.

More resources at www.stoppests.org/what-is-ipm/funding-sources/.

EVALUATING YOUR PROGRAM

PHAs achieve positive results with IPM programs by tracking costs, health impacts, and efficiency. Collect data when you begin your program so you can show change.

Cost

IPM can save property managers and tenants money in the long term. Calendar-based pesticide applications do not provide long-term control and rarely solve pest problems. Keep track of the following costs to justify an IPM program:

- an IPM contract with a licensed pest management professional, including both contract price and any additional expenses billed by the contractor;
- materials and time for staff or contractors to seal holes, cracks, and crevices;
- time invested by property managers or resident support staff for one-on-one interventions with residents to get their units in compliance with housekeeping standards and pest control preparation instructions; and
- supplies for residents that help them do their part, such as cleaning supplies, monitors, mattress encasements, etc.

Consider also the benefits, such as whether you've been able to

- leverage funding as a result of implementing IPM (e.g., use a small grant to bring in additional dollars);
- create positions or marketable skills for residents;
- save money as a result of fewer complaints;
- lower pesticide costs; or
- lower energy costs as a result of sealing holes and eliminating gaps beneath doors.

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Health impacts

Pests such as cockroaches, rodents, and bed bugs present potential health problems. To measure health benefits, consider tracking

- amount of pesticide used on the exterior of the property;
- amount of pesticide used in buildings;
- resident satisfaction;
- employee satisfaction;
- health improvement, such as reduction in asthma attacks;
- improved indoor air quality;
- elimination of water leaks that could cause mold; or
- number of pests caught on monitoring devices.

Efficiency

To measure efficiency, consider tracking

- decrease in work orders related to pest control;
- improvement in REAC and pest inspection results;
- retention of staff and residents; or
- improved partnerships with community organizations (e.g., social services, health department, Cooperative Extension).

SPREADING YOUR SUCCESS

Residential properties are in a good position to become community leaders in pest control. Share successes and knowledge with other landlords, organizations, and city departments. Host trainings that are open to the community, reach out to home health aides and others who work within your communities, and connect with local media. Track the number of people the program reaches.

Expand your program

When implementing IPM for the first time, property managers have the most success if they focus on one building or property at a time. Doing so allows staff to focus and work together in a selected area until the pest problem is brought under control. The goal is to bring pest management activities from a reactive model (treating when infestations are present) to a proactive model (with a focus on prevention). After you document success in the first location, add buildings or other properties to the IPM program one at a time with the same strategy.

Strategic partnerships

Everyone can come together on the issue of pest-free housing. Local support agencies can offer resources and know-how to help address problems when a property manager might not have the time or expertise. Measure resources delivered and obtained through these partnerships to help qualify the residential property as a community asset.

A FINAL WORD

Remember that IPM may take more attention than calendar-based extermination at first, but the long-term results of this proactive approach to pest management ultimately saves money and time, building a healthier living and working environment for your staff and residents.

Integrated Pest Management: A Guide for Affordable Housing

List of Appendices

The appendices in this guide are current as of June 2012. For the most current materials see www.stoppests.org.

Appendix A.	U.S. Department of Housing and Urban Development Office of Public and Indian Housing Promotion of Integrated Pest Management (IPM) as an environmentally-sound, economical and effective means to address a major resident concern (Notice: PIH-2011-22)
Appendix B.	U.S. Department of Housing and Urban Development Office of Public and Indian Housing Guidelines on Bedbug Control and Prevention in Public Housing (Notice: PIH 2012-17)
Appendix C.	U.S. Department of Housing and Urban Development Guidelines on Addressing Infestations in HUD-insured and Assisted Multifamily Housing (Notice: H 2012-5)
Appendix D.	IPM Focus Unit Tracking Log
Appendix E.	Sample Request for Proposal (RFP) and Scope of Work for Pest Control (including site-specific IPM plan guidelines)
Appendix F.	Suggested Housekeeping and Lease Language
Appendix G.	Employee Certificate of Completion

Online resources:

1. HUD Notices
   www.stoppests.org/ipm-training/training-materials/
2. RFP Example, including guidelines on developing an IPM plan
   www.stoppests.org/file/Sample-RFP
3. Fact Sheets for 7 Common Pests
   www.stoppests.org/file/Seven-Pest-Factsheets
4. Case Studies
   www.stoppests.org/success-stories/case-studies/

Integrated Pest Management: A Guide for Affordable Housing

Appendix A: HUD N.tice PIH-2011-22 (Pr.m.ti.n .f IPM)

U.S. Department of Housing and Urban Development Office of Public and Indian Housing

SPECIAL ATTENTION OF:
Regional Directors; State and Area Coordinators; Public Housing Hub Directors; Program Center Coordinators; Troubled Agency Recovery Center Directors; Special Applications Center Director; Administrators; Offices of Native American Programs; Public Housing Agencies; Public Housing; Housing Choice Voucher/Section 8; Tribally Designated Housing Entities; Indian Tribes; Resident Management Corporations

NOTICE: PIH-2011-22

Issued: April 26, 2011

Cross Reference:
24 CFR 903.7(e) (2)
24 CFR 990.165
7 U.S.C. 136r-1 Integrated Pest Management

This Notice Supersedes
PIH Notice 2009-15, PIH Notice 2008-24, PIH Notice 2007-12

Subject: Promotion of Integrated Pest Management (IPM) as an environmentally-sound, economical and effective means to address a major resident concern.

1. Purpose. The purpose of this Notice is to promote and encourage the use of IPM by Public Housing Authorities (PHAs), Indian tribes, Tribal Designated Housing Entities (TDHEs), and owner/agents providing assistance through the HCV program. This notice provides guidance to Public Housing Authorities (PHAs) on the benefits of IPM, additional technical assistance and training opportunities for PHAs. Pest management is integral to the provision of safe and sanitary housing. In accordance with 24 CFR 903.7 (e) (2), PHAs must include in their PHA plans a description of any measures necessary for the prevention or eradication of pest infestations. IPM is an ecological approach using an array of methods to prevent and control pests with reduced reliance on pesticides. Procedures contained within this notice remain in effect until superseded by subsequent HUD Directive or guidance.

2. Applicability. This notice applies to PHAs administering the public housing and project based Section 8 program, and may be of interest to Indian tribes/TDHEs as well as owners/agents providing assisted housing through the Housing Choice Voucher (HCV) Program. The decision to use IPM techniques in their ongoing pest control effort is under PHA, Indian tribes/TDHE discretion. 24 CFR 990.165(a) covers cost associated with Project Expense Level (PEL) such as maintenance expenses. IPM is a maintenance expense.

3. Background. The goal of IPM as defined by the Environmental Protection Agency (EPA) is to control pests by the most economical long term means, and with the least possible hazard to people, property, and the environment. To undertake IPM, project managers should be committed to ongoing or continuous monitoring and record keeping, educational outreach to residents and staff as well as implementing good communication strategies between residents and building managers. IPM methods include: restricted pest access to

food/water; vigi/ant sanitation and waste management; mechanica/ contro/; physica/ barriers; structura/ maintenance; and, where necessary, the judicious use of pesticides.

4. Fundamentals of IPM. IPM efforts must invo/ve PHA staff, contractors, residents, and inc/ude:

   a. Communicating the PHA's IPM po/icies and procedures to be provided in the appropriate format to meet the needs of a// residents inc/uding persons with /imited Eng/ish proficiency and in formats that may be needed for persons who are visua//y or hearing impaired. This app/ies to administrative staff, maintenance personne/, and contractors as we//.
   b. Identifying the environmenta/ conditions that /ead to pests and educating residents.
   c. Identifying pests and immediate/y reporting the presence of pests.
   d. Estab/ishing an ongoing monitoring and record keeping system for regu/ar samp/ing and assessment of pests, survei//ance techniques, and remedia/ actions taken, inc/ude estab/ishing the assessment criteria for program effectiveness. This is a high/y effective preventative measure that can he/p reduce the possibi/ity of a pest infestation outbreak.
   e. Determining, with the invo/vement of residents, the pest popu/ation /eve/s — by species — that wi// be to/erated, and setting thresho/ds at which pest popu/ations warrant action.
   f. Improving waste management and pest management methods.
   g. Se/ecting the appropriate pesticides and insecticides to use. Some residents may suffer from Mu/tip/e Chemica/ Sensitivity or other Environmenta/ I//nesses.
   h. Ongoing efforts to monitor and maintain structures and grounds (e.g., sea/ing cracks, e/iminating moisture intrusion/accumu/ation) and adding physica/ barriers to pest entry and movement.
   i. Deve/oping an outreach/educationa/ program to ensure that /eases ref/ect residents' responsibi/ities for: (1) proper housekeeping, which inc/udes sanitation upkeep and the reduction of c/utter, trash remova/ and storage, (2) immediate/y reporting the presence of pests, /eaks, and mo/d, (3) cooperating with PHA specific IPM requirements such as obtaining permission of PHA management before purchasing or app/ying any pesticides, and (4) avoiding introduction of bed bugs and other pests into bui/dings on used mattresses and other recyc/ed furniture. See "Preventing and Getting Rid of Bed Bugs Safe/y," New York City Department of Hea/th and Menta/ Hygiene http://www.nyc.gov/htm//doh/down/oads/pdf/vector/bed-bug-guide.pdf
   j. Check with /oca/ hea/th department to determine if your state has /aws for re-used furnishings.
   k. The judicious use of pesticides when necessary, with preference for products that, whi/e producing the desired /eve/ of effectiveness, pose the /east harm to human hea/th and the environment. Residents shou/d notify PHA management before pesticides are app/ied.

