SOUTH FIRE DISTRICT

445 RANDOLPH ROAD MIDDLETOWN, CT 06457

SOUTH FIRE DISTRICT BUILDING RENOVATIONS Phase II

FOR BID
100% Submission

August 24, 2023

VOLUME-1

ARCHITECTURAL, STRUCTURAL AND ENVIRONMENTAL TESTING RESULTS

ARCHITECT:

Landmark Architects, P.C. 100 Riverview Center, Suite 204 Middletown, CT 06457 P: 860-346-1333

FACILITIES ENGINEER:

INNOVATIVE ENGINEERING SERVICES, LLC

33 North Plains Industrial Road Wallingford, CT 06492 P: 203-467-4370 F: 203-793-7729

ENVIRONMENTAL ENGINEER:

ENSAFE

1233 Silas Deane Highway Wethersfield, CT 06109 P: 860-665-1140

CIVIL ENGINEER & LANDSCAPE ARCHITECT:

CARDINAL ENGINEERING SERVICES

180 Research Parkway Meriden, CT 06450 203-238-1969

STRUCTURAL ENGINEER:

RICHARD A. SAMBOR, PE

139 High Ridge Road Avon, CT 06001 P: 860-673-9604

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SECTION 011000 through SECTION 018200: GENERAL REQUIREMENTS

SECTION 011000: SUMMARY OF WORK

1.1 CONTRACT

- A. The Project will be constructed under a single prime contract and in a phased manner. The contractor shall submit a construction schedule showing the sequence, commencement, and completion dates and move-out & move-in dates of Owner's personnel for all phases of the work.
- B. It is a mandatory job requirement that all bidders (contractors) physically visit the jobsite and familiarize themselves with all conditions. These drawings are schematic only and indicate the subcontractor's work to be completed and the finished product (completed work) must meet all the building codes which is the intent of the drawings.
- C. Keep driveways, parking lots and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times.
- D. Comply with restrictions on construction operations and Coordinate operations that may result in high levels of noise and vibration, odors or other disruption to Owner occupied areas.

1.2 PERMITS

A. The Contractor performing the work shall make all necessary applications and assume all responsibilities for the securing of required permits.

1.3 LICENSES

- A. The Contractor and its subcontractors performing the work shall hold a relevant license issued by the State of Connecticut, and all work under this contract shall be subject to the rules and ordinances of the state of Connecticut, City of Meriden, and all Federal Regulations.
- B. All work to be performed under Specifications shall be made in accordance with all applicable State laws, and all applicable ordinances, codes, rules, and regulations of the local authorities, for any public board or officer having any jurisdiction, regulation, or control over any work to be done.
- C. Other portions of the manual apply to this Section.
 - 1. Separation of the Specifications into divisions and sections is for convenience only and is not intended to establish limits of work.
- D. Consult Table of Contents to be certain that the set of documents is complete. Report omissions or discrepancies to the Architect.
- E. Items which may be indicated on the Drawings as "NIC" or noted "Not in Contract" are shown for convenience only and are not a part of this Contract. Work so denoted may be

done prior to, during, or later than the term of work for this Contract but under a separate contract.

1.4 PROJECT INFORMATION

- A. Project Identification: South Fire District Phase II
 - 1. Project Location: 445 Randolph Road, Middletown, CT 06457
- B. Owner: South Fire District, 445 Randolph Road, Middletown, CT 06457.
- C. Architect: Landmark, P.C., 100 Riverview Center, Suite 204 Middletown, CT 06457 (860) 346-1333
- D. Other Sub-Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Innovative Engineering Services
 - a. 33 N. Plains Industrial Road
 - b. Wallingford, CT 06492
 - c. 203.467.4370
 - 2. Richard Sambor, P.E. Structural Engineer
 - a. 139 High Ridge Road
 - b. Avon, CT 06001
 - c. 203.481.8600
 - 3. Cardinal Engineering Services
 - a. 180 Research Parkway
 - b. Meriden, CT 06450
 - c. 203.238.1969

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of the Project is defined by the Contract Documents and Drawings.
- B. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

1.6 ACCESS TO SITE

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

- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weather tight condition throughout construction period. Repair damage caused by construction operations.

1.7 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Work hours to be coordinated by owner but in general work can begin at 7 A.M. and end by 6 P.M.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner's representative not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's representative written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner's representative.
 - 1. Notify Owner's representative not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Owner's representative written permission before proceeding with disruptive operations.
- E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor air intakes.

F. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

SECTION 012200: UNIT PRICES

1.8 PROCEEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

SECTION 012500: SUBSTITUTION PROCEEDURES

1.9 SUBMITTALS

A. Substitution Requests: Use CSI Form 13.1A and submit digital pdf copy of each request for consideration. Identify product or fabrication or installation method to be replaced.

SECTION 012600: CONTRACT MODIFICATION PROCEEDURES

1.10 **PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: Architect through Construction Manager will issue a detailed description, may include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect through Construction Manager are not instructions either to stop work in progress or to execute the proposed change.
 - 2. Within time specified in Proposal Request or 20 days, when not otherwise specified, 5 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity

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

- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect through Construction Manager.
 - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
 - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - 4. Include costs of labor and supervision directly attributable to the change.
 - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
 - 6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
- C. On Owner's approval of a Proposal Request, Architect through Construction Manager will issue a Change Order for signatures of Owner and Contractor on AIA Document G701form included in Project Manual

SECTION 012900: PAYMENT PROCEDURES

1.11 SCHEDULE OF VALUES

- A. Submit the schedule of values to Architect through Construction Manager at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment. Use the AIA Document A312 Performance Bond and Payment Bond
 - 1. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
 - 2. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

- 3. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
- 4. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.
- 5. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
- 6. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.12 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
- C. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect through Construction Manager. One copy shall include waivers of lien and similar attachments if required.
 - 1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- D. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
 - 1. Owner reserves the right to designate which entities involved in the Work must submit waivers.
 - 2. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

- E. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
 - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 - 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- F. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
 - 1. Evidence of completion of Project closeout requirements.
 - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 - 3. Updated final statement, accounting for final changes to the Contract Sum.
 - 4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 5. AIA Document G706A, "Contractor's Affidavit of Release of Liens." 6. AIA Document G707, "Consent of Surety to Final Payment."
 - 6. Evidence that claims have been settled.
 - 7. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 - 8. Final liquidated damages settlement statement.
- G. Lien Waivers: The Contractor will have all Subcontractors and Suppliers submit executed Mechanic's Lien Waivers monthly for prior payments made by Owner.

1.13 CHANGES

- A. Changes: Any written proposals for an increase/decrease of changes to the contract must include:
 - 1. Direct cost information outlining materials, equipment, quantities, and labor.
 - 2. Any Subcontractor's work and related materials.
 - 3. Any related insurance, bonds or taxes.
 - 4. Any increase/decrease of time.
 - 5. Any Overhead, Profit and Commission.
 - 6. Allowable overhead profit and commissions shall be negotiated, but in no case shall exceed the following:

	Overhead	Profit	Commission
ord the Construction Manager to manage and per		be per contract, however, if change ders extend the contract schedule, the Construction Manager will charge the contract fee rate plus hourly bor rates and/or any rental fees.	
To first tier subcontractor on work performed by its subcontractor.	0%	5%	0%
To Contractor and/or the subcontractor for that portion of work performed with their respective forces.	10%	5%	0%

SECTION 013100: PROJECT MANAGEMENT AND COORDINATION

1.14 **COORDINATION**

- A. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
- B. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
- C. Make adequate provisions to accommodate items scheduled for later installation

- D. Have registered land surveyor check the accuracy of the building location to within a tolerance of a tenth of an inch. Correct any errors before they affect other trades, or the appearance of the building.
- E. Do not cast any aluminum (conduit, inserts, etc.) in concrete.
- F. Underground Utility Location:
 - 1. The Sub-contractor shall notify utility companies of pending excavation at or near public utilities.
 - 2. The Sub-Contractor shall phone "Call-Before-You-Dig" at least 48 hours prior to the beginning of excavation.
- G. Testing and adjustments shall be as required to provide that product are left in proper condition for satisfactory operation under conditions specified
- H. All firms or persons authorized to perform any work under this Contract shall cooperate with General Contractor and his Subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required. Cutting and patching, drilling and fitting shall be carried out where required by the trade or Subcontractor having jurisdiction, unless otherwise indicated herein or directed by the owners Representative.

1.15 KEY PERSONNEL

- A. Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in project meeting room, in temporary field office, on Project Web site, and by each temporary telephone. Keep list current at all times.

1.16 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI to the Architect through the Construction Manager. Use CSI Form 13.2A.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
 - 1. Name of Contractor.

- 2. Name of Architect and Construction Manager.
- 3. RFI number, numbered sequentially.
- 4. RFI subject.
- 5. Specification Section number and title and related paragraphs, as appropriate.
- 6. Drawing number and detail references, as appropriate.
- 7. Field dimensions and conditions, as appropriate.
- 8. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
- 9. Contractor's signature.
- 10. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. Allow seven working days for Architect's response for each RFI. RFIs received by Architect or Construction Manager after 1:00 p.m. will be considered as received the following working day.
 - 1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 - 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Construction Manage in writing within 10 days of receipt of the RFI response.
- D. On receipt of Architect's and Construction Manager's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect and Construction Manager within seven days if Contractor disagrees with response.

E. Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at project meetings and on Project Web Site.

1.17 PROJECT MEETINGS

- A. Conduct progress meetings on the project weekly. Notify the Owner of scheduled meeting dates. Coordinate dates of meetings with preparation of the payment request.
- B. Attendees: In addition to representatives of the Owner and the Architect, each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
- C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the status of the Project.
 - 1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
- D. Reporting: No later than 3 days after each meeting, distribute minutes of the meeting to each party present and to parties who should have been present. Include a brief summary, in narrative form, of progress since the previous meeting and report.
 - 1. Schedule Updating: Revise the Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue the revised schedule concurrently with the report of each meeting.

SECTION 013200: CONSTRUCTION PROGRESS DOCUMENTATION

1.18 INFORMATIONAL SUBMITALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. PDF electronic file.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working electronic copy of schedule, using software indicated, and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date on label.

- C. CRITICAL PATH METHOD Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of all activities sorted in ascending order of total float.
 - 4. Daily Construction Reports: Submit at weekly intervals.
 - 5. Material Location Reports: Submit at weekly intervals.
 - 6. Field Condition Reports: Submit at time of discovery of differing conditions.
 - 7. Special Reports: Submit at time of unusual event.
 - 8. Qualification Data: For scheduling consultant.

1.19 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

1.20 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for commencement of the Work, to date of final completion.
 - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- C. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.

- 1. Refer to Division 01 Section "Payment Procedures" for cost reporting and payment procedures.
- D. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
 - 1. Unresolved issues.
 - 2. Unanswered RFIs.
 - 3. Rejected or unreturned submittals.
 - 4. Notations on returned submittals.
- E. Recovery Schedule: When periodic update indicates the Work is 14 (fourteen) or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- F. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

1.21 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
 - 1. List of subcontractors at Project site.
 - 2. List of separate contractors at Project site.
 - 3. Approximate count of personnel at Project site.
 - 4. Equipment at Project site.
 - 5. Material deliveries.
 - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 - 7. Accidents.
 - 8. Meetings and significant decisions.
 - 9. Unusual events (refer to special reports).
 - 10. Stoppages, delays, shortages, and losses.
 - 11. Meter readings and similar recordings.
 - 12. Emergency procedures.
 - 13. Orders and requests of authorities having jurisdiction.
 - 14. Change Orders received and implemented.
 - 15. Construction Change Directives received and implemented.
 - 16. Services connected and disconnected.
 - 17. Equipment or system tests and startups.
 - 18. Partial completions and occupancies.
 - 19. Substantial Completions authorized.

- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.
- C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

1.22 SPECIAL REPORTS

A. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare, and submit a special report. List chain of events, persons participating, and response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

1.23 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
- B. Distribute copies of approved schedule to Construction Manager and other parties identified by Contractor and Construction Manager with a need-to-know schedule responsibility.

SECTION 013330: SUBMITTAL PROCEEDURES

1.24 DESCRIPTION OF REQUIREMENTS

This Section specifies the general methods and requirements of submissions applicable to the following work-related submittals, Shop Drawings, Product Data, Samples, and sequencing of Construction operations. Detailed submittal requirements will be specified in the technical specifications sections.

A. Shop Drawings, Project Data Samples:

1. Shop Drawings:

a. Shop Drawings in general and as specified in individual work Sections include, but are not limited to, custom-prepared data such as fabrication and erection/installation drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, coordination drawings, individual system or equipment inspection, and test reports including performance curves and certifications, as applicable to the work.

- b. All Shop Drawings submitted by subcontractors for approval shall be sent directly to the Contractor for preliminary checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
- c. The Contractor shall check all Subcontractor's Shop Drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Drawings found to be inaccurate or otherwise in error shall be returned to the Subcontractors for correction before submission thereof.
- d. All details on Shop Drawings submitted for approval shall clearly show the elevations of the various parts to the main members and lines of the structure and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

2. Product Data:

a. Product data as specified in individual Sections include, but are not necessarily limited to, standard preparation data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specifications and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, printed performance curves and operational range diagrams, production and quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions, and recommended spareparts listing, and printed product warranties, as applicable to the work.

3. Samples:

a. Samples specified in individual Sections include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively used products, color-texture-pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Owner's Representative or Owner for independent inspection and testing, as applicable to the work.

4. Sequencing of Construction Operations:

a. In order to accommodate projected needs of the Owner, and implementation of erosion and sedimentation control measures, the Contractor performing the work shall plan his work to suit his overall planning aspects but must also consider the requirements of the Owner and shall be prepared to be flexible in his plans if needed. Within ten (10) days after written notice of acceptance,

the Contractor performing the work shall confer with the Owner for the purpose of drafting a construction schedule satisfactory to the Owner which is to include all the work of this Contract. The Contractor shall perform the work of this Contract to conform to the construction schedule as approved by the Owner, except that the Owner reserves the right to amend and alter the construction schedule as approved, at any time, in a manner which it deems to be in the best interests of the Owner to do so. The Contractor shall arrange his work under this Contract to conform with the construction schedule as it may be revised from time to time by the Owner, at no additional expense to the Owner. The Contractor performing the work shall notify the Owner immediately of any circumstance which may affect performance of the work in accordance with the current construction schedule.

B. Contractor's Responsibility:

- It is a mandatory job requirement that all bidders (contractors) physically visit the
 jobsite and familiarize themselves with all conditions. These drawings are
 schematic only and indicate the subcontractor's work to be completed and the
 finished product (completed work) must meet all the building codes which is the
 intent of the drawings.
- 2. The Contractor performing the work shall review Shop Drawings, product data and samples prior to submission to determine and verify the following:
 - a. Field Measurements.
 - b. Field Construction Criteria.
 - c. Catalog Numbers and Similar Data.
 - d. Conformance with the Specifications.
- 3. Notify the Owner in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.
- 4. The review and approval of shop drawings, samples or catalog data by the Owner's Representative shall not relieve the Contractor performing the work from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor performing the work, and the Owner's Representative will have no responsibility, therefore.
- 5. No portion of the work requiring a shop drawing, working drawing, samples, or catalog data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased, or on-site construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.
- 6. Project work, materials, fabrication, and installation shall conform to approved shop drawings, working drawings, applicable samples, and catalog data.