   /. Providing and posting "Pesticide Use Notification" signs or other warnings.

5. Health Concerns. Pests may adverse/y impact the hea/th of residents and contribute to worsening some diseases, such as a//ergies and asthma. Cockroaches can cause asthma in chi/dren and can transfer disease-causing organisms to food and surfaces they contaminate. Rodents, such as mice and rats, carry disease, can trigger asthma attacks and even cause fires by gnawing through e/ectrica/ wires. A/though bed bugs are not known to transmit infectious diseases, their bites can /ead to secondary infections. Bed bugs can cause

emotional distress and sleep deprivation for residents as well. Bed bug infestations can spread quickly and must be treated aggressively. All pest control methods are targeted to protecting the health of residents and staff. Although applying pesticides may be effective in eliminating pest populations, many of these chemicals are associated with health and/or environmental risks, and their use should be minimized if alternative methods exist. This is especially important in buildings housing vulnerable age groups such as children or the elderly and in buildings housing residents with compromised immune systems or who may suffer from Multiple Chemical Sensitivity and other environmental illnesses. Therefore, IPM offers the potential to ensure efficacy of pest elimination while protecting the health of residents, staff and the environment.

6. Building. Most of the effective methods of pest elimination, including ongoing repairs, erection of barriers, and monitoring, will extend the useful life of a building and as a result generate significant savings that could offset the costs of the pest control. Many of these non-application methods, including structural maintenance, and inspecting for and repairing leaking pipes and cracks in roofs, walls, and windows are effective in preventing moisture intrusion and accumulation. Additionally, IPM-conscious PHAs assess the need to install physical barriers to both pest entry and pest movement within every structure thereby reducing the spread of pest infestations.

7. Implementation. HUD promotes IPM as a pest control method. IPM effectively eliminates pests in safer and long term cost-effective ways than traditional pesticide treatments. IPM frequently has proven to be more effective in reducing pest populations than relying solely on broadcast pesticides. The Boston Housing Authority (BHA) experienced approximately one-third reduction in pest related work orders over multiple years in multiple sites. BHA has maintained this reduction and now uses IPM in all its BHA maintained properties. Continuation of the IPM program after initial development cost is considered preventative maintenance expense and is an eligible program activity under the Public Housing Operating Subsidy as codified at 24 CFR 990.165. Successful IPM requires resident participation through proper housekeeping, reporting of pest infestations, and trash removal. Residents can monitor pest populations and assist in identifying how to eliminate access to food and water for pests. Resident organizations must be prepared to assist residents who need help to follow the IPM policy. HUD encourages PHAs to partner with local pest management organizations.

8. Procurement of IPM Services. If a PHA uses an outside contractor for pest control, the PHA's pest control/IPM policies and procedures should be incorporated into the specifications or statement of work for the pest management contract. PHAs using an outside contractor are encouraged to use companies that are trained and certified to provide IPM services either through Green Shield certified (http://www.greenshieldcertified.org/) or Green Pro (http://www.npmagreenpro.org/). The PHA should also consider training for maintenance staff, residents, Resident Councils as well as PHA administrative staff who oversee housing developments or administer occupancy and rental duties such as unit housekeeping inspections.

9. PHA Maintenance Staff. If a PHA uses its own maintenance staff for pest management, proper training in the PHA's IPM procedures is essential. It is especially critical to be trained in the proper treatments methods PHAs can use when treating for bed bugs. The contract administrator for any pest management contract should be trained as well. Successful results rely upon proper implementation; training is therefore of critical

importance. IPM training is available at: http://www.stoppests.org/ and http://www.healthyhomestraining.org/ipm/training.htm.

10. Area of High Concern, Bed bugs. As the number of bed bug infestations rise throughout the country, HUD is in the process of developing protocols to address this growing problem. HUD is addressing the unit inspection process as well as developing the tools necessary for PHAs to identify, treat and monitor the effectiveness of bed bug treatments in its portfolio. Identifying, reporting, treating and monitoring pest infestations are all critical components of IPM and are effective in addressing the bed bug problem.

11. Reference Materials for Implementing IPM. The below list of IPM practices does not constitute a HUD endorsement of any specific practice, but provides IPM ideas and practices that have been used to improve pest management while reducing unnecessary dependence on pesticides. HUD encourages PHAs, Indian tribes/TDHEs to share their policies, procedures, resident leases, and written case studies so that these may be published on the HUD website for others to read.

a. National Center for Healthy Housing: http://www.healthyhomestraining.org/ipm
b. Bed Bugs: "What's Working for Bed Bug Control in Multi-family Housing"
http://www.healthyhomestraining.org/ipm/NCHH Bed Bug Control 2-12-10.pdf
http://pestworld.org/pest-world-blog/the-bed-bug-hub-one-stop-shop-for-bed-buginformation
c. National Pesticide Information Center: http://www.npic.orst.edu/
d. Integrated Pest Management (IPM), A Guide for Managers and Owners of Affordable Housing, Boston Public Health Commission: http://http://asthmaregionalcouncil.org/uploads/IPM/asthma ipm guide.pdf.
e. U.S. Environmental Protection Agency:
i. General IPM information http://www.epa.gov/opp00001/contolling/index.htm housing): http://www.epa.gov/pesticides/ipm
ii. EPA staff contacts: http://www.epa.gov/pesticides/about/contacts.htm#ipm
iii. List of EPA IPM publications and instructions for ordering documents: http ://www. epa. gov/oppfead1/Publications/c atalog/subpage3 .htm
f. Massachusetts Department Agriculture Resources — Building Managers and Landlords: http://www.mass.gov/agr/pesticides/docs/CIB Building Managers.pdf
g. HUD funded "Healthy Public Housing Project" conducted by the Harvard School of Public Health In Boston Public Housing, HTTP://www.hsph.harvard.edu/hphi/
h. Bed Bug Fact Sheets in English and Spanish produced by Dr. Dini Miller, http://www.vdacs.virginia.gov/pesticides/bedbugs-facts.shtml

12. PHA Case Studies On IPM Application.
i. Cuyahoga Housing Authority:
http ://www. healthyhome straining. org/ipm/Case Study Cuyahoga 10 -20-07.pdf
ii. Boston Housing Authority:
http://www.http://www.healthyhomestraining.org/ipm/casestudy holgate.pdf
iii. New York City Department of Health, Columbia University and the New York City Housing Authority: http://www.beyondpesticides.org/dailynewsblognp=1604

13. For further information contact Leroy Ferguson at (202) 402-2411 or email at Leroy.Fergusonchud.gov or

you can contact the nearest HUD Field Office of Public Housing

within your state. /ndian tribes and TDHEs should contact the nearest HUD Office of Native American Programs. Locations of these offices are available on HUD's website at http://www.hud.gov.

/s/
Sandra B. Henriquez, Assistant Secretary for

Public and Indian Housing

Integrated Pest Management: A Guide for Affordable Housing

Appendix B: HUD Notice PIH 2012-17 (Bed Bugs for Public Housing)

U.S. Department of Housing and Urban Development Office of Public and Indian Housing

SPE

CIAL ATTENTION OF:

Regional Directors; State and Area Coordinators; Public Housing Hub Directors; Program Center Coordinators; Troubled Agency Recovery Center Directors; Special Applications Center Director; Administrators; Offices of Native American Programs; Public Housing Agencies;

Housing; Housing Choice Voucher/Section 8; Tribally Designated Housing Entities; Indian Tribes; Resident Management Corporations

NOTICE: PIH-2012-17

Issued: February 28, 2012

Expired: This Notice remains in effect until amended, superseded, or rescinded

Cross References:

SUBJECT: Guidelines on Bedbug Control and Prevention in Public Housing

I. Purpose

Bedbug infestations have become a serious problem in housing throughout the country. Public Housing properties are not immune to infestations. This Notice provides information and references to best practices regarding the prevention and control of bedbug infestations. It also provides guidance on the rights and responsibilities of HUD, Public Housing Agencies (PHAs) and tenants with regard to bedbug infestations.

II. Background

After a long absence, bedbug infestations are a growing problem in the United States today. According to the United States Environmental Protection Agency (EPA), bedbug populations have increased dramatically. Bedbugs are considered a pest of significant public health importance by the EPA and the Centers for Disease Control and Prevention (CDC). Although the insects are not known to transmit disease, bites may itch and cause an allergic reaction in some people, which may lead to secondary infections. The presence of bedbugs may also contribute to stress or anxiety.

Experts suspect the resurgence is associated with greater international and domestic travel, lack of knowledge regarding the complex measures needed to prevent and control bedbugs, changes in pesticide availability and technology, and increased resistance of bedbugs to available pesticides. Bedbugs are not an indicator of poor sanitation, but excess clutter can provide them more places to hide, making early detection and targeted control

difficult.

HUD has received numerous reports of bedbug infestations in Public Housing properties in various regions. HUD is working closely with other federal agencies to develop and share best practices for preventing and controlling bedbugs.

III. Applicability

This notice applies to PHAs administering the public housing and project based Section 8 program. It may also be of interest to Indian tribes/TDHEs as well as owners/agents providing assisted housing through the Housing Choice Voucher (HCV) Program.

IV. Prevention of Bedbug Infestations

The best approach to bedbug management is to prevent an infestation from occurring in the first place. Federal agencies, such as EPA and HUD, are working in tandem to develop and share recommendations to prevent bedbug infestations.

PHAs are strongly encouraged to develop an Integrated Pest Management (IPM) Plan. Such plans describe the ongoing efforts the property management will take to prevent and respond to pests. For more details on IPM, please see the online guide at http://www.stoppests.org. According to the EPA, principles of IPM for bedbugs include:

- Raising awareness through education on prevention of bedbugs;
- Inspecting infested areas, plus surrounding living spaces;
- Checking for bedbugs in luggage and clothes when returning home from a trip;
- Looking for bedbugs or signs of infestation on secondhand items before bringing the items home;
- Correctly identifying the pest;
- Keeping records – including dates and locations where pests are found;
- Cleaning all items within a bedbug infested living area;
- Reducing clutter where bedbugs can hide;
- Eliminating bedbug habitats;
- Physically removing bedbugs through cleaning;
- Using pesticides carefully according to the label directions; and,
- Following up on inspections and possible treatments.

In addition or as part of an IPM plan, PHAs are strongly encouraged to take the following preventive steps:

- Provide training for staff to identify bedbugs, and to perform ongoing prevention actions as outlined in the IPM. When a community is at high risk for bedbugs (for example, if the community has experienced prior infestations), periodic building inspections are recommended.

- Actively engage residents in efforts to prevent bedbugs. Education and involvement of tenants is a critical component of IPM for bedbugs. Bedbugs may often go undetected and unreported and because they are active at night tenants may not be aware of their presence. PHAs may wish to hold workshops for tenants to learn to identify bedbugs, to create unfriendly environments for pests, and to report suspicions of bedbugs as soon as possible.

- Provide orientation for new tenants and staff, and post signs and handouts regarding bedbug prevention.

More information on bedbug prevention may be found by accessing the following websites:[1]

- **Healthy Homes Training:** *What's Working for Bedbug Control in Multifamily Housing?: Reconciling best practices with research and the realities of implementation*. http://www.healthyhomestraining.org/ipm/NCHH Bed Bug Control 2-12- 10.pdf.

- **National Pest Management Association Bedbug Hub**: http://pestworld.org/pest-world-blog/the-bed-bug-hub-one-stop-shop-for-bed-buginformation

- **National Pest Management Association Best Practices Website**: http://www.bedbugbmps.org

- **Environmental Protection Agency**: http://www.epa.gov/pesticides/bedbugs/

- **Public Housing Environmental Conservation Clearinghouse (PHECC)** http://www.hud.gov/offices/pih/programs/ph/phecc/pestmang.cfm

V. Addressing Infestations

The PHA should respond with urgency to any tenant report of bedbugs. Within 24 hours of the tenant report, the PHA should make contact with the tenant, provide the tenant with information about control and prevention of bedbugs and discuss measures the tenant may be able to take in the unit before the inspection is performed. However, a bedbug inspection and, if necessary, treatment, may take time to schedule. The PHA should endeavor to take appropriate action within a reasonable time period using the guidelines provided below.

[1] An additional resource for interested parties is the *Bedbug Handbook*. L.J. Pinto, R. Cooper, and S.K. Kraft, *Bedbug Handbook: The Complete Guide to Bedbugs and Their Control* (Mechanicsville, MD: S.K. Pinto & Associates, 2007).

Following a report of bedbugs, the PHA or a qualified third party trained in bedbug detection should inspect the dwelling unit to determine if bedbugs are present. It is critical that inspections be conducted by trained staff or third party professionals. Low level inspections may escape visual detection. For this reason, multiple detection tools are recommended. Recent research indicates that "active" bedbug monitors containing attractants can be effective tools for detecting early infestations. Some licensed pest control applicators use canine detection to verify the presence of bedbugs. The inspection should cover the unit reporting the infestation and no less than surrounding apartments consisting of the units above, below, left and right, and should be completed within three business days of a tenant complaint if possible. If reputable, licensed pest control companies are unattainable within three calendar days, the PHA is required to retain documentation of the efforts to obtain qualified services. If an infestation is suspected but cannot be verified using the methods described above, the PHA should re-inspect the unit(s) periodically over the next several months.

When an infestation is identified, the unit and surrounding units should be treated for bedbugs according to the IPM Plan. Chemical treatments are necessary, but not reliable. Therefore, encasement, interception devices, vacuuming, steaming, freezing and commodity or building heat treatments may be utilized as part of the bedbug control effort. Infestations are rarely controlled in one visit. Effective treatment may require two to three visits, and possibly more. The length, method and extent of the treatment will depend on the severity and complexity of the infestation, and the level of cooperation of the residents.

VI. Additional Considerations

PHAs may offer protective tools to residents to help safeguard properties from infestation and recurrences. For example, the PHA may offer residents bed covers, climb-up interceptors, or other detection or protection devices that may become available. PHAs may voluntarily offer to inspect tenants' furniture before move-in. PHAs may also offer tenants a service of non-chemical treatment of household items upon tenant move-in, non-chemical treatment or inspection of used furniture and/or non-chemical treatment of luggage before it is unpacked when a tenant returns from a trip. Tenants may voluntarily use such services, but PHAs may not require tenants to do so. These services or products are to be offered at the PHAs expense.

A PHA may not deny tenancy to a potential resident on the basis of the tenant having experienced a prior bedbug infestation, nor may give residential preference to any tenant based on a response to a question regarding prior exposure to bedbugs. A PHA may not charge a tenant to cover the cost of bedbug treatment; such costs should be covered by the PHA. HUD reserves the right to approve Lease Addenda. Lease Addenda may not conflict with this Notice.

VII. Tenant Rights and Responsibilities

Tenants are strongly encouraged to immediately report the suspicion of possible bedbugs in a housing unit or other areas of the property. Early reporting allows the pests to be identified and treated before the infestation spreads. Tenants are the first line of defense against bedbug infestations and should be encouraged to create living
environments that deter bedbugs. This includes reducing unreasonable amounts of clutter that create hiding places for bedbugs, and regular checking of beds and laundering of linens.

Bedbug infestations can cause health concerns, including physical discomfort and may contribute to stress and anxiety on the part of the residents. Tenants should be advised of the following:

- A PHA may not deny tenancy to a potential resident on the basis of the tenant having experienced a prior bedbug infestation, nor may an owner give residential preference to any tenant based on a response to a question regarding prior exposure to bedbugs.

- A tenant reporting bedbugs may expect expeditious response and attention by the PHA, but should be advised that inspection and, if necessary, treatment of bedbugs may take time to schedule. The inspections should occur within three calendar days of the tenant report when possible.

- Following a report of bedbugs, the PHA or a qualified third party trained in bedbug detection should inspect the dwelling unit to determine if bedbugs are present. It is critical that inspections be conducted by trained staff or third party professionals. The PHA may enter the unit to perform these activities, in accordance with the lease.

- If bedbug infestation is found in the unit, the tenant may expect treatment to begin within five days of the inspection, though depending on the form of treatment, this may not be possible. Tenants should be advised that treatment may take several weeks.

- Tenants are expected to cooperate with the treatment efforts by allowing for heat treatment of clothing and furniture and refraining from placement of infested furniture or other items in common areas such as hallways. Tenant cooperation is shown to expedite the control of bedbugs and to prevent spreading of infestations.

- Management may make staff available to help with moving and cleaning of furniture to accomplish the treatment effort.

- The tenant will not be expected to contribute to the cost of the treatment effort.

- The tenant will not be reimbursed the cost of any additional expense to the household, such as purchase of new furniture, clothing or cleaning services.

VIII. REAC Inspections

Bedbugs should be addressed when reported by staff, tenants or the Real Estate Assessment Center (REAC), regardless of the score of the REAC physical inspection. Inspectors ask the PHA to identify any units and/or buildings that are infested before the inspection begins. When bedbugs are reported or observed, the inspector will record the units and/or buildings affected in the comment section of the Physical Inspection report, noting that bedbugs were reported. The inspector will then select an alternate unit to inspect to replace any unit with observed or reported bedbugs.

REAC sends a "Bedbugs Reported" email to the local PIH field office with a copy to the PIH Regional director when bedbugs are noted in the comments section of a Physical Inspection Report. The PHA will see the information about bedbugs in the comment section of the Physical Inspection Report which provides PHAs with the necessary information to address the situation.