C. Submission Requirements:

- 1. Make submittals promptly in accordance with approved schedule, and in such sequence as to cause no delay in the work or in the work of any other Contractors.
- 2. Number of submittals required:
 - a. Shop Drawings: Submit (6) copies
 - b. Product Data: Submit (6) copies
 - c. Samples: Submit number stated in the respective specification sections.

3. Submittals shall contain:

- a. The date of submission and the dates of any previous submissions.
- b. The Project title and number.
- c. Identification of the Contractor performing the work.
- d. The names of:
 - 1) Contractor performing the work.
 - 2) Supplier.
 - 3) Manufacturer.
- e. Identification of the product, with the specification section number.
- f. Field dimensions clearly identified as such.
- g. Relation to adjacent or critical features of the work or materials.
- h. Applicable standards, such as ASTM or Federal Specification numbers.
- i. Identification of revisions on resubmittals.
- j. A 3" x 6" blank space for Architect approved stamp.

D. Re-submission Requirements:

- 1. Make any corrections or changes in the submittals required by the Owner's Representative and resubmit until approved.
 - a. The Architects review of submissions in excess of one (1) original and two (2) resubmissions will include costs to be borne by the Contractor performing the work.

2. Shop Drawings and Product Data:

- a. Revise initial drawings or data and resubmit as specified for the initial submittal.
- b. Indicate any changes which have been made other than those requested by the Owner's Representative.
- 3. Samples: Submit new samples as required for initial submittal.

E. Distribution:

1. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Owner's Representative.

F. General Procedure for Submittals:

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 sections of the Specifications, so that the installation will not be delayed by processing times, including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery, and similar sequenced activities. No extension of time will be granted for failure to transmit submittals and obtain acceptance sufficiently in advance of the work.

G. Substitutions:

1. Wherever a trade name or the name of a certain manufacturer appears in these Specifications, it is included to establish a standard of quality. The absence of an "or equal" clause is not meant to exclude competition. Similar products of other manufacturers which are equal in quality as determined by the Owner and Architect may be approved upon request of the Contractor performing the work. The owner and architect reserve the right to approve or disapprove any substitutions. Burden of proof of equality information and samples of the specified product are the Contractors responsibility.

H. Installation:

1. Unless otherwise stated, all codes, regulations and manufacturer's instructions, recommendations and specifications shall govern installation of all materials.

SECTION 014000: QUALITY REQUIREMENTS

1.25 CONTRACTORS' RESPONSIBILITY

- A. The Contractor performing the work will establish, maintain, and be responsible for all lot lines, restrictions, grades, levels, and benchmarks required for completion of all Work. He shall furnish the above for all Subcontractors. He shall verify all grades, lines, levels and dimensions as indicated on the Drawings. He shall report any errors or inconsistencies in the above to the Architect before commencing work.
- B. Any difference between the actual surface and what is marked as the existing grade on the Drawings shall not entitle the Contractor performing the work to extra compensation.
- C. The Contractor performing the work shall prepare as-built drawings of all footings, foundations, slabs-on-grade, site utilities, lot lines, easements and paving to be submitted with each month's requisition for payment. Surveys shall be prepared by a licensed

- surveyor. Final as-built drawings shall be required of the completed Work prior to final payment.
- D. The Contractor performing the work shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto.
- E. The Contractor performing the work shall assume full responsibility for the protection of all buildings, structures, and utilities, public or private, including poles, signs, services to buildings, utilities in the street, gas pipes, water pipes, hydrants, sewers, drains, and electric and telephone cables, whether or not they are shown on the Drawings. The Contractor performing the work shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operations shall be repaired by him at his expense.

SECTION 014200: REFERENCES

1.26 **DEFINITIONS**

A. General: Basic Contract definitions are included in the Conditions of the Contract.

1.27 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
 - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.28 ABBREVIATIONS AND ACRONYMS

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

SECTION 015000: TEMPORARY FACILITIES AND CONTROLS

1.29 CONTRACTORS' RESPONSIBILITY

A. The Contractor performing the work shall be responsible for providing general services and temporary facilities as specified herein and as required for proper and expeditious

- prosecution of Work. Contractor performing the work shall pay costs of such general services and temporary facilities, except as otherwise specified, until Final Acceptance of Work.
- B. All such service and facilities shall comply with applicable Federal, State and Municipal regulations.
- C. The Contractor performing the work shall make all connections to existing services, and sources of supply, shall provide all necessary installation, labor, materials, and equipment. In a manner subject to the approval of the Owner and shall remove temporary installation and connections when no longer required, or when so directed by the Owner and restore the services and sources of supply to proper operating condition as directed.

1.30 USE CHARGES

- A. Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated.
- B. Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.31 TEMPORARY UTILITIES

- A. Provide and maintain toilet facilities for use of all personnel. Chemical toilets shall be provided where Work is in progress and of quantity required to serve conveniently, needs of personnel. Quantity of units to work forces on-site shall confirm to State Health Requirements and other jurisdictions having authority.
- B. Provide potable water for construction purposes for all trades. Pay all costs of installation, maintenance, removal, and water.
- C. Make arrangements with local electric company for temporary electric service, pay expenses in connection with installation, operation, and removal thereof and pay cost of energy consumed by all trades.
- D. Temporary Enclosures and Heating:
 - 1. Temporary weather-tight enclosures and temporary heating shall be provided by the Contractor performing the work as required during construction to make building weather-tight and protect Work from freezing or frost damage, and as necessary to ensure suitable working conditions for trades. All costs of closing in the buildings and all costs of temporary heat shall be paid for by the Contractor performing the work until acceptance of the building by the Owner. In areas of buildings where work is being conducted, temperature shall be maintained as specified but not less than 55 degrees F. Under no circumstances shall temperature be allowed to reach level which will cause damage to portion of Work which may be subject to damage by low temperatures.

- 2. When Work has progressed sufficiently for installation of glazing, Contractor performing the work may, if approved by Owner, use glazed windows in place of temporary enclosures. Permanent windows shall be protected against damage and on completion of Work shall be thoroughly cleaned, damaged component parts including glass shall be satisfactorily repaired or replaced and windows left in perfect condition.
- 3. Until permanent heating system is in place, temporary heating shall be by smokeless portable unit heaters (UL, Factory Mutual approved). Contractor performing the work shall pay for fuel, maintenance and attendance required in connection with temporary heat.
- 4. When permanent heating system, or suitable portion thereof, is in operating condition, such system may be used for temporary heating, provided that Contractor performing the work 1) obtains written approval of Owner, 2) assumes full responsibility for entire heating system, 3) pays costs for operation, maintenance and restoration of system, and 4) complies with jurisdiction having authority.

E. Temporary Telephone/Facsimile:

1. Install a job telephone and facsimile machine and maintain same for duration of the Contract. Both local and long-distance calls shall be paid for by the Contractor performing the work. It shall be the Contractor's responsibility to collect for any long-distance calls made by persons other than those in his own organization.

F. Temporary Fire Protection:

- 1. Provide and maintain adequate fire protection in the form of fire extinguishers or other effective means of extinguishing fire, ready for instant use, distributed around the project and in and about temporary inflammable structures during construction of Work. Fire extinguishers shall be standard 2-1/2-gallon chemical non-freeze type, bearing UL label and shall be checked regularly.
- 2. Gasoline and other flammable liquids shall be stored in and dispensed from UL listed safety containers in conformance with National Board of Fire Underwriters' recommendations. Storage shall not be within building.
- 3. Make arrangements for periodic inspection by local fire protection authorities and insurance underwriter inspectors. Cooperate with said authorities and promptly carry out their recommendations.

1.32 TEMPORARY CONSTRUCTION

A. Furnish and maintain all temporary ramps, stairs and similar items required for proper execution of Work, and permit use of such facilities by other Contractors, Subcontractors, or trades. Hoists and chutes shall be so constructed as to prevent damage, staining, or marring of permanent Work.

- B. Permanent stairs shall be erected as soon as possible, and Contractor performing the work shall provide suitable temporary treads, risers, etc. as required to protect permanent stair members, and provide temporary railings as required for safety.
- C. No materials, rubbish or debris shall be permitted to drop free, but shall be removed by use of material hoists or rubbish chute.
- D. No materials shall be permitted to be passed through finished openings of exterior walls.
- E. Contractor performing the work shall protect finished surfaces, including jambs and soffits of openings used as passageways against possible damage resulting from conduct of Work by trades.

1.33 BARRIERS AND ENCLOSURES

- A. Construct all fences and barricades required for the protection of the public in accordance with local and state regulations. Furnish and install all signs, lights, reflectors, etc., required.
- B. Take proper precautions to protect the Owner's and adjoining property from injury or unnecessary interference; provide proper means of access to the property and replace or put in good condition, every public or private way, conduit, catch basin, fence, tree, or other thing injured by the Contractor performing the work in carrying out the Work.
- C. The contractor performing the work shall save the owner harm from all claims arising from the use of public streets, sidewalks, and adjoining properties for construction purposes.
- D. Protect everything on the premises from injury by water, frost, wind, fire, accident or other cause, and any interference.
- E. Provide ways and means to control the flow water from every source which may cause inconvenience, sitting or other damage during construction.

1.34 ACCESS ROADS AND PARKING AREA

A. The Contractor performing the work shall provide and maintain, for the duration of construction, a means of access to the site for vehicular traffic and authorized personnel. This means of access shall be constructed to sustain the weight of equipment customarily engaged for use in construction projects of this type and magnitude.

1.35 TEMPORARY CONTROLS

- A. The Contractor performing the work shall be responsible for all breakage of glass, from the time the glazier has complete his Work until the building is turned over to the Owner. He shall replace all broken glass and deliver the entire building with all glazing intact and clean.
 - 1. All construction facilities, debris and rubbish shall be removed from the Owner's property.
 - 2. All finished surfaces within the building shall be swept, dusted, washed and polished. This includes cleaning of the Work of all finished trades where needed

- whether or not cleaning for such trades is included in their respective Specifications.
- 3. All finish flooring and resilient bases shall be thoroughly cleaned with a well-rinsed mop containing only enough moisture to clean off any surface dirt or dust. The floors shall be buffed dry by machine, bringing the surfaces to sheen.
- 4. Install and maintain adequate runner strips of building paper on all finished floors, to the satisfaction of the Architect.
- 5. All glass shall be washed, both sides, by a window cleaning contractor specializing in such work.
- B. The subcontractors performing the work for mechanical and electrical Work, shall respectively clean all materials and equipment installed by them, leaving all in a finished and clean state.
- C. Immediately after unpacking all packing materials, case lumber, excelsior, wrapping, or other rubbish (flammable or otherwise), shall be collected and removed from the building and premises.
- D. The Contractor shall require each of his Subcontractors to bear his full responsibility for cleaning up during and immediately upon completion of his Work, and shall remove all rubbish, waste, tools, equipment, and appurtenances caused by and used in the execution of his Work; but this shall in no way be construed to relieve the Contractor of his primary responsibility for maintaining the building and site clean and free of debris, leaving all work in a clean and proper condition.
- E. The Contractor performing the work shall employ all possible methods and materials to control dust as necessitated by weather or site conditions.

1.36 FIELD OFFICE AND SHEDS

- A. Locate field offices, storage sheds, and other temporary construction and support facilities for easy access.
 - 1. Maintain support facilities until Completion.
- B. Provide incombustible construction for offices, shops, and sheds located within the construction area. Comply with requirements of NFPA 241.
- C. Field Offices: Provide insulated, weather-tight temporary offices of sufficient size to accommodate required office personnel at the Project site. Keep the office clean and orderly for use for small progress meetings. Furnish and equip offices as follows:
 - 1. Furnish with a desk and chairs, a four-drawer file cabinet, plan table, plan rack, and a six shelf bookcase. Equip with a water cooler.
 - 2. Provide medical safety kit, telephone, fax machine and adequate power for mobile equipment.

1.37 PRODUCT REQUIREMENTS

- A. Unless otherwise specified, only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Owner and Architect. No material shall be delivered to the work without prior approval of the Owner and Architect.
- B. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor performing the work.
- C. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of a claim against the Owner or the Owner's Representative.
- D. The materials and equipment used on the work shall correspond to the approved samples or other data.

1.38 DELIVERY, STORAGE AND HANDLING

- A. Materials for all trades shall be delivered to the jobsite in manufacturer's original unopened containers with manufacturer's brand name clearly marked thereon.
- B. Handle and store materials carefully in accordance with manufacturer's recommendations and protect them from moisture and extremes of heat and cold.
- C. Provide at the site, where directed, maintain in good condition, and remove when directed, suitable and substantial weather-tight storage as required for materials that may be damaged by storage in open.
- D. All materials and equipment to be incorporated in the work shall be handled and stored by the manufacturer, fabricator, supplier, and Contractor performing the work before, during, and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, puncture, contamination and any injury, theft, or damage of any kind whatsoever to the material or equipment.
- E. Cement and lime shall be stored under a roof and off the ground and shall be kept completely dry at all times. All structural, miscellaneous, reinforcing steel shall be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Block and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking, and spalling to a minimum.
- F. All mechanical equipment or other supplies subject to damage by the atmosphere if stored outdoors (even though covered by canvas) shall be stored in a building to prevent injury or damage. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Owner and Architect.
- G. All materials which, in the opinion of the Owner and Architect, have become so damaged as to be unfit for the use intended or specified shall be promptly removed from the site of the work, and the Contractor shall receive no compensation for the damaged material or its removal.

1.39 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and

limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

- 1. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.
- 2. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures

SECTION 017300: EXECUTION

1.40 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety
 - 3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety
 - 4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment

1.41 WARRANTY

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

1.42 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
 - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

1.43 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
 - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping, underground electrical services, and other utilities.
 - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 - 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

1.44 PREPARATION

- A. Existing Utility Information: Furnish information to Owner through construction manager, when it is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Section "Project Management and Coordination."

1.45 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- C. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- D. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

1.46 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

1.47 CUTTING AND PATCHING

- A. Cutting and Patching, General: Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Section "Summary."
- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

- a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
- 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an evenplane surface of uniform appearance.
- 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

1.48 OWNER – INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.

1.49 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Utilize containers intended for holding waste materials of type to be stored.
 - 4. Coordinate progress cleaning for joint-use areas where more than one installer has worked.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.

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

1.50 PROTECTION OF INSTALLED CONSTRUCTION

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

1.51 CORRECTION OF WORK

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

SECTION 017410: CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

1.52 CONSTRUCTION WASTE MANAGEMENT PLAN

- A. Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
 - 1. Comply with Division 01 Section "Temporary Facilities and Controls" for operation, termination, and removal requirements.
 - 2. Comply with Volume 2: Section 0200 Sitework of the 2013 CHFA Standards of Design and Guidelines, for waste management practices and requirements.
 - 3. Reference NAHB Research Center's "Builder's Field Guide to Residential Construction Waste Management" publications for more information on waste management practices and requirements.
- B. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
 - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - 2. Comply with Division 01 Section "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

1.53 RECYCLING WASTE, GENERAL

- A. General: Recycle paper, plastic food and beverage containers used by on-site workers, through an approved local recycling program.
- B. Recycle jobsite demolition and construction waste, like wood, drywall, metals, concrete, dirt and cardboard through an approved local recycling facility.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.
 - 1. Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project site. Include list of acceptable and unacceptable materials at each container and bin.
 - a. Inspect containers and bins for contamination and remove contaminated materials if found.

- 2. Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
- 3. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
- 4. Store components off the ground and protect from the weather.
- 5. Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

1.54 WASTE

- A. General: Except for items or materials to be, recycled, or otherwise reused, remove waste materials from Project site and legally dispose of them in a State approved construction and demolition landfill or incinerator acceptable to authorities having jurisdiction.
 - 1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.
- C. Disposal: Transport waste materials off Owner's property and legally dispose of them.

SECTION 017700: CLOSEOUT PROCEEDURES

1.55 CLOSE OUT PROCEEDURES

- A. Submit a written request for inspection for Substantial Completion. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
- B. Submit a written request for final inspection for acceptance. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1.56 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1.57 WARRENTIES

- A. Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

1.58 MATERIALS

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

1.59 FINAL CLEANING

- A. Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from
 - e. Project site.
 - f. Remove snow and ice to provide safe access to building.
 - g. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - h. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - i. Sweep concrete floors broom clean in unoccupied spaces.

- j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, visionobscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- 1. Remove labels that are not permanent.
- m. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates.
- n. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- o. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
- p. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- q. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - 1) Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
- r. Clean HVAC system in compliance with NADCA Standard 1992-01.
- s. Provide written report upon completion of cleaning.
- t. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- u. Leave Project clean and ready for occupancy.
- C. Semi-Final Inspection: Prepare a complete, detailed list of items for completion and correction. List to be submitted to the Owner and Architect at time of request for this inspection.
- D. Final Inspection: Inform the Owner and Architect in writing when all the items of semifinal inspection have been completed and when the work is ready for final inspection. Owner shall have the final say if the finished product is suitable for acceptance.
- E. If the Owner and/or Architect be required to conduct more inspections than noted in B. above, all re-inspection report costs shall be borne by the Contractor.

SECTION 017820: OPERATION AND MAINTENANCE DATA

1.60 CLOSEOUT SUBMITTALS

- A. Deliver to the Owner, upon substantial completion of the Work, two (2) copies of each house maintenance and instruction manuals customarily supplied by manufacturers for items incorporated in this Work.
- B. Give physical demonstration and oral instruction for proper operation and maintenance of machines and equipment to the Owner (or his designated representative).
- C. At termination of Work, submit complete maintenance manuals presenting full details for care and maintenance of visible surfaces and equipment of every nature.
- D. In order to ensure adequate servicing, adjustments, and replacement of equipment furnished or installed under the Contract, the Contractor and his Subcontractors performing the work shall submit to the Owner at the completion of Work, three (3) loose leaf binders containing the following:
 - 1. Shop drawings
 - 2. Operating and maintenance instructions
 - 3. Manufacturer's cuts and pertinent information
 - 4. Guarantee cards with name, address, and phone number of person or company who will be responsible for repairs.
 - 5. Parts list and ordering information.
- E. Where guarantees are required for Work performed by Subcontractors, secure warranties from said Subcontractors to be addressed to and in favor of Owner and deliver copies of same to Owner upon completion of Work.

1.61 WARRANTIES AND BONDS

- A. Deliver to the Owner, three copies of all required guarantees and warranties for each house. Provide original documents as required by manufacturer.
- B. The Contractor performing the work shall secure guarantees-warranties from all Subcontractors for their part of the Work. All Work shall be guaranteed-warranted for one year unless specified to be for a longer period. The start of the guaranty-warranty period shall be the date of certificate of completion.
- C. The fact that an equipment manufacturer's warranty is for less than one year shall not relieve the Contractor performing the work of his one-year guarantee-warranty. If a manufacturer's Owner exceeds one year, the Contractor performing the work shall turn over such warranty to the Owner at the end of the one-year guarantee-warranty period.
- D. Guarantees covering specific Work, as called for in the Specifications shall be furnished to the Owner.
- E. Provide the minimum warranty period for the following items (and other items unique to the project):
 - 1. GC: 1-year warranty.
 - 2. Membrane Roofing: 20- years material and labor (no dollar limit).

- 3. Windows and Exterior Doors: 10 years minimum on entire assembly (window units and installation).
- 4. Miscellaneous warranties as provided by the manufacturers for specified products and equipment.
- 5. Miscellaneous labor warranties as provided by manufacturer-trained/approved installers, in conjunction with the manufacturers of specified products and equipment.

1.62 RECORD DRAWINGS

- A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Architect's reference during normal working hours.
 - 1. Record Drawings (Infrastructure and House-construction related work): Maintain a clean, undamaged set of blue or black-line white prints of Contract Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; Give particular attention to concealed elements that would be difficult to measure and record at an alternate date including locations of underground utilities or drains that have been capped and the depth and locations of all excavations that have been filled.
 - 2. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
 - 3. Mark new information that is important to the Owner and Architect but was not shown on Contract Drawings or Shop Drawings.
 - 4. Note related Change Order numbers where applicable.
 - 5. Organize record drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.
- B. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily described later by direct observation. Note related record drawing information and Product Data.
 - 1. Upon completion of the Work, submit record Specifications to the Owner.
- C. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work. Immediately prior to the date or dates of Substantial Completion, complete

- miscellaneous records, and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Owner and Architect.
- D. Prepare record (two sets), or as-built drawings as work progresses, or as necessary to show changes from the Contract documents. Submit to the Owner and Architect.
- E. Show deviations from Documents with reference to locations, sizes, methods, qualities, quantities, and other specified requirements.
- F. Indicate the actual locations of all pipes, conduits, switches, cut-offs, equipment and machinery which would be visible and readily accessible after work is completed. H. Deliver two sets of As-builts to the Owner at completion of project.
- G. Provide an as-built survey at the completion of the Project.

SECTION 017900 - DEMONSTRATION AND TRAINING

1.63 DEMONSTRATION AND TRAINING

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect

END OF GENERAL REQUIREMENTS

SECTION 020800 - ASBESTOS REMOVAL PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and General Provisions of Contract, including General Supplementary Conditions and Division 1 Specifications Sections, apply to this Section.
- B. Building renovation inspection figures and laboratory reports. EnSafe Figures 1 and 2.

1.2 PROJECT DESCRIPTION

- A. The City of Middletown is undertaking a renovation project at the South Fire District Building in Middletown, Connecticut. The project will include interior rehabilitation of select areas (See Demolition Plan), an addition, floor replacement, ceiling replacement and selective building demolition. Prior to the renovations, confirmed and suspect ACMs will be removed.
- B. The South Fire District Building is located on 445 Randolph Road, Middletown, Connecticut
- C. Pre-renovation asbestos-containing material testing has identified various types of asbestos-containing materials within and on the building. Asbestos abatement will be necessary to support the overall renovation of the Site building.
- D. The work of this Contract shall be completed within the specified number of days allotted in the overall Contract. Review the overall project schedule requirements for the actual number of days.
- E. The asbestos removal work includes the following asbestos-containing materials:
 - 1. Black mastic and the associated flooring tile, where shown in demolitions plans. Flooring material to be abated to concrete slab.

1.3 SCOPE OF WORK

- A. The HMAC shall utilize full containment procedures, for interior abatement, with a contiguous personnel decontamination facility for each work area. Modified containment procedures may be utilized where friable thermal systems pipe insulation is present.
- B. The HMAC shall coordinate power and water usage with the City of Middletown. Where power and water is not available, the HMAC shall provide temporary utilities to support their work.
- C. The HMAC shall be responsible for all selective demolition to access abatement materials. Selective demolition shall only be performed once the area is under containment.

D. There are multiple layers of flooring materials present, where specified for abatement. The HMAC shall be responsible for removal of all layers of flooring down to the sub-floor concrete surface.

1.4 QUALITY ASSURANCE

- A. The HMAC shall be licensed by the State of Connecticut Department of Public Health to perform asbestos abatement.
- B. The Asbestos Abatement Supervisor(s) and Asbestos Abatement Workers shall be accredited in accordance with EPA regulation 40 CFR Part 763, subpart E, Appendix C; and shall be licensed by the State of Connecticut Department of Public Health.

1.5 APPLICABLE CODES

- A. The HMAC shall be solely responsible for conducting this project and supervising all work in a manner that will be in conformance with all federal, state and local regulations and guide lines pertaining to asbestos abatement. Specifically, the HMAC shall comply with the requirements of the following:
 - 1. USEPA AHERA Regulation (40 CFR 763 Final Rule and Notice);
 - 2. NESHAP Regulations (40 CFR 61, Subpart M);
 - 3. OSHA Asbestos Regulations (29 CFR 1910.1001 and 1926.1101);
 - 4. Connecticut DEEP Regulations (Section 22a-209-8 (I) and Section 22a-220 of the Connecticut General Statutes);
 - 5. Connecticut DPH Standard for Asbestos Abatement Sections 19a-332-1 to 19a-332-16:
 - 6. Asbestos-Containing Materials in Schools Regulations (19a-333-1 through 19a-333-13);
 - 7. Licensure and Training Requirements Section 20-440-1 to Section 20-440-9;
 - 8. Connecticut Basic Building Code;
 - 9. Connecticut Fire Safety Code;
 - Local health and safety codes, ordinances or regulations pertaining to asbestos remediation and all national codes and standards including ASTM, ANSI, and Underwriter's Laboratories.

1.6 EXEMPTIONS

A. None apply.

1.7 EXAMINATION OF CONTRACT DOCUMENTS AND SITE

- A. The HMAC shall carefully examine and read and review all aspects of the Contract Documents and visit the site of work to become familiar with the existing site conditions.
- B. All work called for in the Contract Documents but not shown on the Contract Drawings in their present form, or vis versa, is required, and shall be performed by the HMAC as though it were originally delineated or described.
- C. Work on particularly specified in the Contract Documents, but involved in carrying out their intent or in the complete and proper execution of work, is required pursuant to this Contract and shall be performed by the HMAC.
- D. The apparent silence of the Contract Documents as to any detail, or the apparent omission from the Contract Documents of a detailed description concerning any work to be done and materials to be furnished, shall be interpreted to mean that only the best practice of the industry is to prevail and that only the best materials and workmanship is to be used.
- E. Should any conflict occur in or between the Contract Drawings, Specification and/or other elements of the Contract Documents, the HMAC shall be deemed to have estimated on the most expensive way of performing the work unless the HMAC shall have asked for and obtained a decision in writing from the Owner's Representative before the submission of its bid as to which shall govern.

1.8 INDEMNIFICATION

A. The HMAC and its subcontractors shall indemnify and hold harmless the Owner and the Owner's Representative, and their directors, officers, agents, employees and consultants from and against all claims, damages, losses, liabilities and expenses, out of or resulting from the performance of the work specified herein.

1.9 NOTIFICATIONS, POSTINGS AND PERMITS

- A. The HMAC will make the following notifications, and provide the submittals to the following agencies ten (10) days prior to the commencement of work:
 - CT Department of Public Health Asbestos Program MS#51 AIR 410 Capitol Ave.
 P.O. Box 340308 Hartford, CT 06134-0308
- B. The minimum information included in the notification includes:
 - 1. Name, address and telephone number of building owner/operator
 - 2. Name, address and telephone number of asbestos contractor
 - 3. Facility location

- 4. Facility size, age, and use
- 5. Amount of asbestos to be removed
- 6. Work schedule, including proposed start and completion date
- 7. Asbestos removal procedures to be used
- 8. Name and location of disposal site for generated asbestos waste, residue, anddebris
- 9. Type of asbestos abatement activity.
- 10. The nature of asbestos abatement

1.10 WORK SITE SAFETY PLAN

- A. The HMAC shall establish a set of emergency procedures and shall post them in a conspicuous place at the work site. The minimum requirements of the safety plan should include provisions for the following:
 - 1. Evacuation of injured workers.
 - 2. Emergency and fire exit routes from all work areas.
 - 3. Emergency first aid treatment.
 - 4. Local telephone numbers for emergency services including ambulance, fire, and police.
 - 5. A method to notify occupants of the building in the event of a fire or other emergency requiring evacuation of the building.
 - 6. Confined space entry program.
 - 7. 24 hour site security program.
- B. The HMAC is responsible for training all workers in these procedures.

1.11 ALTERNATE WORK PRACTICES (AWP)

A. Any modification from the standard work practices identified in the State of Connecticut DPH Standard for Asbestos Abatement Section 19a-332a-1 to 19a-332a-16 must be requested in writing to the State DPH by the HMACs subcontractor and project designer.

1.12 REOCCUPANCY CLEARANCE

- A. There shall be re-occupancy air sampling performed for this work. For bidding purposes, the HMAC shall assume that re-occupancy air testing will be performed by its third party subcontractor and licensed project monitor. Containments shall be maintained until re-occupancy clearance is acceptable.
- B. The HMAC is required to provide a 48 hour notice to the Owner's representative indicating final visual inspection and re-occupancy air sampling results.

1.13 CONTROL OVER REMOVAL WORK

- A. All HMAC work procedures shall be monitored by the HMAC's "competent person" to ensure that areas outside the designated work locations do not become contaminated. The following controls shall be implemented each working day to help ensure this:
 - 1. Prior to work on any given day, the HMAC's designated "competent person" shall evaluate job tasks with respect to safety procedures and requirements specified to prevent contamination of the building or the employees. This includes a visual survey of the work area and the decontamination enclosure systems.
 - 2. The competent person shall perform a visual inspection of each enclosure at the beginning and end of each work shift to evaluate the integrity of the containment barriers. The visual inspections shall be logged in the Supervisors daily project logs.
 - 3. The competent person shall smoke test each Class I negative pressure enclosure at the beginning and end of each work shift to evaluate make up air flow into the containment area. The results of the smoke testing shall be logged into the supervisor's daily project logs.
 - 4. The competent person shall ensure that all warning signs are intact and visible at each approach to the work area on a daily basis.
- B. The HMAC shall maintain control of and be responsible for access to all work areas to ensure the following requirements:
 - 1. Nonessential personnel are prohibited from entering the area;
 - 2. All authorized personnel entering the work area shall sign the work area entry log.
 - 3. All authorized personnel entering the work area shall read the "worker protection procedures" which are posted at the entry points to the enclosure system, and shall be equipped with properly fitted respirators and protective clothing;
 - 4. All personnel are donning proper personal protective equipment and are not wearing street cloths under protective coveralls.
 - 5. All personnel who are exiting from the decontamination enclosure system shall be properly decontaminated;
 - 6. Asbestos waste that is taken out of the work area must be properly bagged and labeled in accordance with these specifications. The surface of the bags shall be decontaminated. Asbestos leaving the enclosure system must be transported off site or immediately placed in locked, posted temporary storage on site, and be removed within 24 hours of the project conclusion.

7. Any material, equipment, or supplies that are brought out of the decontamination enclosure system shall be cleaned and decontaminated by wet cleaning and/or HEPA vacuuming of all surfaces.

1.14 SITE SECURITY

- A. The HMAC shall be responsible for the security of regulated areas. Post asbestos abatement warning signs at entrances to the work area including the waste load out and worker decontamination chamber. The HMAC shall have an outside supervisor monitoring the entrance of the worker decontamination chamber during abatement work.
- B. The HMAC shall establish hard barriers over personnel decontamination systems where the entrance is located on the exterior of the building.
- C. The HMAC shall establish and maintain exterior regulated work areas during exterior roofing material removal. Exterior regulated work areas shall consist of orange construction fencing, polyethylene drop cloths, warning signs and work area access control logs.