/s/

Sandra B. Henriquez, Assistant Secretary for Public and Indian Housing

Attachment

Appendix C: HUD Notice H 2012-5 (Bed Bugs for HUD-insured and Assisted Multifamily Housing)

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, DC 20410-8000

ASSISTANT SECRETARY FOR HOUSING-
FEDERAL HOUSING COMMISSIONER

As Special Attention of

All Multifamily Hub Directors
All Multifamily Program Center Directors
All Multifamily Operations Officers
All Directors of Project Management
All Field Counsel

Notice H 2012-5

Issued: April 23, 2012

Expires: This notice remains in effect until amended, revoked, or superseded

Cross References: Housing Notice 2011-20

SUBJECT: Guidelines on Addressing Infestations in HUD-insured and Assisted Multifamily Housing

I. Purpose

This Notice supersedes Housing Notice 2011-20, -Guidelines on Bed Bug Control and Prevention in HUD Insured and Assisted Multifamily Housing." Readers seeking guidance on the subject of bed bug infestations should instead refer to this Notice, which provides updated information to prevent and address infestations, including but not limited to bed bugs, insects, and all manner of vermin. HUD is providing guidance to Owners, Management Agents (O/As) and residents of HUD Multifamily insured and assisted properties to remind all parties of the importance of prevention, identification, and treatment of infestations in HUD-assisted and HUD-insured rental housing. The Department has received numerous inquiries and comments from the industry and HUD residents seeking clarification and information on appropriate steps to address infestations in Multifamily properties. This Notice provides information and references to best practices regarding the prevention and control of infestations. It also reaffirms existing program requirements with regard to infestations.

II. Background

Pursuant to 24 CFR Part 5, Subpart G, HUD housing must be decent, safe, sanitary and in good repair. Owners of HUD-insured or assisted housing must maintain such housing in a manner that meets physical condition standards. In accordance with project Regulatory Agreements and Section 8 HAP Contracts, the housing must have no evidence of infestation. HUD monitors Owners and Agents (O/As) to ensure that housing meets physical condition standards enumerated in 24 CFR 5.703. This includes providing guidance aimed at preventing and addressing infestations.

Many residents and 0/As have contacted HUD to seek guidance on infestations. Of particular concern is the growing problem of bed bugs. According to the United States Environmental Protection Agency (EPA), bed bug populations have recently increased dramatically. HUD is working closely with other federal agencies to develop and share best practices for preventing, identifying and controlling bed bugs.

III. Applicability

This Notice provides guidance to the following types of projects:

A. Properties assisted with Section 8 Project Based Rental Assistance, Rent Supplement or Rental Assistance Payment (RAP) contracts.

B. Properties with active Section 202 Direct Loans, Section 202/162, Section 202 and 811 Capital Advances, and Section 202 Senior Preservation Rental Assistance Contracts or Section 811 Project Rental Assistance demonstration funding.

C. Properties with active FHA insured first mortgages under Sections 207 pursuant to 223(f), 221(d)(3), 221(d)(4), 221(d)(5), 231, 213 or 236.

Certain provisions of this Notice are applicable only to assisted properties, as specified in various sections of the Notice below. The Notice does not supersede eXisting lease provisions that comply with state and/or local landlord/tenant laws and that have been approved by HUD (where such approval is required).[1] All parties should refer to the property lease eXecuted between the tenant and the 0/A, and the property House Rules, for details on Owner and resident rights and responsibilities related to infestations and housing physical condition standards. Certain assisted properties[2] are also subject to provisions of the HUD Model Lease for SubsidiZed Programs (Family Model Lease) (Form HUD-90105-A, HUD-90105-B, HUD 90105-C and HUD-90105-D) in HUD Handbook 4350.3, *Occupancy Requirements of Subsidized Multifamily Housing Programs.*

IV. Prevention of Bed Bug Infestations

Of particular concern for Multifamily 0/As, as well as project residents, is the resurgence of bed bugs, which can cause discomfort and anXiety for residents and which can spread quickly. The ideal approach to bed bug infestations is to prevent them from occurring in the first place. Federal agencies, such as EPA and HUD, are working in tandem to develop and share recommendations to prevent infestations.

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[1] For or unassisted 0/As, this Notice does not supersede state and local landlord/tenant law related to lease enforcement, housing habitability, and cure rights or damages.

[2] Section 221(d)(3) BMIR, Section 236, Section 8 New Construction, Section 8 Substantial Rehabilitation, Section 8 State Agency, RHS 515 with Section 8, Section 8 Loan Management Set-Aside (LMSA), Section 8 Property Disposition Set-Aside (PDSA), Rental Assistant Payment (RAP), and Rent Supplement projects are subject to the provisions of the Family Model Lease.

Appendix C: HUD Notice H 2012-5 (Bed Bugs for HUD-insured and Assisted Multifamily Housing)

HUD encourages Multifamily O/As to develop an Integrated Pest Management Plan (IPM) to focus on preventing infestations. Such plans describe the ongoing efforts the property management will take to prevent and respond to pests. For more detail on IPMs generally, please see the online guide at http://www.stoppests.org. The information below pertains specifically to bed bug infestations.

According to the EPA, principles of IPM for bed bugs include:

- Raising awareness through education on prevention of bed bugs;
- Inspecting infested areas, plus surrounding living spaces;
- Checking for infestations on luggage and clothes when returning home from a trip;
- Reducing the number of secondhand items brought into units and looking for bed bugs or signs of infestation on secondhand items before bringing the items home;
- Correctly identifying the pest;
- Keeping records — including dates when and locations where pests are found;
- Cleaning all items within a bed bug infested living area;
- Reducing clutter where bed bugs can hide;
- Eliminating bed bug habitats;
- Physically removing bed bugs through cleaning;
- Using pesticides carefully according to the label directions; and,
- Following up on inspections and possible treatments.

In addition to or as part of an IPM program, Multifamily O/As are strongly encouraged to take the following steps to prevent bed bugs:

- Provide training for staff to identify bed bugs, and to perform ongoing prevention actions as outlined in the IPM. When a community is at high risk for bed bugs (for example, if the community has experienced prior infestations), periodic building inspections are recommended.
- Actively engage residents in efforts to prevent bed bugs. Education and involvement of project residents is a critical component of IPM for bed bugs. Bed bugs may often go undetected and unreported, because they are active at night, and tenants may not be aware of their presence. O/As may wish to hold workshops for tenants to teach them to identify bed bugs, to create unfriendly environments for pests, and to report suspicions of bed bugs as soon as possible.
- Provide orientation for new tenants and staff, and post signs and handouts.
- In addition, tenants should immediately report the suspicion of infestations in housing units or other areas of the property. Early reporting allows the pests to be identified and treated before the infestation spreads. Tenants are the first line of defense against infestations and should cooperate to create living environments that deter pests. This includes reducing unreasonable amounts of clutter that create hiding places for pests and deter treatment.

More information on bed bug prevention may be found by accessing the following websites:[3]

- **Healthy Homes Training:** *What's Working for Bed Bug Control in Multifamily Housing? : Reconciling best practices with research and the realities of implementation*. http://www.healthyhomestraining.org/ipm/NCHH Bed Bug Control 2-12-10.pdf.
- **National Pest Management Association Bed Bug Hub**: http://pestworld.org/pest-world-blog/the-bed-bug-hub-one-stop-shop-for-bed-buginformation
- **National Pest Management Association Best Practices Website**: http://www.bed_bugbmps. org
- **IPM Curriculum and Blog:** http://www.stoppests.org
- **Environmental Protection Agency**: http://www.epa.gov/pesticides/bed bugs/

V. Addressing Infestations

The O/A should respond with urgency to tenant reports of infestations. The O/A should endeavor to take appropriate action within a reasonable time period. However, tenants are advised that pest inspections and, if necessary, treatment, may take time to schedule, particularly for recently resurgent pests such as bed bugs, for which it may be difficult to find trained specialists to perform inspections and conduct treatments.

Residents should fully cooperate with the 0/A's efforts to identify and address infestations. This tenant cooperation is shown to expedite the control of infestations. Cooperation includes allowing the O/A to enter the unit to perform inspections and treatments, allowing pest treatments to occur, following the pest treatment protocol, and removing infested furniture or other items from common areas such as hallways or community rooms.

Residents are advised that some infestations, including bed bugs, require multiple treatments over the course of several weeks. Generally, relocation from units is not necessary for effective pest treatment. However, if reasonable temporary relocation is necessary, the O/A may request withdrawals from available project funds (which may include Reserve for Replacement, project income, or Residual Receipts, if authorized by HUD), as described below in Section VI, for those days when treatment is actively occurring that may render the unit uninhabitable. All withdrawals of this type must be approved by the Hub/PC Director or designee. Any temporary relocation must be carried out in accordance with applicable civil rights laws, including, but not limited to, Title VI

[3] An additional resource for interested parties is the *Bed Bug Handbook*. L.J. Pinto, R. Cooper, and S.K. Kraft, *Bed Bug Handbook: The Complete Guide to Bed Bugs and Their Control* (Mechanicsville, MD: S.K. Pinto & Associates, 2007).

of the Civil Right Act of /964 and Section 504 of the Rehabilitation Act of /973. For example, when persons with disabilities are temporarily relocated, they must be placed in housing that provides, at a minimum, the same accessibility features as the housing in which they currently reside. Additionally, the O/A must ensure the right of return for tenants who have had to be temporarily relocated while the treatment is being performed.