1.15 AIR SAMPLING

- A. The HMAC shall monitor airborne asbestos concentrations in the workers' breathing zone to establish conditions and work procedures for maintaining compliance with OSHA Regulations 29 CFR 1910.1001 and 1926.1001.
- B. The HMAC's air sampling professional shall document all air sampling results and provide all air sampling reports within five (5) days of collection. OSHA air monitoring results shall be posted at a conspicuous location at the job site.
- C. All personnel air sampling shall be conducted in accordance with methods described in OSHA standards 29 CFR 1910.1001 and 1926.1101.

1.16 SUBMITTALS

- A. Submittals shall be made in hard copy format on white paper. Submittals must be legible and clear. Any submittal, which cannot be read or where information easily distinguished, shall be rejected.
- B. The HMAC will have available two (2) copies of the following submittals available prior to the commencement of removal work:
 - 1. HMAC's construction schedule
 - 2. Waste generator label to be used for each address
 - 3. Waste shipment and disposal form to be used with generated information for each address
 - 4. Waste hauling contractor
 - 5. Landfill to be used

- 6. Training, licenses and medical records of each employee who may be on the project site
- 7. The qualifications of the hygiene firm that the HMAC proposes to use for this project to analyze contractor employee OSHA monitoring samples and final visual inspections and re-occupancy air sampling
- 8. Copies of all notifications and permits.
- Copies of the written respirator plan compliant with the most current issue of OSHA 1910.134
- 10. Copies of all MSDS sheets for materials to be used on site
- 11. Work Site Safety Plan
- 12. Negative Exposure Assessment
- 13. Contractor's State of Connecticut Asbestos Contractor license.
- C. The HMAC will have two (2) copies of the following submittals to provide following the completion of removal work.
 - 1. State Notifications and any revisions for each address
 - 2. Contractor License
 - 3. Contractor Daily Logs (with identification of site supervisor)
 - 4. Work area access logs for each containment area (interior and exterior)
 - 5. OSHA personnel monitoring results
 - 6. Worker and Supervisor training certificates and State of Connecticut licenses
 - 7. Medical clearance letters and respirator fit-test records
 - 8. Final clearance inspection and air sampling report.
 - 9. Completed waste shipment records.

1.17 **DEFINITIONS**

- A. ABATEMENT Procedures to control fiber release from asbestos-containing materials; includes removal, encapsulation, and enclosure.
- B. AIRLOCK A system for permitting ingress and egress while assuring air movement to a contaminated area from an uncontaminated area. Two curtained doorways spaced a minimum of six feet apart can form an airlock.
- C. AIR MONITORING The process of measuring the fiber concentration of an area or of a person.
- D. AIR SAMPLING PROFESSIONAL A licensed professional capable of developing air sampling protocols and conducting air monitoring and analysis. This individual should be an industrial hygienist, an environmental scientist, or an engineer with experience in asbestos air monitoring and worker protection equipment and procedures. This individual

- should have demonstrated proficiency in conducting air sample collection in accordance with 29 CFR 1910.1001 and 1926.1101.
- E. ADEQUATELY WETTED Means sufficiently mixed or coated with water, amended or an aqueous solution; or the use of removal encapsulant to prevent dust emissions.
- F. AMENDED WATER Water to which a surfactant has been added.
- G. ASBESTOS The name given to a number of naturally occurring fibrous silicates. This includes the serpentine forms and the amphiboles and includes Chrysotile, Amosite, Crocidolite, Tremolite, Anthophyllite, and Actinolite, or any of these forms that have been chemically altered.
- H. ASBESTOS ABATEMENT Means the removal, encapsulation, enclosure, renovation, or repair of asbestos-containing materials except activities that are related to the removal or repair of asbestos cement pipe and are performed by employees of a water company as defined in Section 25-32a of the Connecticut General Statutes.
- I. ASBESTOS ABATEMENT SITE SUPERVISOR Means any licensed individual who is employed or engaged by an HMAC to supervise an asbestos abatement project.
- J. ASBESTOS ABATEMENT WORKER Means any employee of an HMAC who engages in asbestos abatement.
- K. ASBESTOS CONSULTANT Any person who engages in any activity directly involved with asbestos consultation services and who has been issued a certificate by the commissioner and a license by the department.
- L. ASBESTOS CONTAINING MATERIAL (ACM) A material composed of asbestos of any type and in an amount greater than one percent be weight, either alone or mixed with other fibrous or non-fibrous material.
- M. ASBESTOS CONTROL AREA An area where asbestos abatement operations are performed which is isolated by physical boundaries to prevent the spread of asbestos dust, fibers, or debris.
- N. ASBESTOS FIBERS Those particles with a length greater than five (5) microns and a length to diameter ratio of three to one (3:1) or greater.
- O. ASBESTOS PERMISSIBLE EXPOSURE LIMIT (PEL) The maximum airborne concentration of asbestos fibers to which an employee is allowed to be exposed. The current level established by OSHA is 0.1 fibers per cubic centimeter of air as an eight (8) hour time weighted average and 1.0 fibers/cc averaged over a sampling period of thirty (30) minutes as an excursion limit. The HMAC is responsible for maintaining work areas in a manner that this standard is not exceeded.
- P. ASBESTOS PROJECT MONITOR The licensed asbestos consultant who is certified as a project monitor by over-seeing the activities of the asbestos abatement contractor.
- Q. AUTHORIZED VISITOR Any person authorized by the Owner to enter the building.

- R. BUILDING OWNER For this Contract only, the building Owner is South Fire District.
- S. CLEAN ROOM An uncontaminated area or room, which is a part of the workers' decontamination enclosure with provisions for storage of workers' street clothes and protective equipment.
- T. CLEARANCE SAMPLING Final air sampling performed aggressively after the completion of the abatement project in a regulated area. Five (5) air samples collected by the asbestos abatement project monitor inside the work area, and having a fiber concentration of less than 0.010 fibers/cc of air will denote acceptable clearance sampling by Phase Contrast Microscopy. Five air samples collected by the asbestos abatement project monitor having an average asbestos concentration of less than seventy (70) asbestos structures mm/sq. will denote acceptable clearance sampling for Transmission Electron Microscopy.
- U. COMMISSIONER Means the Commissioner of the Connecticut Department of Health Services or his/her authorized agent.
- V. COMPETENT PERSON A representative of the HMAC who has completed the 40 Hour Contractor/Supervisor course and is certified by the Department of Public Health. The Site Supervisor shall be capable of identifying an asbestos hazard and who has the authority to take prompt corrective measures to eliminate the hazard during asbestos removal.
- W. CONFINED SPACE A work zone where access and egress are restricted, a potential for gaseous vapors to accumulate exist, or a potential for low oxygen content exists.
- X. DECONTAMINATION ENCLOSURE SYSTEM A series of connected areas, with curtained doorways between any two adjacent areas, for the decontamination of workers and equipment. A decontamination enclosure system always contains at least one airlock and is adjacent and connected to the regulated area, where possible.
- Y. DEPARTMENT The State of Connecticut Department of Public Health.
- Z. EPA Means the U.S. Environmental Protection Agency.
- AA. ENCAPSULANT A liquid material that can be applied to asbestos-containing material that controls the possible release of asbestos fibers from the materials by either creating a membrane over the surface (bridging encapsulant) or penetrating the material and binding its components together (penetrating encapsulant).
- BB. ENCAPSULATION A specified asbestos remediation strategy involving the application of an encapsulant to asbestos containing materials to control the release of asbestos fibers into the air.
- CC. EQUIPMENT DECONTAMINATION ENCLOSURE That portion of a decontamination enclosure system designed for controlling the transfer of materials and equipment, typically consisting of a washroom and a holding area.

- DD. EQUIPMENT ROOM A contaminated area or a room, which is part of the workers' decontamination enclosure with, provisions for storage of contaminated clothing and equipment.
- EE. FACILITY Means any private or public building or structure including but not limited to those used for institutional, residential (including single family homes), commercial or industrial purposes and vessels while ashore or in dry-dock.
- FF. FIXED OBJECT A unit of equipment or furniture in the work areas which cannot be removed from the work area.
- GG. FRIABLE ASBESTOS MATERIAL Any material that contains more than 1% asbestos by weight, that can be crumbled, pulverized or reduced to powder by hand pressure.
- HH. GLOVE BAG An impervious plastic bag-like enclosure affixed around asbestos containing material, with glove-like appendages through which materials and tools may be handled.
- II. HAZARDOUS MATERIALS ABATEMENT CONTRACTOR (HMAC) Means the Asbestos Contractor, Lead Based Paint Abatement Contractor and or PCB/DEHP and Mercury Vapor Lamp Removal Contractor.
- JJ. HEPA FILTER A high efficiency particulate air (HEPA) filter in compliance with ANSI Z9.2-1979.
- KK. HEPA VACUUM EQUIPMENT Vacuum equipment with a HEPA filter system for filtering the effluent air from the unit.
- LL. HOLDING AREA An air-locked chamber in the equipment decontamination enclosure located between the washroom and an uncontaminated area.
- MM. INSPECTOR (ASBESTOS ABATEMENT PROJECT MONITOR)- An individual, who is a "qualified asbestos abatement project monitor" as defined by the State of Connecticut Department of Public Health, and who will be responsible for monitoring the HMAC during the asbestos abatement project.
- NN. MOVABLE OBJECT A unit of equipment or furniture in the work area, which can be removed from the work area.
- OO. NEGATIVE AIR FILTRATION EQUIPMENT A portable local exhaust system equipped with HEPA filtration used to create negative pressure in a regulated area (negative with respect to adjacent unregulated areas) and capable of maintaining a constant, low velocity air flow into regulated areas from adjacent unregulated areas.
- PP. OWNER'S REPRESENTATIVE -The Asbestos Consultant for the project.
- QQ. NESHAPS National Emissions Standard for Hazardous Air Pollutants regulations enforced by the EPA.
- RR. PLASTICIZE To cover floors and walls with plastic sheeting as specified herein.

- SS. SEPARATION BARRIER A rigid barrier sealed with two (2) layers of six (6) mil polyethylene sheeting installed between an occupied area and the asbestos abatement work area.
- TT. SHOWER ROOM A room between the clean room and the equipment room in the workers' decontamination enclosure with hot/cold running water and suitably arranged for employee showering during decontamination. The shower room is located in an airlock between the contaminated area and the clean area.
- UU. STRIPPING Removing asbestos materials from any structural member, pipe surface, HVAC, or other equipment.
- VV. WASHROOM A room between the work area and the holding area in the equipment decontamination enclosure with provisions for storage of contaminated clothing and equipment.
- WW. WET CLEANING The process of reducing asbestos contamination from building surfaces and objects by using cloths, mops, or other cleaning tools, which have been dampened by amended water, and by then disposing of these cleaning items as asbestos contaminated waste.
- XX. WORK AREA Designated rooms, spaces, or areas of the project in which asbestos abatement actions are occurring and which may become contaminated as a result of such abatement actions. The work area must be totally self-contained by sealing, plasticizing and equipping the area with a decontamination enclosure system.
- YY. WORKER DECONTAMINATION ENCLOSURE SYSTEM That portion of a decontamination enclosure system designated for controlled passage of workers, other personnel, and authorized visitors, typically consisting of a clean room, a shower room, and an equipment room.
- ZZ. WORK STOPPAGE CLEANUP PROCEDURE A process following the issuance of a written stop work order, whereby the HMAC thoroughly cleans and decontaminates the work area, the decontamination enclosure system, and any other areas of the building affected by the removal project, to the satisfaction of the Asbestos Project Monitor.
- AAA. WORK ZONE The area of the decontamination enclosure system where asbestos is being removed.

1.18 PRECONSTRUCTION MEETING

A. The HMAC shall be required to attend a preconstruction conference with his site supervisor and project manager and any subcontractor that they employ for the purpose of reviewing the contract requirements.

PART 2 - MATERIALS AND EQUIPMENT

2.1 MATERIALS

- A. Deliver all materials in the original packages, containers, or bundles bearing the name of the manufacturer and the brand name and product technical description.
- B. Damaged or deteriorating materials shall not be used and shall be removed from the premises. Material that becomes contaminated with asbestos shall be decontaminated or disposed of as asbestos waste.
- C. Polyethylene sheet in a roll size to minimize the frequency of joints shall be delivered to job site with factory label indicating four (4) or (6) mil.
- D. Polyethylene disposable bags shall be true six (6) mil with pre-printed labels.
- E. Tape or adhesive spray will be capable of sealing joints in adjacent polyethylene sheets and for attachment of polyethylene sheets to finished or unfinished surfaces of dissimilar materials and capable of adhering under both dry and wet conditions, including use of amended water.
- F. Surfactant (wetting agent) shall consist of fifty (50) percent polyoxyethylene ether and fifty (50) percent polyoxyethylene ester, or equivalent, and shall be mixed with water to provide a concentration of one (1) ounce surfactant to five (5) gallons of water or as directed by manufacturer.
- G. Impermeable containers are to be used to receive and retain any asbestos-containing or contaminated materials until disposal at an acceptable disposal site. (The containers shall be labeled in accordance with OSHA Standard 29 CFR 1926-1101.) Containers must be both air and watertight.
- H. Labels and signs, as required by OSHA Standard 29 CFR 1926.1001 will be used.
- I. Encapsulant shall be bridging or penetrating type and usage shall be in accordance with manufacturer's printed technical data.
- J. Disposal labels shall be preprinted on self-adhesive labels with the generator name, generator telephone number, abatement site and contractor's name and address.

2.2 TOOLS AND EQUIPMENT

- A. Provide suitable tools for asbestos removal, encapsulation and enclosure.
- B. The HMAC shall have air monitoring equipment of type and quantity to monitor operations and conduct personnel exposure surveillance per OSHA requirements.
- C. The HMAC shall have available sufficient inventory on site for materials necessary for the job including protective clothing, respirators, filter cartridges, polyethylene sheeting of proper size and thickness, tape, and air filters.
- D. The HMAC shall provide temporary electrical power sources such as generators, portable water vessels, as required.

- E. The HMAC shall have available shower stalls and sufficient hose length and a drain system equipped with five (5) micron filters.
- F. Exhaust air filtration system units shall contain HEPA filter(s) capable of sufficient air exhaust to create negative pressure of 0.02 inches of water within the enclosure with respect to the outside area. Equipment shall be checked for proper operation by smoke tubes or a differential pressure gauge before the start of each shift and at least twice during the shift. Adequate exhaust air shall be provided for a minimum of four (4) air changes per hour within the enclosure. No air movement system or air filtering equipment shall discharge unfiltered air outside.
- G. Vacuum units, of suitable size and capacities for project, shall have HEPA filter(s) capable of trapping and retaining at least 99.97 percent of all monodispersed particles of 0.3 micrometers in diameter or larger.
- H. The HMAC will have reserve exhaust air filtration system units in order to maintain negative air filtration in the event that a unit malfunctions during use.
- I. The HMAC shall have available and use recording manometers for all Class I activities to monitor pressure differential between the work area and non-work area. A minimum negative pressure differential of -0.02 inches of water column shall be maintained.
- J. The HMAC shall have available spray equipment capable of mixing a wetting agent with water and capable of generating sufficient pressure and volume and having sufficient hose length to reach all areas with asbestos.
- K. HEPA filtered local exhaust ventilation shall be utilized during the installation of enclosures and supports where asbestos-containing materials may be disturbed.

PART 3 - EXECUTION

3.1 INTERIOR CONTAINMENT WORK AREA PREPARATION - GENERAL

- A. Provide GFCI devices, temporary power, and temporary lighting installed in compliance with the applicable electrical codes. All temporary installations are to be made by a licensed electrician. Under no circumstances during the abatement procedures will lighting fixtures or other electrical outlets and switches be permitted to be in operation during abatement activities.
- B. Isolate heating, cooling, and ventilation air systems or zones to prevent contamination and fiber dispersal to other areas of the structure. Lock and tag out circuits associated with heating and cooling units. During the work, vents within the work area shall be sealed with duct tape and polyethylene sheeting.
- C. Seal off all openings, including but not limited to windows, corridors, doorways, skylights, ducts, grills, diffuser, and any other penetration of the work areas, with

- polyethylene sheeting minimum of six (6) mils thick sealed with duct tape. Install five (5) micron water filtration socks in all floor drains prior to sealing.
- D. Where friable asbestos containing materials are present, establish worker decontamination facility, critical barriers and negative air filtration prior to conducting pre-cleaning activities. Pre-clean fixed objects within the work areas, using HEPA vacuum equipment and/or wet cleaning methods as appropriate, and enclose with minimum six (6) mil plastic sheeting sealed with duct tape.
- E. Seal penetrations with two layers of six-mil polyethylene sheeting where piping runs into the walls of the first floor.
- F. After HEPA vacuum pre-cleaning, conduct remainder of work area preparation in accordance with this Specification section.
- G. Where fixed walls are not used, one layer of six (6) mil polyethylene sheeting will be applied to a rigid framework of wood, metal, or PVC. An additional two layers of four (4) mil polyethylene sheeting shall be installed over the six (6) mil critical barriers. All overlaps shall be sealed with tape or spray adhesive. This includes all mini-containments that may be utilized for asbestos pipe insulation removal at risers.
- H. Cover all floors in the work area with a double layer of six (6) mil polyethylene sheeting. Secure the polyethylene flooring directly to the wall surfaces.
- I. Maintain emergency and fire exits from the work area, or establish alternative exits satisfactory to fire officials.
- J. Create pressure differential between work areas and occupied areas by the use of acceptable negative air pressure equipment. The HMAC shall ensure required negative air pressure is obtained throughout the containment and the total volume of air within the work area is changed every fifteen (15) minutes. Once the negative air is established, the negative air machines must remain in operation throughout the abatement period and until reoccupancy air clearance criteria is achieved. At no times shall the negative air machines be turned off during active abatement or at any time prior to re-occupancy air clearance being achieved.
- K. Post all approaches to each work area with Asbestos Warning signs. Warning signs shall be of size and type that are easily readable and are visible from all approaches to the work areas.
- L. Maintain a work area access control log at each containment. The control log shall be maintained at the entrance to the personnel decontamination system. The work area access control log shall identify the building address and work area.

3.2 INTERIOR CONTAINMENT CONTIGUOUS PERSONNEL DECONTAMINATION SYSTEM

A. The HMAC shall establish one (1) fully operational contiguous personnel decontamination system per work area. The decontamination system may not be used as a remote decontamination system for other work.

- B. The HMAC shall establish contiguous to each work area, where feasible, a personnel decontamination system consisting of equipment room, shower room and clean room in series. Access between the contaminated and uncontaminated areas shall be through this decontamination enclosure only. The decontamination system shall be constructed of two layers of six-mil polyethylene sheeting.
- C. Access between rooms in decontamination system shall be through double flap- curtained openings. Clean room, shower and equipment room within decontamination system shall be completely sealed ensuring that the sole source of air flow through this area originates from uncontaminated areas outside the work area.
- D. The shower unit shall be equipped with an adequate supply of warm water. A shower filtration pump containing two (2), five (5) micron sock filters or the best available technology shall be installed to filter shower water. Filtered shower water shall be discharged into sanitation drains and shall not be discharged into storm drains or onto floor or ground surfaces.
- E. The shower shall contain soap and an adequate supply of drying towels. Provide an adequate number of shower units in accordance with OSHA 29 CFR 1926.1101.

3.3 REMOTE PERSONNEL DECONTAMINATION SYSTEM

- A. Remote personnel decontamination systems are only acceptable for exterior work or interior glove bag removal operations or when it is not feasible to establish a contiguous personnel decontamination system. The feasibility of a remote personnel decontamination system shall be determined between the HMAC's competent person and the on-site Asbestos Project Monitor.
- B. The HMAC shall establish a remote personnel decontamination system in a heated room where contiguous decontamination systems are not feasible. The remote personnel decontamination system shall consist of an equipment room, shower room and clean room in series. Access between the contaminated and uncontaminated areas shall be through a single chamber airlock. The decontamination system shall be constructed of two (2) layers of six (6) mil polyethylene sheeting.
- C. Access between rooms in decontamination system shall be through double flapcurtained openings. Clean room, shower and equipment room within decontamination system shall be completely sealed between chambers.
- D. The shower unit shall be equipped with an adequate supply of warm water. A shower filtration pump containing two (2), five (5) micron sock filters or the best available technology shall be installed to filter shower water. Filtered shower water shall be discharged into sanitation drains and shall not be discharged into storm drains or onto floor or ground surfaces.
- E. The shower shall contain soap and an adequate supply of drying towels. Provide an adequate number of shower units in accordance with OSHA 29 CFR 1926.1101.

3.4 WASTE LOAD OUT SYSTEMS

- A. The HMAC shall establish as needed waste load out systems, where feasible, attached to the work areas. Waste load out systems shall consist of a minimum of two (2) chambers that are of suitable size for transporting waste out of the work area. Waste load out systems shall be constructed of two layers of six-mil polyethylene sheeting.
- B. Access between rooms in the waste load out system shall be through double flapcurtained openings. The waste load out system shall be used for decontaminating waste containers, bags, bundles, etc. prior to removal from the work area and transporting waste from the work area to the non-work area.
- C. Persons working inside the contaminated work area are not permitted to pass from the work area to the non-work area through the waste load out system. Persons inside the contaminated work area shall not be permitted to enter into the clean area of the waste load out system.
- D. The waste load out system shall remain sealed at all times except during decontamination of waste containers and transport of waste from the work area to the non-work area.

3.5 EXTERIOR NONFRIABLE WORK AREA PREPARATION - GENERAL

- A. Where exterior non-friable ACM is to be removed outdoors, post asbestos abatement warning signs and erect temporary barricades, which include four (4) foot high orange construction fence to create regulated areas. The construction fence shall be staked at intervals sufficient to maintain tight fencing.
- B. Post exterior regulated work areas with OSHA warning signs at fifteen (15) foot intervals around the exterior work area. At a minimum, one (1) warning sign shall be placed on each directional run of fencing.
- C. Install single six (6) mil drop cloths extending a minimum of ten (10) feet from the base of the building. Extend polyethylene sheeting outward from the base of the structure in order to collect debris when working from higher elevations. Drop cloths shall be sealed to the foundation and staked on the edges to prevent blowing or lifting.
- D. Install single six (6) mil critical barriers over any window, door, vent or penetration into the building interior within or directly adjacent to the regulated area.
- E. Maintain an operable remote worker decontamination unit during exterior abatement work.
- F. Maintain a work area access control log at the entrance to the exterior regulated work area. The work area access control log shall include the building address and work area.

3.6 ALTERNATIVE WORK PRACTICE PROCEDURE – GENERAL

A. Alternative Work Practices (AWP) have not been approved for this project.

3.7 ASBESTOS REMOVAL PROCEDURE - GENERAL

- A. The HMAC shall have a designated "competent person" on the job at all times to ensure establishment of a proper enclosure system and proper work practices throughout the project. At a minimum, the HMAC competent person shall perform or supervise the following duties, as applicable:
 - 1. Ensure the integrity of the containment or enclosure.
 - 2. Set up procedures to control entry to and exit from the enclosure.
 - 3. Supervise employee exposure monitoring.
 - 4. Ensure that employees set up, use and remove engineering controls, use work practices and personal protective equipment in compliance with OSHA, DPH and EPA regulations.
 - 5. Ensure that employees use the worker decontamination facilities and observed econtamination procedures.
 - 6. Manage waste packaging, labeling and storage.
 - 7. Communicate with on-site Asbestos Project Monitor daily work activities, schedule, visual inspection and re-occupancy air clearance needs.
 - 8. Perform pre-commencement and final visual inspections with the on-site Asbestos Project Monitor
- B. Abatement work will not commence until all work area preparation is completed in accordance with this technical specification section and is approved by the on-site asbestos project monitor.
- C. Perform selective demolition of all walls, ceilings, floors, cabinets, plumbing fixtures, etc. once containment is established to access asbestos-containing materials for removal.
- D. Spray asbestos materials with amended water using airless spray equipment or apply approved removal wetting agent to reduce the release of fibers during removal operation. The Owner's Representative shall pre-approve use of amended water as the wetting agent.
- E. Fill disposal containers as removal proceeds, seal filled containers before moving to waste load out system. Wet clean each container thoroughly, double bag, drum or use other approved containerization methods and apply a caution label before moving to holding area. Floor tile waste shall be containerized in rigid lined drums.
- F. Remove and containerize all visible accumulations of asbestos-containing and/or asbestos-contaminated debris.
- G. Where AWP procedures are necessary, remove all porous materials and dispose of as friable asbestos-contaminated waste and decontaminate all non-porous materials and dispose of as non-regulated solid waste.
- H. Solidify all liquid waste prior to containerization for disposal.

- I. Sealed disposal containers and all equipment used in the work area shall be included in the cleanup and shall be removed from work areas, via the waste load out system at an appropriate time in the cleaning sequence. Floor tiles shall be placed in lined fiber drums or steel drums or within re-enforced nylon bags and two (2) six-mil disposal bags.
- J. At any time during asbestos removal, should the competent person or on-site Asbestos Project Monitor suspect contamination of areas outside the work area(s), they shall cause to stop all abatement work until steps to decontaminate these areas and eliminate causes of such contamination are completed. Unprotected individuals shall be prohibited from entering suspected contaminated areas until air sampling and visual inspections certify decontamination.
- K. The competent person and Asbestos Project Monitor shall each perform their own final visual inspection. Once the competent person determines that the no visible asbestos residue criteria is met, the Asbestos Project Monitor shall perform their final visual inspection.
- L. Upon acceptance of the work area by the Owner's Representative, the HMAC shall apply an even coating of bridging encapsulant to all exposed surfaces contained within the work area. Apply encapsulant in accordance with manufacturer's recommendation.
- M. Re-occupancy air clearance monitoring shall be performed by Phase Contrast Microscopy (PCM) on a twenty-four (24) hour turnaround time.

3.8 MINIMUM SPECIFIC ASBESTOS REMOVAL PROCEDURE - FLOORING

- A. Prior to the removal of any flooring materials, perform work area preparation in accordance with this Specification.
- B. Multiple layers of flooring materials are present in each work area where flooring is scheduled for abatement. In most cases, the asbestos-containing floor tile and or mastic is located beneath carpet. The HMAC shall remove all layers of flooring down to the sub-floor concrete surface.
- C. Provide selective demolition to remove base cove and other restrictive molding to access all flooring as specified herein. In addition, the contractor shall be responsible for removing all floor-mounted cabinets, built-ins, furnishings, equipment, etc., if any, in the work areas in order to access floor tile that may exist underneath those units.
- D. Minimum specific requirements relative to the removal of asbestos-containing non-friable flooring materials are as follows.
 - 1. Prior to the removal of any non-friable flooring products, the HMAC shall ensure the work area is prepped in accordance with the requirements of Section 3.1 INTERIOR WORK AREA PREPARATION GENERAL.

2. The HMAC shall continuously mist the non-friable flooring products with amended water, removal encapsulant, or detergent solution, so that entire surface is wet. Do not allow wetting agent to puddle, or run off to other areas.

3.9 INTERIOR WORK AREAS FINAL CLEANING AND ENCAPSULATION

- A. Upon completion of gross removal of all ACM specified for removal, the HMAC shall begin final cleaning of the effected work area. The HMAC shall HEPA vacuum and wet wipe all surfaces contained within the work area.
- B. All tools or equipment that are not necessary for final cleaning shall be decontaminated or bagged and removed from the work area enclosure.
- C. The HMAC shall begin final cleaning procedures at the furthest and highest most points from the personnel decontamination facility. The HMAC shall ensure that all exposed building components and or surfaces are thoroughly HEPA vacuumed and wet wiped.
- D. The HMAC shall HEPA vacuum and wet wipe any component specified to remain inside the work area enclosure.
- E. The HMAC shall thoroughly wet wipe all polyethylene sheeting inside the work area enclosure.
- F. Once all surfaces and components within the work area have been thoroughly cleaned, the HMAC's Competent Person shall perform a visual inspection of all surfaces and components within the work area enclosure. The HMAC's Competent Person shall sign off on the work area stating that all abatement has been completed for this portion of work and that the work area has met final visual inspection criteria.
- G. The HMAC's Competent Person shall then request a final visual inspection to be performed by the Asbestos Project Monitor. The Asbestos Project Monitor shall visually inspect all surfaces and components in the work area for residual debris and or dust. Additional cleaning shall be performed at the HMAC's expense if the Asbestos Project Monitor identifies visual debris and or dust during the visual inspection. Additional cleaning shall be performed until the work area meets the Final Visual Inspection criteria.
- H. Upon acceptance of the work area by the Asbestos Project Monitor, the HMAC shall apply an even layer of bridging encapsulant to all surfaces contained within the work area. The Asbestos Project Monitor shall verify the completeness of work area encapsulation.
- I. Re-occupancy air clearance monitoring shall be performed by Phase Contrast Microscopy (PCM) analysis on a twenty-four (24) hour turnaround time.

3.10 WASTE PACKAGING AND REMOVAL PROCEDURE

A. The HMAC shall strictly adhere to the requirements of this section for ACM waste packaging and transporting waste from the work area enclosure to the disposal dumpster.

- B. The HMAC shall utilize lined drums or nylon mesh bags for waste packaging of floor tiles.
- C. Waste disposal bags and drums shall be affixed with pre-printed OSHA warning labels, DOT labels and NESHAP labels.
- D. Each container of ACM waste shall be made adequately wet prior to sealing the container. Bags shall be sealed immediately following additional wetting procedures. Bags of ACM waste shall not be permitted to remain unsealed while in the work area enclosure.
- E. Each bag of ACM waste shall be doubled during waste load out procedures. The following waste load out procedure shall be strictly adhered to:
 - 1. Wet wipe inner bag or drum to remove all ACM contamination. Ensure the inner bag is sealed.
 - 2. Transport bag or drum to the equipment room located in the worker decontamination enclosure.
 - 3. One worker, equipped with personal protective equipment, shall be inside the clean room of the worker decontamination enclosure.
 - 4. The worker in the clean room of the decontamination enclosure shall open a six-mil disposal bag and hold it open inside the shower room where the inner bag containing the ACM waste shall be placed.
 - 5. The outer bag shall be sealed with duct tape inside the shower room.
 - The double bagged or drummed waste shall be removed from the decontamination
 enclosure and waste generator labels shall be immediately affixed to the outer bag or
 drum.
 - 7. Waste generator labels shall be printed self-adhering labels and shall contain the Owner's name, the site location address, and the HMAC's name.
 - 8. The properly labeled waste shall be transported directly to the lined waste container.
 - 9. The waste container shall be double lined with 6-mil polyethylene sheeting.
 - 10. OSHA warning signs shall be secured to the waste container prior to any loading operations.
 - 11. The waste container shall be kept locked at all times other than loading and unloading.