VI. Project Resources

An O/A may contact HUD to request project resources for control of infestations. An O/A may use available operating funds to pay for activities to prevent and/or treat infestations. When other sources of funds are not available or sufficient, the Hub/PC Director may honor requests to reimburse Owners for infestation treatment from the Reserve for Replacement account, or, if authorized, the Residual Receipts account. The releases should follow the processes outlined in HUD Handbook 4350./, *Multifamily Project Servicing*, Chapters 4 and 25. Owners may make advances (loan without interest) when no reserves are available. With prior HUD approval, Owners may repay the advances from project resources as discussed in HUD Handbook 4350./.

For assisted housing projects, HUD may consider use of rental assistance to pay reasonable and necessary project expenses, such as an increased pest control line item in the project's operating budget, if the Section 8 Housing Assistance Payments (HAP) contract allows for budget-based rent setting in accordance with the *Section 8 Renewal Policy Guide*.

Owners of assisted properties are advised that any rental assistance received under Section 8, Rent Supplement or RAP cannot be used to reimburse residents for the cost of any additional expense to the household, such as purchase of new furniture, clothing or cleaning services. Assisted project Owners' requests for tenants to pay the costs of infestation treatment must be in accordance with the provision for tenant payment of damages or noncompliance as required in the Family Model Lease.

VII. Recurring Infestations

Many properties face recurring infestations. O/As may take initiative to offer protective tools to residents to help safeguard properties from recurrences. To prevent pests from entering a Multifamily property, O/As may voluntarily offer to inspect tenants' furniture before move-in. Where there is an approved (for Assisted Owners) lease provision that complies with state and/or local landlord/tenant law, O/As may require appropriate treatment of furniture upon tenant move-in, or when a tenant moves furniture into the apartment. These services or products are to be offered at the Owner's expense, or may be paid from project operating funds if available.

All Owners (of assisted and unassisted properties) may pursue remedies provided in the lease agreement and in accordance with state and local rental law. Assisted Owners must follow additional guidelines including occupancy requirements for assisted housing, and must adhere to all HUD and state and local landlord/tenant laws before taking action to deny tenancy or remove residents for causes related to infestations. For O/As of assisted properties, the Family Model Lease provides remedies related to damages or noncompliance. Many O/As have proposed lease addenda

related to infestations. As detailed in HUD Handbook 4350.3, Section 6-9, Lease Addenda in assisted properties may not conflict with the Family Model Lease. HUD reserves the right to review and approve Lease Addenda for assisted properties, for example to ensure that tenant payment provisions in proposed Addenda do not exceed the remedies for damages or noncompliance provided in the Family Model Lease.

VIII. Responding to Inspection Findings

Infestations should be addressed when reported by staff, tenants or the Real Estate Assessment Center (REAC), or if an audit by the HUD Office of the Inspector General identifies possible infestation.

Presently, REAC inspectors will only deduct points if there is the –presence *f rats, *r severe infestation by mice or insects such as roaches or termites. The following deficiencies can be noted: 1) Insects and 2) Rats/Mice/Vermin."[4] If there is no evidence of infestation (i.e. there are baits, traps, and sticky boards with no presence of insects or vermin) inspectors are instructed not to record this as a deficiency. If evidence is identified, the infestation may be cited as a deficiency.

As per Inspector Notice No. 2010-01, –the presence and/*r treatment *f bed bugs will n*t be sc*red in the UPCS inspecti*n." However, inspectors now ask the O/A to identify any units and/or buildings that are infested before the inspection begins. If bed bugs are reported, the inspector will record the units and/or buildings affected in the comment section of the Physical Inspection report.

Because bed bug infestations are on the rise, HUD staff will take additional steps to monitor and track reports of bed bug infestation and treatments of such infestations. When bed bugs are reported by the Owner/Agent at the time of inspection or if the Inspector notes the presence of bed bugs, REAC sends a –Bed Bugs Rep*rted" email t* the Hub/Program Center Director. HUD staff must take the f*ll*wing steps up*n receipt *f the –Bed Bugs Rep*rted" email fr*m REAC
(regardless of the PASS score the property receives) or if bed bugs are cited as a deficiency within the REAC report, or if bed bugs are reported by the O/A, project residents, the Performance Based Contract Administrator, or an OIG audit:

- Enter the bed bug information on the Problem Statement screen in the Integrated Real Estate Management System (iREMS).
- If bed bugs were identified by REAC, send the attached letter (Attachment 1) to the Owner regardless of the score of the REAC Physical Inspection.
- Advise the Owner to describe what actions were taken or will be taken to eradicate the infestation.
- Advise the Owner to inform HUD of the response to the infestation, and to inform HUD if and when the problem has been completely eradicated.

[4] HUD Physical Inspection Program—Chapter 3: UPCS Definitions Training—Health & Safety

- Release funds from Reserve for Replacement or Residual Receipts accounts if requested and if such funds are available and authorized.
- Continue to enter all related information into the Problem Statement screen in iREMS; and,
- Report any significant developments or problems regarding a bed bug infestation to Headquarters, Office of Asset Management.

If you have questions, please contact your Desk Officer in the Office of Asset Management.

Carol J. Galante
Acting Assistant Secretary for Housing Federal
Housing Commissioner

Enclosures

ATTACHMENT

Property 0wner
Address

SUBJECT: Bed Bugs
Property Name:

Dear 0wner:

The [Hub Name] Multifamily Hub has received notification from the Real Estate Assessment Center (REAC) that during the physical inspection of your property performed on [Date], the inspector indicated that bed bugs were reported present at the property. The units/buildings below were identified as being infested with bed bugs:

Within 5 days of the date of this letter, please inform your Project Manager of the actions you are taking for bed bug control. This information should include the method of treatment used (or to be used), the timing for treatment(s), and your proposed plan for monitoring and preventing the possibility of future infestation.

If you have any questions, please contact your Project Manager, [Project Manager's Name], at [Project Manager's Telephone Number] ext. [Extension]

Sincerely,

Supervisory Project Manager
Project Management Division

APPENDIX D—IPM FOCUS UNIT TRACKING LOG

Name/Address of Property:

The IPM team identifies areas or units of focus and coordinates IPM efforts. This sheet unites pest control, housing, and maintenance record-keeping systems. Keep it in the front of the IPM log.

Date	Unit / Location	Name of Staff Member / Technician	Pest Level	Repairs Needed		Recent or Current Focus Unit?	Housekeeping / Lease Compliance	
			Note any pests and circle the level of infestation. Involve your PMP.	Work order number or problem description	Check when completed	Yes or No	Housekeeping level* (circle one)	Action taken (e . g ., met with tenant, sent violation notice)
			Type of Pest: Light Moderate Heavy				G F P	
			Type of Pest: Light Moderate Heavy				G F P	
			Type of Pest: Light Moderate Heavy				G F P	

*** Housekeeping level:**
G Good—little or no food or water accessible to pests, easy to move throughout the unit, and inspection in all areas is possible
F Fair—dishes left undone for more than one day, or plenty of food or water accessible to pests, or PMP has to step over or move items to inspect **P** Poor—multiple days of dirty dishes, sloppy food storage methods, or PMP's inspection and service is limited by clutter

Download additional copies of this log at: www.stoppests.org/file/IPM-Log-Example

Integrated Pest Management: A Guide for Affordable Housing

APPENDIX E—SAMPLE REQUEST FOR PROPOSAL (RFP) AND SCOPE OF WORK FOR PEST CONTROL[4]

A. Sample Request for Proposal

Firms interested in responding to this Request for Proposal (RFP) must submit the following information, in the order specified below.

1. Introduction and Executive Summary (up to 1 page)

Submit a letter of introduction and executive summary of the proposal. The letter must be signed by a person authorized by your firm to obligate your firm to perform the commitments contained in the proposal. Submission of the letter will constitute a representation by your firm that your firm is willing and able to perform the commitments contained in the proposal.

2. Service Approach (up to 12 pages including Sample IPM Plan)

A. **Examples of IPM Approach:** Describe three examples from multifamily housing where your firm has creatively applied the IPM approach to solve difficult pest problems. Provide project summary, budget information if appropriate, and contact information for references at the facility involved (see below).

B. **Record-Keeping and Reporting Capability:** The firm shall describe how it intends to meet the record-keeping and reporting requirements in a way that property staff will be able to read and use to track trends. Include sample forms.

C. **Mandatory Site Visit and Initial Inspection Report**: Proposers must attend the mandatory site visit and submit a set of Sample IPM Plan documents based on the visit.