3.11 DISPOSAL OF ASBESTOS AND ASBESTOS CONTAMINATED WASTE

- A. All disposal of asbestos containing and or asbestos contaminated material must be in compliance with requirements of the Department of Energy & Environmental Protection, State of Connecticut Department of Public Health and the USEPA NESHAP regulations.
- B. Disposal approvals shall be obtained from the State Department of Energy & Environmental Protection before commencing asbestos removal if asbestos will be disposed of in the state of Connecticut.

- C. Waste container storage locations shall be pre-approved by the Owner and Owner's Representative.
- D. A copy of approved disposal authorization shall be provided to the Owner and Owner's Representative and any required federal, state or local agencies.
- E. Copies of all landfill receipts will be retained by the Owner's Representative as part of the project file. The receipts will be signed by the landfill operator on receipt, and the quantity of asbestos debris leaving the job site <u>and</u> arriving at the landfill acknowledged.
- F. All asbestos debris shall be transported in covered, sealed vans, boxes or dumpsters, which are physically isolated from the driver by an airtight barrier. All vehicles must be properly licensed to meet United States Department of Transportation (US DOT) requirements.
- G. Friable ACM waste shall be placed in double lined enclosed waste containers equipped with a lockable hasp. Waste containers shall be posted with OSHA warning signs during loading and unloading.
- H. All liquid waste generated during the work shall be solidified. At no time will liquid wastes be permitted to be stored on site. Liquid waste generated during this project shall be solidified prior to the end of each work shift.
- I. Completed waste shipment records signed by the landfill must be returned to the Owner or Owner's Representative no later than 45 days from the time the waste was transported off-site. Completed waste shipment records that are not received by the Owner within 35 days shall require the HMAC to begin tracking the waste. The HMAC must notify the Owner of intentions on tracking the waste.
- J. The HMAC must take appropriate actions as outlined in 40 CFR part 61 NESHAP regulations when completed waste manifests are not forwarded to the Owner or Owner's Representative within 45 days from the time the waste was transported off- site.

3.12 ASBESTOS PROJECT MONITOR RESONSIBILITY

- A. The HMAC shall retain the services of an independent Asbestos Project Monitor to monitor this project. The Asbestos Project Monitor shall collect and analyze air samples to ascertain the integrity of controls, which protect the building from asbestos contamination. Independently, the HMAC shall monitor air quality within the work area to ascertain the protection of employees and to comply with OSHA regulations.
- B. The Asbestos Project Monitor shall collect and analyze air samples.
 - 1. <u>Abatement Period:</u> The Asbestos Abatement Project Monitor shall collect samples on a daily basis during the work period. A sufficient number of background samples shall be taken outside of the work area, at the exhaust of the negative pressure filtration equipment, and outside of the building to evaluate the degree of cleanliness or contamination of the building during asbestos removal. Additional

samples may be taken inside the work area and decontamination enclosure system, at the discretion of the Asbestos Abatement Project Monitor.

- a. The Asbestos Abatement Project Monitor shall provide a continual evaluation of the air quality of the building during asbestos abatement, using his/her best professional judgments in respect to the State Department of Public Health guideline of .010 fibers/cc and the background air quality established during the pre-abatement period by the Project Manager.
- b. If the Asbestos Abatement Project Monitor determines that the building air quality has become contaminated from the project, he/she shall immediately inform the HMAC to cease all removal operations and implement a work stoppage clean up procedure. The HMAC shall conduct a thorough cleanup of areas of the building designated by the Asbestos Abatement Project Monitor. No further asbestos abatement work shall take place until the Asbestos Abatement Project Monitor has determined that the building's air has been decontaminated.
- c. Abatement air samples shall be collected for a minimum period of ninety minutes at a minimum flow rate of twelve (12) liters per minute, or as required to obtain a volume of one thousand (1,000) liters. Samples shall be analyzed by phase contrast microscopy (PCM) using the NIOSH 7400 protocol.
- 2. Post-Abatement Period: The Asbestos Abatement Project Monitor shall conduct air sampling following the final cleanup phase of the project, once the "no visible residue" criterion as established by Asbestos Abatement Project Monitor has been met. Five (5) samples shall be collected inside containment utilizing aggressive methods to comply with State of Connecticut DPH Standard for Asbestos Abatement sections 19a-332a-12, and 19a-332a-13. Analysis of the samples to determine airborne concentrations of asbestos shall be conducted by Phase Contrast Microscopy (PCM) with a limit of 0.01 fibers per cubic centimeter of air in accordance with the above State of Connecticut DPH Standard for Asbestos Abatement regulations.
- 3. <u>Elevated fiber counts:</u> If elevated fiber counts exceeding the establish preabatement level or 0.01 fibers per cubic centimeter of air are recorded, a stop work order shall be issued and the air sample will be analyzed by TEM utilizing the NIOSH 7402 Method. Sample analyses will be performed on a 24 hour turn around. If asbestos is detected on the air sample the project will be shut down and the environmental controls will be reevaluated. The HMAC shall be responsible for cleaning the effected area and will provide additional support to lower the air born fiber levels.

- C. Inspections shall be conducted by the Asbestos Project Monitor throughout the progress of the abatement project. Inspections shall be conducted in order to document the progress of the abatement work as well as the procedures and practices employed by the HMAC. The Asbestos Abatement Project Monitor shall perform the following inspections during the course of abatement activities.
 - 1. Precommencement Inspection: Precommencement inspections shall be performed at the time requested by the HMAC. The Asbestos Abatement Project Monitor shall be informed forty-eight (48) hours prior to the time the inspection is needed. During the course of the precommencement inspection, the Asbestos Abatement Project Monitor shall inspect the containment. This shall include, but not be limited to, inspection of barrier integrity, the worker decontamination, facility, negative air filtration equipment etc. If during the course of the precommencement inspection, deficiencies are found, the HMAC shall perform the necessary adjustments in order to obtain compliance.
 - 2. Work Area Inspections: Work area inspections shall be conducted on a daily basis at the discretion of the Asbestos Abatement Project Monitor. During the course of the work area inspections, the Asbestos Abatement Project Monitor shall observe the HMAC removal procedures, verify barrier integrity, monitor negative air filtration devices, assess project progress, and inform the HMAC of specific remedial activities if deficiencies are noted.
 - 3. Presealant Inspection: Upon request of the HMAC, the Asbestos Abatement Project Monitor shall conduct a presealant inspection. The presealant inspection shall be conducted after completion of the initial final cleaning procedures, but prior to work area encapsulation. The presealant inspection shall verify that all ACM and residual debris have been removed from the work area. If, during the course of the presealant inspection, the Asbestos Abatement Project Monitor identifies residual dust or debris, the HMAC shall comply with the request of the Asbestos Abatement Project Monitor, in order to render the area is free of visible residue.
 - 4. <u>Final Visual Inspection:</u> Following receipt of acceptable reoccupancy air monitoring results and concurrent with removal of the work area containment, the Asbestos Abatement Project Monitor shall conduct a final visual inspection. If residual dust or debris is identified during the course of the final inspection, the HMAC shall comply with the request of the Asbestos Abatement Project Monitor, in order to render the area free of visible residue.

5. <u>Post Tear Down Inspection:</u> Following tear down of the containment, the Asbestos Project Monitor shall perform a post tear down inspection of the work area to determine if any residual debris is present behind the containment barriers.

END OF SECTION 020800

SECTION 024119 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Demolition and removal of selected portions of building or structure.
- 2. Demolition and removal of selected site elements.
- 3. Salvage of existing items to be reused or recycled.

B. Related Requirements:

1. Division 01 Section "Summary" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.

1.3 **DEFINITIONS**

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

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.

- 1. Inspect and discuss condition of construction to be selectively demolished.
- 2. Review structural load limitations of existing structure.
- 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
- 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
- 5. Review areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- E. Predemolition Photographs or Video: Submit before Work begins.
- F. 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.
- G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 QUALITY ASSURANCE

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

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove the following items:
 - a. T.B.D.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
 - 1. Roof system.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PEFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. 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 selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs.
 - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
 - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. Arrange to shut off indicated utilities with utility companies.
 - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.
- C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.3 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

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

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain[fire watch and] portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain adequate ventilation when using cutting torches.

- 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
- 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
- 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- 9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

- 1. Clean salvaged items.
- 2. Pack or crate items after cleaning. Identify contents of containers.
- 3. Store items in a secure area until delivery to Owner.
- 4. Transport items to Owner's storage area on-site designated by Owner.
- 5. Protect items from damage during transport and storage.

C. Removed and Reinstalled Items:

- 1. Clean and repair items to functional condition adequate for intended reuse.
- 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
- 3. Protect items from damage during transport and storage.
- 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings.

- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 07 Section "Asphalt Roofing" for new roofing requirements.
 - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
 - 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them 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.
 - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 - 4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

3.8 SELECTIVE DEMOLITION SCHEDULE

- A. Exterior windows, interior doors.
- B. Exterior windows, interior and exterior doors as indicated on plans.

END OF SECTION 024119

SECTION 031000: CONCRETE FORMWORK

PART 1 - GENERAL

1.1 GENERAL

A. Work of this Section shall conform to the requirements of the General Conditions, Supplementary General Conditions and Special Requirements.

1.2 SCOPE

- A. The work under this Section includes all materials, labor, accessories equipment and related services necessary for furnishing and erecting forms for cast-in-place structural frame concrete work as shown on Drawings and Specified herein.
- B. Related Work Specified in Other Sections:

Submittals: Division 1 Section
 Concrete Reinforcement: Section 032000
 Cast-in-Place Concrete: Section 033000

1.3 APPLICABLE SPECIFICATIONS AND CODES

- A. American Concrete Institute (ACI):
 - 1. ACI 318 "Building Code Requirements for Reinforced Concrete".
 - 2. ACI 301 "Specifications for Structural Concrete for Buildings".
 - 3. ACI 347 "Recommended Practice for Concrete Formwork".

1.4 SUBMITTALS

A. Shop Drawings:

- 1. Shop drawings showing intended concrete placement sequence and location of construction joints shall be submitted by the Contractor for the Architect/Engineer's review.
- 2. The shop drawings shall be submitted in the form required in Submittals and Section 033000.
- B. Manufacturers' Data: Submit manufacturers' data and installation instructions for materials used including form coating, ties, accessories, and manufactured form systems if used.
- C. Samples: At request of Architect, submit samples of form ties and spreaders.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

- A. Formwork for concrete surfaces shall be undamaged plywood or other panel type materials, acceptable to the Architect/Engineer, to provide continuous, straight smooth as cast surfaces, free from visible bulges, indentations, nail heads or other imperfections. Forms shall be furnished in largest practicable panel sizes to minimize number of joints. Form materials should be of sufficient thickness to withstand pressures of newly placed concrete without excessive and objectionable bow or deflection.
- B. Form ties shall be factory-fabricated, adjustable-length, removable or snap-off metal form ties, designed to prevent form deflection and spalling concrete surfaces upon removal. Portion of form-ties remaining within concrete after removal of exterior parts shall be at least 1-1/2" from the outer surface of concrete. Form ties used will leave a maximum hole of 1" diameter in concrete surface.
- C. Form coatings: Provide commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect the concrete surfaces and impair subsequent treatment of concrete surfaces requiring bond or adhesion, impede the wetting of surfaces to be cured with water or curing compounds. Apply in compliance with manufacturers' instructions.

PART 3 - EXECUTION

3.1 DESIGN OF FORMWORK

- A. Design, erect, support, brace and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure.
- B. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose.
- C. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation and position.
- D. Provide shore and struts with positive means of adjustment capable of taking up formwork settlement during concrete placing operations, using wedges or jacks or a combination thereof
- E. Provide trussed supports when adequate foundations for shores and struts cannot be secured.
- F. Support form facing materials by structural members spaced sufficiently close to prevent objectionable deflection.
- G. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities, and within allowable tolerances.
- H. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads.
- I. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

3.2 SURFACE CONDITIONS

A. Examine the substrate and conditions under which work of this Section is to be performed, and correct unsatisfactory conditions which would prevent proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.3 FORM CONSTRUCTION

- A. Construct forms complying with ACI 347, to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, level, and plumb work in finished structures.
- B. Provide for openings, offsets, sinkages, keyways, recesses, moldings, reglets, chamfers, blocking, screeds, bulkheads, anchorages, inserts, and other features required. Use selected material to obtain required finishes.

 Forms for openings, and construction which accommodates installation by other trades

Forms for openings, and construction which accommodates installation by other trades whose materials and products must be fabricated before the opportunity exists to verify the measurements of adjacent construction which affects such installations, shall be accurately sized and located as dimensioned on the Drawings. In the event that deviation from the Drawing dimensions results in problems in the field, the Contractor shall be responsible for resolution of the conditions as approved by the Architect, without additional expense to the Owner.

3.4 FORM FABRICATION

- A. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.
- B. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to temporary openings on forms in as inconspicuous locations as possible, consistent with design requirements. Form intersecting planes to provide true, clean cut corners.

3.5 INSPECTION

A. Examine the areas and conditions where concrete formwork is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Architect.

3.6 FORM COATINGS

A. Coat form contact surfaces with form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come into

contact with surfaces which will be bounded to fresh concrete. Apply in compliance with manufacturer's instructions.

3.7 INSTALLATION OF EMBEDDED ITEMS

- A. General: Set and build into the work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of the items to be attached thereto.
- B. Edge Forms and Screeds Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface.

3.8 REMOVAL OF FORMS

- A. Forms shall be removed in accordance with requirements of the ACI 318 Code unless otherwise herein modified without damage to concrete and in a manner to ensure complete safety of the structure. Leave shoring in place until concrete member will safely support its own weight plus any live loads that may be placed upon it.
- B. The Contractor shall assume responsibility for all damages due to removal of the forms.
- C. Whenever formwork is removed during the curing period, the exposed concrete shall be cured by one of the methods specified under "Curing" in Section 033000.
- D. All wood formwork, including that used in void spaces, pockets and other similar places shall be removed.
- E. At the Architect request form tie holes shall be filled as per approved samples submitted to the Architect and Engineer.
- F. Forms shall not be stripped until the concrete affected has been in place for the following minimum periods of time which shall be applicable only providing bottom forms, shores, etc., remain undisturbed during this phase:
 - 1. Forty-eight hours after concrete is poured when the average air temperature is: 50 degrees F or greater.
 - 2. Thirty-six hours after concrete is poured when the average air temperature is below the above.
- G. Forms shall be left in place for longer periods than the above-listed minimums when required, due to weather conditions, due to lack of adequate artificial heat and protection, due to construction loads and/or the condition of the concrete and whenever it is directed by the Engineer.
- H. The average temperature, for the period from the time of pouring to the time of stripping, shall be defined as the average of the local weather bureau maximum temperature during the day and minimum temperature for the night or the morning immediately following, whichever is lower. The average for more than one day shall be the average of the daily values as computed above. If artificial heat and protection is provided for the concrete, the average temperature of the air directly above the concrete in question at a point midway between representative's heaters shall be used as the average temperature for determining proper stripping time.

- I. Consider the time interval for stripping forms from the start of the concrete pour to the start of stripping providing:
 - 1. Stripping is started at the first section poured and continues in the same sequence as concrete was placed.
 - 2. The rate of stripping is such that no member is stripped more than six hours earlier than it would have been if stripping were timed from the start of placing concrete for that member.
- J. Upon removal of forms, the Architect/Engineer and Inspecting Agency shall be notified by the Contractor in order that an inspection of the newly stripped surfaces may be made prior to patching.
- K. Freshly stripped surfaces shall not be pointed up or touched in any manner before having been inspected by the Architect/Engineer and Inspecting Agency.