The mandatory site visit will be held at:

LOCATION:
TIME:

Based on this visit, the contractor shall submit an initial site inspection report. The following specific points should be addressed in the report:

[4] Adapted from:

- EcoWise Contracting Tool Kit: www.ecowisecertified.org/toolkit/
- GreenPro Standards: www.npmagreenpro.org/download2.asp?FileName=GPC_Standards.pdf
- City and County of San Francisco's RFP for Integrated Pest Management Service for City Owned Buildings and Properties (RFP 83518, 2007)
- Multiple pest control RFPs from housing authorities across the U.S.

Integrated Pest Management: A Guide for Affordable Housing

- Discussions of effectiveness of previous efforts;
- Identification of problem areas in and around the building (locations and extents of infestations, observed damage to structure or commodities, conditions conducive to infestation, harborage areas, sanitation deficiencies, avenues of potential entry);
- Contractor access system and coordination to all necessary areas;
- Information given to the contractor during the inspection about any restrictions or special safety precautions; and
- Any other items or factors that would impact the development of a pest management program.

D. **Emergency and Special Services Capability:** The firm shall describe its plan for meeting the emergency and special service requests described in the scope of work (for example, availability of trucks and personnel).

E. **Public Health Vector Control Capability:** The firm shall describe all relevant experience with control of mosquitoes and other disease vectoring organisms of public health interest.

F. **A Sample IPM Plan:** See the Scope of Work for details.

3. Firm Qualifications (up to 3 pages) Provide the following:

A. **Name, address, and telephone** number of a primary contact person.

B. **A brief description of your firm,** certifications held, professional organization affiliations, as well as how any joint venture association would be structured.

C. **Address(es) and location(s) of local offices** and service headquarters that would be involved in servicing the PHA contract.

D. **Description of microscopes,** pest detection equipment or other equipment possessed by the firm that would be used for performance of the contract.

E. **Names of all staff,** supervisors, and subcontractors who would work on the contract. The firm must have sufficient licensed employees to cover the property's needs. Provide

- The role each staff member and subcontractor would play in the project (onsite service technician, onsite supervisor, manager, owner, etc.).
- Experience, education, and qualifications of each staff member, including licenses and certifications held, verification that license(s) are valid, and other relevant training or skills. Contractor shall have access to an Associate Certified Entomologist (ACE) or Board Certified Entomologist (BCE) or person holding a degree in entomology who has demonstrated expertise in structural pest control, especially for rodents, bed bugs, and cockroaches.
- Written assurance that the staff members listed above will be performing the work and will not be substituted with other personnel or reassigned to another project without prior approval. Assurance must also be made that any substitute personnel be fully qualified.

Appendix E: Sample Request for Proposal (RFP) and Scope of Work for Pest Control

F. **Certifications:** The contractor shall provide the following:

- Certificate of Contractor General Liability Insurance, with the contracting party named as an additional insured
- Certificate of Workers' Compensation Insurance
- A copy of the pesticide applicators' license(s)
- Listing of any violations of state pesticide regulations or pest management regulations within the past three years.
- Description of in-house training program for firm employees.
- Description of in-house health & safety program.

G. **Commitments:** The contractor must commit to providing qualified, professional pest management personnel who:

- Will not distribute or sell pesticide products to residents or staff;
- Will not store any pesticide product in the buildings specified in this contract;
- Understand current practices in this field and have experience providing pest control services in a residential environment;
- Conduct themselves in a professional manner, with minimal noise and disruption;
- Cooperate with the building occupants to assure the progress of this work;
- Have good communication skills and will speak with residents who are present during a visit. It is expected that the PMPs will make an effort to obtain pest sighting information from residents and educate them on IPM techniques;
- Maintain certification as a Commercial Pesticide Applicators in the category of residential and institutional pest control services;
- Wear a distinctive uniform that has the contractor's name easily identifiable, affixed in a permanent or semi-permanent manner while working at PHA-owned or leased properties;
- Use additional personal protective equipment required for safe performance of work as determined and provided by the contractor that, at a minimum, conform to Occupational Safety and Health Administration (OSHA) standards for products being used;
- Use only contractor vehicles identified in accordance with state and local regulations;
- Observe all safety precautions throughout the performance of this contract. Certain areas within some buildings may require special instructions for persons entering these areas;
- Will comply with all government regulations as are applicable during the time spent on government property;
- Obtain building passes, if needed, as supplied by the PHA or appropriate building manager; and
- Take all necessary precautions to ensure tenant and employee safety, and all necessary steps to ensure the containment of the pesticide to the site of application.

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4. References (1 page)

The Contractor must submit a list of at least four (4) verifiable references (including names, titles, affiliations, and telephone numbers) for work comparable to that discussed in these specifications that has been completed during the past three (3) years or is currently in progress.

5. Price Proposal (1 page per section)

The PHA intends to award this contract to the firm that it considers will provide the best overall program services. The PHA reserves the right to accept other than the lowest bid and to reject any proposals that are not responsive to this request. Please provide a price proposal in a sealed envelope that includes hourly rates for the services described in the Scope of Work. These rates will be used either to charge for services on a time and materials basis, or as base rates for negotiating flat monthly fees with individual facility managers.

- Focus Units
- Unit Turnover Service
- Routine Inspection
- Call-Back Service: No Charge
- Emergency Services
- Special Services
- Training/Consultation

B. Scope of Work

1. **Monitoring.** Begin with a property-wide inspection and monitoring, using both monitoring devices and visual inspection.
2. **IPM Plan.** Use the monitoring results to design an IPM plan for the property. This plan will be updated at least annually along with monitoring results. The following components should be included in all written IPM plans:
   A. **Management objectives:** Identify key pests to be controlled, level of control desired (thresholds), and areas of the facility requiring special attention. Include a clear understanding of all guarantees, exclusions, and limitations, including the definitions of high-, medium-, and low infestations. Proposal must adhere to HUD's Guidance on IPM (PIH Notice 2011-22).
   B. **Communication and accountability system:** Designate contact people and alternates at both the facility and the contractor's company. Establish a location for the pest activity log book(s) at the facility. Set up a procedure for the contractor to report maintenance or pest prevention needs to appropriate staff at the facility.
   C. **Schedule of service:** Describe the expected schedule and duration of service visits required to meet management objectives. Except as otherwise agreed

upon, all work at properties under this contract should be performed between 9:00 a.m. and 4:00 p.m., Monday through Friday, and should not interfere with daily PHA operations.

D. **Monitoring program:** The contractor should describe methods and procedures to be used for a) identifying sites of pest harborage and access; and b) assessing pest populations throughout the term of the contract. This information must include general locations of common area monitoring traps and responsibilities for routinely checking the traps. Differences in pest pressures associated with seasons and preventative action should be addressed. As a general rule, pesticides should not be applied unless monitoring indicates the presence of pests in that specific area.

E. **Description of IPM methods and products:**

- Summarize nonchemical IPM methods proposed and choose pest management strategies that are:
  - Least disruptive of natural controls;
  - Least hazardous to human health;
  - Least toxic to nontarget organisms;
  - Least damaging to the environment;
  - Most likely to produce a permanent reduction of the pest population;
  - Easiest to carry out effectively; and
  - Most cost-effective over the short and long-term.
- Do not apply pesticides inside or outside unless visual inspection or a monitoring device indicates the presence of pests in that specific area;
- Control rodents inside buildings only with trapping devices. All such devices shall be concealed from view, being placed in protected areas unaffected by routine cleaning and other operations. Check trapping devices on a schedule approved by the Contract Manager. The Contractor is responsible for disposing of all trapped rodents and all rodent carcasses in an appropriate manner;
- Use portable vacuums rather than pesticide sprays for initial cleanouts of cockroach infestations, for swarming (winged) ants and termites, and for control of spiders in webs;
- Bait formulations shall be the standard pesticide technology for cockroach and ant control, with alternate formulations restricted to unique situations where baits are not practical; and
- The Contractor shall apply all insecticides as "crack and crevice" treatments only, defined in this contract as treatments in which the formulated insecticide is not visible to a bystander during or after the application process.
- List EPA-approved pesticide products proposed for use in the program together with the rationale, proposed methods of use, and methods planned to minimize exposure. For each pesticide, list the product name, EPA

registration number, pests targeted, and where pesticide will be applied (e.g., indoors, in wall voids, or outside).

F. **Desirable structural or operational changes:** Identify pest-proofing activities or modification of staff operational methods or timing that would improve pest management efforts (e.g., caulking around pipes).

G. **Record-keeping system:** Describe data to be collected and provide a sample monitoring form designed to track data on pest location, populations, harborage, trends in pest populations, status of previously suggested pest exclusion and prevention measures for which facility staff are responsible, and other relevant information. See "Log Book" below.

H. **Education and training activities:** List recommended education and training activities for facility staff that would increase their support for IPM activities.

3. **Service Units.** Treatments should be scaled to the type and level of infestation and priced accordingly.

A. **Focus units:** Units that are infested (henceforth referred to as Focus Units) shall be serviced at least monthly until the infestation is gone. Once pest-free, the focus unit will be removed from the monthly service list and inspected routinely.