END OF SECTION 031000

SECTION 032000 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 GENERAL

A. Work of this Section shall conform to the requirements of the General Conditions, Supplementary General Conditions and Special Requirements.

1.2 SCOPE

- A. The work covered by this section includes all materials, labor, accessories, equipment, permits and related services to furnish and place all reinforcement in cast-in-place concrete construction, as shown on Drawings, as specified herein, and all required accompanying accessories.
- B. Related Work Specified in Other Sections:

Submittals: Division 1 Section
 Concrete Formwork: Section 031000
 Cast-in-Place Concrete: Section 033000

1.3 APPLICABLE SPECIFICATIONS AND CODES

- A. American Concrete Institute (ACI):
 - 1. ACI 318 "Building Code Requirements for Reinforced Concrete".
 - 2. ACI 301 "Specifications for Structural Concrete for Buildings".
 - 3. ACI 315 "Details and Detailing of Concrete Reinforcement".
- B. Concrete Reinforcing Steel Institute (CRSI):
 - 1. "Recommended Practice for Placing Reinforcing Bars."
- C. American Welding Society (AWS):
 - 1. AWS D1.1 "Structural Welding Code Steel".
 - 2. AWS D1.4 "Structural Welding Code Reinforcing Steel".

1.4 SUBMITTALS

- A. Shop Drawings:
 - 1. The shop drawings shall be submitted in the form required in Submittals and Section 033000.
 - 2. The Contractor shall prepare shop drawings showing detailed layout of reinforcement, including dimensions, openings, bar spacing, bending details, bar schedules, and similar

- items required for the proper construction of the work. Drawing shall show grades of reinforcing steel and shall be prepared in compliance with the Structural and Architectural Drawings. Provisions for the connection of work by other trades and the location of all embedded items shall be indicated on the shop drawings.
- 3. The shop drawings for the top bars and the bottom bars for the slabs shall be prepared on different sheets. Reinforcement of concrete walls and beams shall be shown on elevations with sections as required. Elevations of walls and beams shall be at least 1/4" = 1'-0" scale.
- 4. Shop drawings shall be prepared in accordance with ACI 315 "Details and Detailing of Concrete Reinforcement."
- 5. Review by Engineer: After receipt of the shop drawings by the Engineer, they will be reviewed and necessary revisions will be marked on a copy which will be returned. Revisions shall then be made and the drawings resubmitted. This procedure will be continued until the drawings are approved or approved as noted and released for construction. The Contractor shall then deliver to the Engineer one set of black line prints for record and use AND at the completion of the job one electronic version of the shop drawings on a CD-Rom or other acceptable media.
- B. Mill Certificates: Submit, for record, the steel producer's certificates of mill analysis, tensile and bend tests for reinforcing steel.

1.5 PRODUCT HANDLING

- A. Delivery: Deliver reinforcement to the job site bundled, tagged and marked. Use metal tags indicating bar size, lengths and other information corresponding to markings shown on shop drawings.
- B. Storage: Store reinforcement at the jobsite in a manner to prevent damage and accumulation of dirt and excessive rust.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcing bars shall be billet steel deformed bars rolled from new stock and shall conform to the requirements of ASTM A615, grade 60. As an alternate reinforcing bars scheduled to be welded may conform to the requirements of ASTM A706, grade 60.
- B. Welded wire fabric shall conform to the requirements of ASTM A185, delivered in sheets not in rolls.
- C. Supports for Reinforcement: Bolsters, chairs, spacers and other devices for supporting, spacing and fastening reinforcement in place:
 - 1. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick, or other materials that do not comply with CRSI recommendations.
 - 2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.

3. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms, provide supports with either hot-dip galvanized or plastic protected legs.

PART 3 - EXECUTION

3.1 FABRICATION

- A. Fabrication of reinforcing bars shall conform to required shape and dimensions, with fabrication tolerances complying to the CRSI Manual and ACI 315. Fabrication shall not commence until shop drawings have been reviewed and returned by the Architect and/or Engineer as appropriate. In case of fabricating errors, do not rebend or straighten reinforcement in a manner that will injure or weaken the material.
- B. Welding of reinforcing bars:
 - 1. Reinforcing bars to be welded shall be preheated based upon the carbon equivalent in accordance with AWS D1.4. If the carbon equivalent is not known, it shall be assumed to be greater than 0.75%.
 - 2. Plates to which reinforcing bars are to be welded shall be preheated in accordance with AWS D1.1. In the case of different preheat requirements for the reinforcing bar and plate, the higher value shall be used.
- C. Unacceptable materials: Reinforcement with any of the following defects will not be permitted in the Work:
 - 1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
 - 2. Bends or kinks not indicated on Drawings or final Shop Drawings.
 - 3. Bars with reduced cross-section due to excessive rusting or other causes.

3.2 INSPECTION

- A. Examine the substrate, formwork, and the conditions under which concrete reinforcement is to be placed, and correct conditions which would prevent proper and timely completion of the work. Do not proceed with the work until satisfactory conditions have been obtained.
- B. Refer to specification section 033000, 1.05 "QUALITY CONTROL" for additional requirements.

3.3 INSTALLATION

- A. Comply with the specified standards for details and methods of reinforcement placement and supports, and as herein specified.
- B. Clean reinforcement to remove loose rust and mill scale, earth, and other materials which reduce or destroy bond with concrete.
- C. Position, support, and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing with metal chairs, runners, bolsters, spacers, and hangers, as required.

- D. Place reinforcement to obtain the required minimum coverage for concrete protection. Arrange, space, and securely tie bar supports together with 16 gage wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.
- E. Install welded wire fabric in maximum lengths practicable. Lap adjoining pieces at least one full mesh or 6" minimum. Welded wire fabric shall be tied adequately to prevent the curling of edges.
- F. Provide supports of sufficient number and strength to carry reinforcement. Do not place reinforcing bars more than 2" beyond the last leg of any continuous bar support. Do not use supports as bases for runways for concrete conveying equipment or similar construction loads.
- G. Avoid splices not indicated on Structural Drawings. Where splices are unavoidable, provide standard reinforcing bar splices by lapping ends, placing bars in contact and tightly tying with wire. Splices should be staggered if possible. Splicing of reinforcement at points of maximum stress will not be allowed.

END OF SECTION 032000

SECTION 033000- CAST IN PLACE CONCRETE

PART 1 - GENERAL

1.1 GENERAL

A. Work of this Section shall conform to the requirements of the General Conditions, Supplementary Conditions, and Special Requirements.

1.2 SCOPE

- A. Provide all labor, materials, equipment, services and transportation required to complete all concrete work as shown on Drawings, as specified herein, and as required by the job conditions.
- B. Related Work Specified in Other Sections:

Submittals: Division 1 Section
 Earthwork: Section 022000
 Concrete Formwork: Section 031000
 Concrete Reinforcement: Section 032000

1.3 APPLICABLE SPECIFICATIONS AND CODES

- A. Code: Concrete work shall conform to the requirements of the International Building Code and all applicable OSHA requirements.
- B. Standards: Perform all work in accordance with the latest editions and revisions of the following standards which hereby become part of this section:
 - 1. American Society for Testing and Materials (ASTM): ASTM specifications shall apply to any and all materials for which an ASTM standard has been established unless otherwise specified. The manufacturer or supplier of each material shall certify that the material conforms to the applicable ASTM specification.
 - a. C31 Standard Method of Making and Curing Concrete Test Specimens in the Field.
 - b. C33 Standard Specification for Concrete Aggregates.
 - c. C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 - d. C40 Standard Test Method for Organic Impurities in Fine Aggregates for Concrete
 - e. C42 Standard Test Method of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
 - f. C88 Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.
 - g. C94 Standard Specification for Ready-Mixed Concrete.
 - h. C117 Standard Test Method for Materials Finer than 75-μm (No. 200) Sieve in Mineral Aggregates by Washing.

- i. C123 Standard Test Method for Lightweight Particles in Aggregate.
- j. C142 Standard Test Method for Clay Lumps and Friable Particles in Aggregates.
- k. C143 Standard Test Method for Slump of Hydraulic Cement Concrete.
- 1. C150 Standard Specification for Portland Cement.
- m. C172 Standard Method of Sampling Freshly Mixed Concrete.
- n. C173 Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
- o. C192 Standard Method of Making and Curing Concrete Test Specimens in the Laboratory.
- p. C227 Standard Test Method for Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method
- q. C260 Standard Specification Air-Entraining Admixtures for Concrete.
- r. C289 Standard Test Method for Potential Alkali-Silica Reactivity of Aggregates (Chemical Method).
- s. C330 Standard Specification for Lightweight Aggregates for Structural Concrete.
- t. C404 Standard Specification for Aggregates for Masonry Grout.
- u. C494 Standard Specification for Chemical Admixtures for Concrete.
- v. C496 Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens.
- w. C567 Standard Test Method for Unit Weight of Structural Lightweight Concrete.
- x. C618 Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- y. C666 Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing.
- z. C989 Standard Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars.
- aa. C1017 Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- bb. C1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- cc. C1157 Performance Specification for Hydraulic Cements.
- dd. C1240 Standard Specification for Silica Fume for Use in Hydraulic-Cement Concrete and Mortar.
- ee. C1260 Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
 - C1315 Standard Specification for Liquid Membrane-Forming Compounds having Special Properties for Curing and Sealing Concrete.
- ff. E154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.
- gg. E1745 Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

- 2. Comply with the above standards. Should copies be required, they may be obtained at the Contractor's expense from:
 - a. American Society for Testing and Materials
 100 Barr Harbor Drive
 P.O. Box C700

1.0. Box C/00

West Conshohocken, PA 19428-2959

Phone: (610) 832-9585

www.astm.org

- 3. American Concrete Institute (ACI):
 - a. ACI 117 Standard Tolerances for Concrete Construction and Materials.
 - b. ACI 211.1 Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.
 - c. ACI 211.2 Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
 - d. ACI 214 Evaluation of Strength Test of Concrete.
 - e. ACI 301 Specifications for Structural Concrete for Buildings.
 - f. ACI 302 Guide for Concrete Floor and Slab Construction.
 - g. ACI 304 Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.
 - h. ACI 305 Hot Weather Concreting.
 - i. ACI 306 Cold Weather Concreting.
 - j. ACI 308 Standard Practice for Curing Concrete.
 - k. ACI 309 Guide to Consolidation of Concrete in Congested Areas.
 - 1. ACI 318 Building Code Requirements for Reinforced Concrete.
 - m. ACI 347 Recommended Practice for Concrete Formwork.
- 4. Comply with the above standards. Should copies be required, they may be obtained at the Contractor's expense from:
 - a. American Concrete Institute

38800 Country Club Drive

Farmington Hills, MI 48331

Phone: (248) 848-3700

www.aci-int.org

- C. Conflicts: In case of conflict between the standards cited, drawings, specifications, and Building Code requirements, the Contractor shall make allowance in his bid for the most stringent requirements.
- D. The Contractor shall at all times keep available on the site the above codes and standards for reference.
- E. All work shall be performed to secure for the entire job homogeneous concrete having required strength, durability and weathering resistance, without any unnecessary

weakness and other structural defects and free of pronounced honeycombs, air pockets, voids, projections, offsets, and other defacements on exposed surfaces.

1.4 SUBMITTALS

- A. Manufacturers' Literature: When different than specified submit a substitution request per Division 1 and submit manufacturers' standard specifications, test data, and installation instructions for each product, edited to correlate to specific job requirements, when different from that specified in Section 2.01 Materials.
- B. Substitution: Any request for product substitution must be submitted for review with supporting documentation prior to time of bid. No requests for substitutions will be considered after bids have been received.
- C. The shop drawings shall be submitted in the form required in Submittals, Division 1 Section and this section.
- D. Shop Drawings:
 - 1. Scope: The Contractor shall prepare shop drawings showing detail layouts of reinforcing, including dimensions, openings, spacing, bending details, bar schedules, and similar items required for the proper construction of the work. Provisions for the connection of work by other trades shall be indicated on the shop drawings. The location of all embedded items shall be indicated by the contractor on the shop drawings. All shop drawings shall be submitted for approval in accordance with the requirements of the Contract Documents.
 - 2. Submissions: Refer to Division 01 Section "Submittals".
 - 3. Construction Joints: Submit layout showing proposed locations of construction joints.
 - 4. Checking by Contractor: Prior to submission of the shop drawings to the Architect and/or Engineer, they shall be pre-checked by the contractor for conformity of detail with the Contract Documents and for coordination with other subcontractors. The signature of a representative of the Contractor indicating that the drawings have been pre-checked will be required. The Contractor shall be wholly responsible for the conformity of dimensions and details of the shop drawings with the Contract Documents.
 - 5. Review by Engineer: After receipt of the shop drawings by the Engineer, they will be reviewed and necessary revisions will be marked on the drawings which will be returned. Revisions shall then be made and the drawings resubmitted. This procedure will be continued until the drawings are approved or approved as noted and released for construction.
 - 6. The responses on the shop drawing review stamp used by the Engineer require the following actions:
 - a. APPROVED indicates that the Engineer has found the information presented on the shop drawing appears to conform to the requirements of the Contract Documents.
 - b. APPROVED AS NOTED indicates that the Engineer requires the shop drawing to be corrected to reflect the notes and comments shown before it

- can be APPROVED. Fabrication may proceed only if the work will incorporate the corrections. Resubmit the revised shop drawing for record.
- c. REVISE and RESUBMIT alone or with (b) indicates that the Engineer requires resubmission of the shop drawing after revision per notes and comments. Fabrication shall not proceed until the Contractor has received a returned shop drawing marked APPROVED or APPROVED AS NOTED.
- d. NOT APPROVED indicates that the shop drawing does not conform to the Contract Documents and must be extensively revised before re-submittal. Fabrication shall not proceed.
- 7. The review and/or approval of shop drawings shall not be construed as permitting any departure from the contract documents. Requests for such must be submitted in writing by the Contractor and approved in writing by the Engineer. Failure to specifically indicate modifications, departures from contract documents, or revisions to previously submitted shop drawings, shall automatically be considered cause for rejection of the modification or revision whether or not the drawing has been approved by the Engineer.
- 8. The contractor shall indicate on submittals, RFI's or other requests, any and all deviations from the specific requirements of the contract documents (drawings, notes and specifications). The acceptance by the Engineer of Record of a specific and isolated request by the contractor to deviate from these requirements does not constitute a waiving of that requirement for other conditions of the project, unless specifically addressed as such and permitted by the EOR in writing.
- 9. File: At least one copy of each approved shop drawing shall be kept available in the contractor's field office. Drawings not bearing Approved or Approved as Noted action stamps by the Architect/Engineer shall not be kept on the job.

E. Requests for Information (RFIs):

- 1. The turnaround time for answering RFI's depends on the category in which they are assigned.
 - a. Upon receipt by the Engineer, RFIs will be categorized in one of the following categories and will be tracked in the same manner for construction administration purposes:
 - 1) No cost clarification.
 - 2) Change to be issued in future bulletin.
 - 3) Called out in contract documents.
 - 4) Previously answered.
 - 5) Request for substitution.
 - 6) Request for corrective field work.
 - 7) Information needs to be provided by others.
 - b. RFIs in categories 1, 2, 3, 4 and 7 will generally be turned around in a manner to help expedite the project.