B. **Unit turnover service:** Conduct intensive inspection and necessary treatment as requested by the PHA when units are prepared for occupancy. Typically these units will be existing units changing residents. They may also be new units added to the scope of the contract. A unit is treated at unit turnover only if evidence of pest infestation is found.

C. **Routine inspection:** Conduct regularly scheduled inspections for pests, set out or collect monitoring traps, and treat units for pests as needed. Sticky trap monitors shall be placed in all common areas and checked/replaced at each routine service. Schedule routine inspections so that the Contractor visits each unit twice a year, using the same PMPs when possible.

D. **Call-back service:** Conduct follow-up inspection in response to resident or staff complaints. Routine call-back service shall be furnished within one (1) workday after receipt of notification by the PHA. Call-back service required by the PHA due to contractor negligence will be at no charge.

E. **Emergency services** are directed at urgent pest problems that must be addressed as soon as is practical. They are not "call backs" resulting from other routine services provided under the contract. Except for holidays or other "shut down" periods, the Contractor is expected to address emergency problems within 24 hours of the service call. The Contractor may charge the "emergency rate" for these services but must notify the requesting department that the emergency rate applies before performing the service. In the event that such services cannot be completed within the above-stipulated time frame, the Contractor shall immediately notify the PHA representative and indicate an anticipated completion date.

F. **Special services** are those that require special skills, training, or licensing, and may utilize subcontractors for whose work the Contractor shall be accountable. The contractor should list pests or situations for which a subcontractor will be hired.

G. Regardless of service type, at each visit, the PMP must complete and leave a service ticket detailing what was found and done in each unit and area. When needed or appropriate, the Contractor shall also provide detailed, site-specific recommendations for structural and procedural modifications to aid in pest prevention.

H. The Contractor shall provide additional consultation, training, and technical support, by phone or in person during business hours (8:00 a.m.Ð5:00 p.m.). The Contractor must provide, free of charge, up to eight (8) hours of his/her time per calendar year.

C. Log Book

The Contractor shall be responsible for maintaining a complete and accurate Pest Management Log Book at each facility that is served under the contract. The Log Book shall be updated at each visit by the Contractor. If the facility lacks a log book, the Contractor is responsible for providing one.

The Log Book shall contain at minimum the following items:

- A copy of the IPM plan and/or service schedule for the building.
- A copy of each license, certification, or proof of insurance required.
- A list of pesticides used, including copies of sample labels and material safety data sheets (MSDS). All pest control products must be registered by the U.S. EPA for residential use and must be applied according to the manufacturer's label instructions and in compliance with all applicable local, state and federal laws and regulations.
- A pest sighting log where new work orders and a Focus Unit list is updated.
- The location of all traps and bait stations on the premises, preferably in map format.
- Copies of all service report forms for the facility.
- Sample educational materials for residents (with translations)

D. Reporting and Recordkeeping

As part of the services provided under this contract, the collection and transmittal of data collected by the contractor during the work is crucial to the effectiveness in managing the IPM. The Contractor must propose reporting and recordkeeping plans to enable the PHA to monitor Contractor’s work in a timely and efficient manner. The reporting and recordkeeping forms will be kept in the building’s IPM Log. At a minimum, Contractor is

required to collect and submit the reports detailed below. The PHA will review and approve the report format prior to finalizing a contract.

- **Notification of Upcoming Service (at least one week before scheduled visit):** The Contractor shall provide Pesticide Use Notification signs and preparation instructions for the PHA to post at least one week in advance of routine inspection. The notifications will include a translation if the building residents do not speak English.
- **Notification of Pesticide Use (at time of treatment):** If an infestation is found that requires pesticides, a form is left at the treatment location detailing what product was used, where, any precautions that can be taken to reduce risk of exposure, and nonchemical control techniques that can be used to prevent further infestation.
- **Inspection/Sanitation Report (service tickets):** Upon completion of each routine inspection at the property, the Contractor must submit a summary highlighting troubled areas or units. The Contractor must submit the report in hard-copy format. The hard copy must be signed by the building manager and kept in the IPM Log. An individual Unit Service Ticket must be completed for each unit in which pesticides were applied.
- **Quality Control Summary (bi-annually):** A report on the quality control program in place that quantitatively and qualitatively measures the successes and failures of the program. A report on the findings of quality control shall include recommendations for improvement including, but not be limited to the following:
    - Brief narrative discussing the findings as they relate to an increase or new infestations by unit or apartment number, including recommendation for treatment or preventative measures; and
    - Discussion of any findings of deficiencies due to lack of access, inadequate or improper treatments, or recommendations of change to a more effective chemical.
- **Updates to IPM Plan:** Contractor shall receive the concurrence of the PHA prior to implementing any subsequent changes to the approved IPM Plan, including additional or replacement pesticides and on-site service personnel. Contractor shall continue to provide licenses for every contractor employee who will be performing on-site services before the employee begins work on the PHA's property. Any substitutions, additions, or replacement of personnel from those cited in the contractor's original proposal must be submitted to the PHA for approval.

E. Selection Criteria (600 points possible)

Proposals passing the minimum requirements above will be evaluated by a selection committee that includes parties with expertise in IPM.

A. **Submission Requirements** (10 points)

- Organization of the document (3 points).

Appendix E: Sample Request for Proposal (RFP) and Scope of Work for Pest Control

- Complete and accurate information (4 points).
- Follow RFP instructions (3 points).

B. **Contractor's Licenses and Certifications** (70 points)

- Breadth and level of licenses and certifications held by Contractor's assigned project staff and subcontractors, above and beyond the minimum requirements set by the state (10 points).
- Firms that offer GreenPro, GreenShield, or EcoWise service will automatically receive 30 points (30 points).
- Firm includes at least one onsite staff member with valid certifications for public health pest control (20 pts)
- Firm includes at least one onsite staff member with valid license for animal trapping (10 pts)

C. **Experience of Contractor and Contractor's Assigned Project Staff** (50 points)

- Quality of performance on recent contracts, including number of violations (30 points).
- Extent of experience with vector control projects (10 points).
- Quality and extent of in-house IPM training program (5 points).
- Quality and extent of in-house health & safety program (5 points).

D. **Service Approach** (170 points)

- Creativity and thoroughness in seeking less-toxic pest management approaches (40 points).
- Emergency and special services capability (5 points).
- Completeness of data reporting capabilities, and abilities to integrate with the PHAs work order system (10 points).
- Proximity of Contractor's business to service areas (5 points).
- Adequacy of Contractor's facilities, including the availability of microscopes and other pest identification tools (5 points).
- Site-Specific Sample IPM Plan (95 points)
  - Ability of Contractor to recognize pest problems and sources of problems (30 points).
  - Thoroughness of recommendations for pest prevention (30 points).
  - Quality of recommendations for most affordable and feasible chemical or nonchemical controls (25 points).
  - Justification for all actions proposed (10 points).
    - Quality and completeness of monitoring forms (5 points).
    - Quality and completeness of service report form (5 points).

E. **References** (100 points)

- Quality of recently completed projects, including effectiveness, adherence to IPM principles, adherence to schedules and budgets, and references (100 points).

F. **Oral Interview** (100 points) Interviews conducted for up to three highest scoring proposals

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- Contractor's working knowledge of the biology and behavior of problem pests (15 points).
- Contractor's working knowledge of the use of least toxic approaches to pest management (20 points).
- Extent of Contractor's experience using nonchemical and reduced-risk chemical pest control methods (15 points).
- Contractor's working knowledge of pesticide hazards, including toxicity, human exposure potential, and potential environment effects of pesticides (10 points).
- Knowledge of the specialized pest management concerns typically faced by PHAs (25 points).
- Quality of proposed communication approach between pest management personnel and PHA staff (15 points).

G. **Fee Proposal** (100 points): Points will be awarded *for each service type* proportionally based on the formula below. Points for each service type will then be added together for a possible 100 points total.

Formula for calculating Point Score:

Points for proposer "A" for each service type =
Possible points for service x (lowest qualified price proposal for service Ö proposer "A's" price proposal for service)

Example:

Firm A's price proposal for Emergency Services: $100/hour
Lowest qualified price proposal for Emergency Services: $50/hour
3 (possible points) x ($50/$100) = 1.5 points
Total points for proposer "A" =
Focus Unit Service Points + Unit Turnover Service Points + Routine Inspection Points + Emergency Service Points + Special Service Points + Training & Consultation Points

The possible points for the various services are as follows:

Service Type	Possible Points
Focus Unit Services	30
Unit Turnover Service	20
Routine Inspection	30
Emergency Services	3
Special Services	15
Training & Consultation	2

F. Evaluation Worksheet

EVALUATION WORKSHEET—FOR COMPLETION BY REVIEWERS **[TEMPLATE]**
(See Evaluation & Selection Criteria for Reference)

Proposer #: _____

Contractor Name: _____ Reviewer: _____

MINIMUM REQUIREMENTS

	Item	Check
	1. Registered structural pest control company	!
	2. One onsite supervisor with Operator's License	!
	3. All onsite staff have Applicator certification	!
	4. 5 years minimum experience	!
	5. Four (4) verifiable references provided	!
	6. All onsite supervisors have licenses	!
	Minimum Requirements Met? ***(If 'No', Stop Here)***	! Yes ! No

SELECTION CRITERIA

	Item		Points
	1. Submission Requirements (10 points)		
	a) Organization of the document	(3 pts)	
	b) Complete and accurate information	(4 pts)	
	c) Follow RFP instructions	(3 pts)	
	2. Licenses and Certification (70 points)		
	a) Breadth and level of licenses and certifications held	(10 pts)	
	b) GreenPro, EcoWise or GreenShield Certified IPM Services	(30 pts)	
	c) Firm includes at least one onsite staff member with valid certifications for public health pest control	(20 pts)	
	d) Firm includes at least one onsite staff member with valid license for animal trapping	(10 pts)	
	3. Experience (50 points)		
	a) Performance on recent contracts	(30 pts)	
	b) Experience with vector control	(10 pts)	
	c) Quality and extent of in-house IPM training program	(5 pts)	
	d) Quality and extent of in-house health & safety program	(5 pts)	

	Item (cont'd)	Points
	4. Service Approach (170 points) a) Least toxic approach—or certified through GreenPro, GreenShield, or EcoWise: automatic 40 pts (40 pts) b) Emergency and special services capability (5 pts) c) Data reporting capabilities (10 pts) d) Proximity of Contractor's business to service areas (5 pts) e) Adequacy of facilities, availability of microscopes, etc. (5 pts) f) Ability to recognize pest problems (sample IPM plan) (30 pts) g) Thoroughness of recommendations for pest prevention (sample IPM plan and initial inspection report) (30 pts) h) Quality of recommendations for most affordable and feasible chemical or non-chemical controls (sample IPM plan) (25 pts) i) Justification for all actions proposed (sample IPM plan) (10 pts) j) Quality and completeness of monitoring forms (5 pts) k) Quality and completeness of service report form (5 pts)	
	5. References (100 points) Quality of recently completed projects, including effectiveness, adherence to IPM principles, adherence to schedules and budgets, and references (100 points).	
	6. Oral Interview (100 points) *Interviews conducted for up to three highest scoring proposals* a) Knowledge of the biology and pest behavior (15 pts) b) Knowledge of least toxic pest management approaches (20 pts) c) Experience using reduced-risk chemical methods (15 pts) d) Knowledge of pesticide hazards (10 pts) e) Knowledge of the specialized pest management concerns typically faced by local government agencies (25 pts) f) Quality of proposed communication approach between Contractor's personnel and PHA staff (15 pts)	
	7. Fee Proposal (100 points possible) a) Focus Unit Services: 30 x (Lowest bid $ / man-hr) / ($ / man-hr bid) = b) Unit Turnover Service: 20 x (Lowest bid $ / man-hr) / ($ / man-hr bid) = c) Routine Inspection Services: 30 x (Lowest bid $ / man-hr) / ($ / man-hr bid) = d) Emergency Services: 3 x (Lowest bid $ / man-hr) / ($ / man-hr bid) = e) Special Services: 15 x (Lowest bid $ / man-hr) / ($ / man-hr bid) = f) Consultation/Training Services: 2 x (Lowest bid $ / man-hr) / ($ / man-hr bid) = ***Point Score = Sum of a–f*** (100 points possible)	
Total Score	(600 points)	
ADJUSTED FINAL SCORE		

APPENDIX F—SUGGESTED HOUSEKEEPING AND LEASE LANGUAGE

Suggestions for residential lease agreements

- Eliminate the words "exterminate," "extermination," and "exterminator." Replace with "manage pests," "integrated pest management (IPM)," and "pest management professional (PMP)."
- Specify that residents are to report any pest sightings through the work order system so that the PMP can address the infestation at no cost to the resident. The owner/operator will pay for pest control, but the resident must prepare for the service as instructed in writing, let the PMP in to service, and maintain the unit according to the housekeeping standards so that conditions within the unit do not support the growth of the infestation. Failure to do any of these is a lease violation.
- Within the dwelling unit, garbage must be stored in a bag in a lidded trash receptacle. Trash should be promptly removed from the dwelling unit and placed into trash receptacles. Cans, jars, bottles, cardboard, and paper are not to be stored for extended periods on property.

Suggestions for housekeeping and unit inspection standards

- Walls: Report holes larger than /4 inch to maintenance.
- Doors: Door sweeps should be intact at the bottom of each door that leads to the outside.
- Trash and garbage: The trash bag should never overflow in the unit. Cans, jars, and bottles must be rinsed if they are to be stored. Cardboard and paper are not to be stored on property for extended periods.
- Refrigerator: Must be clean, including the space behind, floor underneath, and surface on top of the refrigerator.
- Sink: Dirty dishes must be washed and put away nightly.
- Lawn: All plants (including trees, bushes, and shrubs) must be trimmed so that they are at least 2 feet away from the side of the building.
- Windows: Screens should be in place and free from holes.
- Entire unit should be free of rodent or insect infestation. If you see pests or signs of pests (droppings, damage, eggs, or cast skins), call in a work order to central maintenance at _____. A pest management professional will address the problem at no cost to you.
- Cabinets: No expired food.
- Tub and shower: Should be clean and free of any mildew and mold.

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APPENDIX G—EMPLOYEE CERTIFICATE OF COMPLETION

Use this form for employees who have read this guide and understand their role in IPM implementation. Copy and cut out the certificate for the employee file. A PDF of this certificate is also available at: www.stoppests.org/file/Employee-Certificate.

Cut Here

- -

The employee acknowledges that he or she has carefully read the IPM Guide for Affordable Housing, understands all of the information, and agrees to do his or her part as described here.

Employee Name: _____

Signature: _____

Date: _____

STOP Pests in housing
www.StopPests.org

NY Rising Housing Recovery Program
Guidance on the Prohibition of Luxury Items

The intent of the NY Rising Housing Recovery Program is to assist owners of residential property who sustained damage due to Hurricane Sandy, Hurricane Irene, and Tropical Storm Lee in restoring their dwelling to a standard that supports the national objective of a "decent home and suitable living environment" of the federal Community Development Block Grant Disaster Recovery (CDBG-DR) program, which is providing New York State with the funding to implement repair and reconstruction activities. Applicants assisted under the NY Rising Housing Recovery Program may have their homes repaired, rehabilitated, or reconstructed to basic construction standards, but these standards do not include luxury items that are above the minimum construction standards of the program. Homeowners that wish to include a luxury item may elect to pay the difference between what the NY Rising Housing Recovery Program provides and the actual cost of the item.

The following list provides examples of luxury items that are not eligible to be paid for by CDBG-DR funds; however this list is for illustrative purposes and is not exhaustive.

1. Detached garages (Attached garages only allowable when repairing a home with an existing attached and damaged garage)
2. Garage door openers
3. Alarm systems, excluding smoke, fire & CO alarm systems
4. Irrigation systems, fountains, ponds, etc.
5. Sound systems, wireless computer & communication systems
6. Light fixtures beyond standard builder's package grade, except to allow similar models that are ENERGY STAR compliant fixtures.
7. Lighting controls beyond standard one & three way switches
8. Exterior lighting beyond lights at entry doors
9. Out buildings (i.e. sheds, gazebos, trash enclosures, & pool houses)
10. House vacuum systems
11. Swimming pools, hot tubs, saunas, etc. and associated equipment
12. Appliances beyond standard builder's package (no laundry equipment, built-in microwave)
13. Other than 30 inch wide builder's grade electric or gas kitchen ranges (i.e. no wall ovens or in-cabinet appliances; exceptions made for wall ovens and range tops for residents with mobility impairment)
14. Refrigerator styles beyond builder's standard, top freezer mounted models with these nominal size limits per # of bedrooms: 1br: 14cf; 2 br: 18cf; 3br: 20cf; 4 br: 25cf (exceptions made for side-by-side and bottom mounted freezers for residents with a mobility impairment)
15. Portable appliances (i.e. air conditioners, electric heaters, etc.)
16. Countertops beyond standard, builder's grade plastic laminate. (i.e. no stone, composite stone or solid surface)

17. Vanity tops beyond standard builder's grade plastic laminate or builder's grade simulated stone
18. Cabinets beyond standard builder's grade
19. Built-in bookshelves, radiator covers, or any item requiring custom millwork or shop drawings
20. Kitchen sinks and bathroom fixtures beyond standard builder's grade (i.e. porcelain, composite, stone, & solid surface)
21. Door hardware beyond builder's grade entry hardware for exterior doors and residential grade for interior doors; knobs to be builder's standard
22. Stone tile floors & walls
23. Wood trim profiles and species beyond standard builder's grade; stain grade is allowable to replace existing stained trim
24. Luxury carpet
25. Wall paper
26. Built-in closet systems – only rod & shelf allowed
27. New fireplaces (wood, gas, or electric); repairs to storm damaged fireplace chimneys are allowed
28. Exterior decks, unless to allow for egress on homes being elevated; materials limited to builder's grade composite decking and rail systems
29. Covered porches, unless replacing an existing covered porch
30. Carports
31. Similar items as determined by the NY Rising Housing Recovery Program