- c. RFIs in categories 5 and 6 will be treated as submittals or job standards, and may have a delayed response time.
- F. Samples: When different than specified submit a substitution request per Division 1 and Submit samples of the following products when provided as "or equal" to those specified.
 - 1. Premolded joint filler.
 - 2. Waterstops.
 - 3. Compressible filler.
 - 4. Wedge inserts.
 - 5. Expansion bolts.
 - 6. Other drilled-in anchoring devices.
 - 7. Vapor barrier.
 - 8. Geotextile filter fabric.

One sample of each product shall be provided to the Architect and Engineer with a sample data sheet. The data sheet shall be returned after review.

G. Product Data:

- 1. Complete material lists of items proposed to be furnished and installed under this Section.
- 2. Sufficient data to demonstrate compliance with the specified requirements.
- 3. Complete information on cement and cementitious admixtures: sources of supply, physical and chemical characteristics, transportation and intermediate procedures for mill-to-site handling, and site storage procedures.
- 4. Complete information on aggregate procurement, properties, processing and storage.
- 5. Complete information on proposed batching and mixing equipment and procedures, including water chilling or other devices or systems to reduce mix temperature.
- 6. Complete information on concrete handling equipment proposed to be used, including capacities, use of chutes, pumps, tremies, buckets, and all other equipment.
- 7. Complete information on proposed consolidation equipment.
- 8. Complete description of proposed curing methods.
- 9. Complete mix designs, prepared in accordance with the provision of the Drawings, Specifications and applicable ACI publications.
- H. Conflicts: The contractor shall be solely responsible for errors of detailing, fabrication, and placement of reinforcement steel; placement of inserts and other embedded items; and the structural adequacy of all formwork.
- I. Reimbursement for Additional Services: Should additional work and/or visits be required which are necessitated by failure of the Contractor to perform his work in accordance with the contract documents, or if additional design or drafting time is

required for corrective measures caused by failure to perform in accordance with the contract documents and/or approved shop drawings, or if additional shop drawing reviews are required due to Contractor's lack of follow-through on previous comments on the same work, Contractor shall reimburse the Architect and Engineer at the rate of 2.5 times direct personnel expense plus out-of-pocket traveling expenses incurred at cost + 10%.

1.5 QUALITY CONTROL

- A. Design Mixes (By Contractor):
 - 1. Costs: All costs of developing concrete mix designs and concrete materials testing in accordance with specification requirements shall be borne by the Contractor.
 - 2. Design Mixes: All design mixes shall be proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318. The mix designs shall be submitted for review on the mix design submittal form at the end of this specification. Design mixes proportioned by trial mix method must be developed by a testing laboratory and approved by the Engineer.
 - a. Normal Weight Structural Concrete: 4000 psi concrete as designated on the structural drawings.
 - b. Air Content: All concrete exposed to freezing and thawing and/or required to be watertight shall include an air-entraining admixture and shall have an air content of 5.0% to 7.0%. All interior steel troweled floors, subject to vehicular traffic, shall have a maximum air content of 3% and shall not include an air-entraining admixture. Air entrainment is optional for other concrete.
 - c. Slump: Concrete design mixes shall be proportioned to meet the following slump limitations:
 - 1) Concrete without high-range water-reducing admixture ('superplasticizer'):
 - a) All Concrete: 4" Max
 - 2) Concrete with high-range water-reducing admixture ('superplasticizer'): Concrete shall arrive at job site with a slump of 2" to 3" for normal weight concrete. Slump shall be verified, then after addition of high-range water-reducing admixture, the concrete shall have a maximum slump of 8" unless otherwise approved by the Engineer.
 - d. Brands of Cement: The brand, color and type of cement used throughout the job shall be the same as that employed in the preliminary tests.

- e. Aggregates: The source of supply of the aggregates used throughout the job shall be the same as that employed in the preliminary tests. Should the aggregate characteristics change materially, new water-cement ratios shall be established by additional testing, as outlined above, at the Contractor's expense.
- f. Water / Cementitious Materials Ratio by Weight ("W/1C ratio"): Unless lower limits are stated in the contract documents, all concrete subjected to freezing and thawing in moist condition and/or required to be watertight shall have a maximum W/cm ratio of 0.45.
- g. Absent the above conditions, all concrete with required strength of 4000 psi or higher shall have a maximum W/C ratio of 0.50.
- h. Mix Design Approval: Concrete shall not be placed until mix designs including material tests are submitted to and approved by the Engineer.
- i. Make one test for each design mix to verify that the total chloride content (CI) ion content is within the specified limits. Perform chloride tests in accordance with ACI 318.
- j. Mix design reports for concrete specified to be air entrained shall include ASTM C173 test results.

B. Field Tests and Inspection:

- 1. Concrete Samples: The Architect reserves the right to take samples from any or every lot of concrete delivered to the job. The tests shall be made as required by the Architect and the expense incurred shall be borne by the owner when the concrete meets specification requirements, and by the contractor when the concrete fails to meet the specification requirements. Any rejected concrete shall be immediately removed from the work.
- 2. No single strength test shall have a valve of 90% of the specified compressive strength.
- 3. Concrete Placement: All controlled concrete, including the placement of the reinforcing and the placing of the concrete, is to be inspected by the Owner's representative and/or testing laboratory. Any concrete rejected for failure to meet specification requirement shall be removed by the contractor at his own expense.
- 4. Inspections shall include:
 - a. Preparing, curing, transporting, and testing concrete cylinders. For each class of concrete placed, at least four cylinders shall be taken for each 50 cubic yards or fraction thereof, of each class of concrete placed each day. Cylinders are to be taken in accordance with ASTM C31 and results shall be submitted to the Architect, Engineer, and owner. Test cylinders in accordance with ASTM C 39. One cylinder will be tested at 7 days, two at 28 days and one held in reserve for further testing if found necessary.
 - b. Recording air temperature, concrete temperature (ASTM C 1064), unit weight of concrete, amount of entrained air (ASTM C 173), and slump (ASTM C 143) for each batch of concrete.

- c. Testing of aggregate gradation and moisture content, monitoring material batching at the concrete plant.
- d. Inspection of placement of reinforcing steel and supporting devices.

 Contractor shall not be permitted to place concrete until reinforcing steel has been inspected and approved, by Engineer or approved testing agency.
- e. Inspection of compliance with specification requirements, including elapsed time since introduction of mixing water, proper conveying, protection during periods of hot or cold weather, vibration and curing of concrete.
- f. Rejection of concrete not meeting specification requirements and immediate reporting to the Construction Manager.
- g. Obtaining certified mill test results for each load of cement delivered to the concrete producer for use of this project.
- h. Preparation of daily reports of testing and submission of results in triplicate to the Engineer, Construction Manager and Owner daily.
- 5. Coordination with Owner's Testing and Inspection Agency: The Contractor shall have sole responsibility for coordinating their work with the testing agency to assure that all test and inspection procedures required by the Contract Documents and Public Agencies are properly provided. The Contractor shall cooperate fully with the testing and inspection agencies in the performance of their work and shall provide the following:
 - a. Provide information as to time and place of work at least 3 working days prior to the start of work.
 - b. Two complete sets of approved shop and erection drawings. Provide drawings for the work to be performed in the shop or field one week prior to the start of work.
 - c. Concrete batch tickets, bar lists, order sheets, material bills and shipping bills.
 - d. Representative samples requested by the inspection agency for testing, if necessary.
 - e. Full and ample means of assistance for testing and inspection of material.
 - f. Proper facilities, including scaffolding, temporary work platforms, etc., for inspection of the work in shop and field. The Contractor shall provide assistance and reasonable facilities for use by the Owner's representative and testing laboratory inspector.
- 6. Intent: The Owner's testing laboratory is hired solely for the protection of the Owner and does not relieve the Contractor of his responsibility to provide concrete in accordance with the plans and these specifications. The Contractor may elect to employ an additional testing laboratory of their own choice at their own expense.
- C. Tests on Questionable Concrete:

- 1. If the results of tests and/or inspections indicate the concrete and/or steel reinforcement or construction techniques do not meet the requirements as set forth on the drawings in these Specifications and as determined by Architect and/or Engineer, due to inadequate batching, placing, curing, protection or other construction activities, Contractor shall proceed as directed by Architect/Engineer.
- 2. Additional Tests: The Architect or Engineer shall have the right to order the Contractor to make load tests, compression tests on specimens taken from the inplace concrete, or any other tests of the completed structure or any part thereof. If the need for additional testing is based on Architect or Engineer or approved testing and inspection agency observations that materials, methods or workmanship were not per requirements, or based on results of routine tests not meeting requirements, then any investigation and/or tests directed by Architect/Engineer to verify concrete requirements as related to drawings and Specifications shall be performed at Contractor's expense whether the final results meet or do not meet Specification requirements.
- 3. Condemned Concrete: If the Architect or Engineer determines, based on observations, routine testing and/or additional tests, that the concrete will not meet the project requirements, the concrete shall be condemned. The Contractor, at his own expense shall remove any condemned concrete and replace same with new concrete to the satisfaction of the Architect and/o Engineer.
- 4. Any additional costs resulting from re-testing, load testing, replacement of concrete and/or damage to the work of other trades, inclusive of Architect's and/or Engineer's costs for the investigation of work, etc., shall be borne by Contractor.
- 5. Reimbursement by Contractor: Additional architectural and engineering fees, based upon direct personnel expense plus 150%, and out-of-pocket traveling expenses at cost plus 10%, shall be borne by the Contractor for redesign and extra supervision due to the above when such concrete tests are required.

1.6 REVIEW AND CORRECTIONS BY ARCHITECT OR ENGINEER

- A. Review: The Architect and/or Engineer as appropriate will review the construction for general compliance with the provisions of the contract documents during various phases of construction. Should additional work and/or visits be required which are necessitated by failure of the Contractor to perform their work in accordance with the Contract Documents the Contractor shall bear the cost of such.
- B. Additional architectural and engineering fees, based upon direct personnel expense plus 150% and out-of-pocket traveling expenses at cost plus 10%, shall be borne by the Contractor for redesign and extra supervision due to the above.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement: Portland cement, Type I, unless noted otherwise, of approved manufacturer, fresh stock, meeting requirements of ASTM C150. Air-entraining cement will not be

permitted. Cement blended with admixtures will not be permitted. Air entrainment must be achieved by the use of an air entrained mixture so that the dosage can be changed as required to achieve the specified air content. Chloride ion content should not exceed 0.15% of the cement weight. The alkali content shall not exceed 0.6% when tested in accordance with ASTM C114 unless either of the following requirements is satisfied:

The manufacturer certifies that no alkali reactivity is produced with the proposed combination of materials when tested in accordance with ASTM C227.

B. Concrete Aggregates for Normal Weight Concrete:

- 1. Fine and coarse aggregates for normal weight concrete shall conform to ASTM C33. Aggregates shall have hard, angular, strong, clean, uncoated, durable particles and shall be free of injurious amounts of thin elongated pieces, mica, clay, silt, or organic matter. Aggregates shall be from a local source with prior record of acceptable use.
- 2. Fine aggregate shall be natural sand or stone screenings. Note that the fineness modulus must not vary by more than 0.20 throughout the work.
- 3. Coarse aggregate shall be crushed stone or a gravel, meeting gradation requirements for Size no. 67 (3/4-inch to No. 4).
- 4. Coarse aggregate shall not contain any problematic materials. Coarse aggregate that contains any iron sulfides, minerals including pyrite and/or pyrrhotites shall not be employed.
- 5. Combined aggregate gradation for slabs and other designated concrete shall be 8% 18% retained on each sieve below the top size and above the No. 100 for large top size aggregates (1½ in.), or 8% 22% for smaller top size aggregates (1 in. or ¾ in.).
- 6. Aggregate Sizes: Maximum aggregate size shall not be larger than one-fifth of the narrowest dimension between sides of forms, one-third the depth of slabs, nor three-fourths of the minimum clear spacing between individual reinforcing bars or bundles of bars.
- 7. The acceptability of aggregates for the work will depend on proof that their potential alkali reactivity is not deleterious to the concrete.
- 8. Aggregates shall be free of deleterious substances, including material that could react harmfully with alkalis in the cement. Tests shall be submitted as per ASTM C40, C117, C123, C142, and C227, C289, or C1260.
- 9. Soundness: Acceptable results of ASTM C88 for aggregate soundness shall be submitted.
- 10. Aggregate Sources: Provide aggregate from one source of supply only.
- C. Water: Water for concrete shall be potable, clean and free from all organic materials, strong acids or alkalis.
- D. Concrete Admixtures:

- 1. Water-Reducing Admixture: The admixture shall conform to ASTM C494, Type A, and not contain more than 0.05 percent chloride ions. Products: Provide one of the following:
 - a. "WRDA" w/ Hycol"; W.R. Grace & Co.
 - b. "Eucon WR-75, WR 89, or Eucon MR"; The Euclid Chemical Company.
- 2. Water-Reducing, Retarding Admixture: The admixture shall conform to ASTM C 494, Type D, and not contain more than 0.05 percent chloride ions. Products: Provide one of the following:
 - a. "Eucon Retarder 75"; The Euclid Chemical Co.
 - b. "Daratard-17"; W.R. Grace & Co.
- 3. High-Range Water-Reducing Admixture (Superplasticizer): The admixture shall conform to ASTM C494, Type "F" or Type "G" and not contain more than 0.05 percent chloride ions. Products: Provide one of the following:
 - a. "Eucon 37/1037" or "Plastol 341/5000"; The Euclid Company.
 - b. "Daracem-100" or "ADVA Flow"; W.R. Grace & Co.
- 4. Non-corrosive, Non-chloride Accelerator Admixture: The admixture shall conform to ASTM C494, Type "C" or "E" and not contain more than 0.05 percent chloride ions. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least a year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures. Products: Provide one of the following:
 - a. "Accelguard 80"; The Euclid Chemical Co.
 - b. "Daraset"; W.R. Grace & Co.
- 5. Air-Entraining Admixture: The admixture shall conform to ASTM C260 and be certified by the manufacturer to be compatible with other required admixtures. Products: Provide one of the following:

 "Air-Mix or AEA 92"; The Euclid Chemical Co.
 - a. "Sika AER"; Sika Chemical Corporation.
- 6. Silica Fume (Microsilica) Admixture: Silica fume admixture shall consist of a silica fume pozzolanic material containing a high content of amorphous silicon dioxide (90 to 95 percent) meeting the requirements of ASTM C1240. Product: Provide one of the following:
 - a. "Force 10,000"; W.R. Grace & Co.
 - b. "Eucon MSA"; The Euclid Chemical Co.

- 7. Fly Ash Admixture: Fly ash admixture shall consist of finely divided coal fly ash meeting the requirements of ASTM C618 Class F and L.O.I. maximum of 2% +/-.5%. Product: Provide one of the following:
 - a. "ProAsh" by Separations Technologies, Inc.
 - b. Processed fly ash with low and consistent Loss on Ignition (LOI) indicating low carbon that could otherwise affect concrete properties.
- 8. Ground Granulated Blast Furnace Slag: ASTM C989, Grade 120: The amount of ground granulated blast furnace slag in the mix shall not exceed 40% of the total amount of ground granulated blast furnace slag and cement in the mix. Acceptance of type and quantity of ground granulated blast furnace slag shall be subject to demonstration by a successful test slab placement with that material and mix. Product: Provide one of the following:
 - a. "New Cem" by LaFarge Cement Co.
 - b. "Grancem" by St. Lawrence Cement Co.
- 9. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05% chloride ions are not permitted.

D. Admixture Usage:

- 1. All concrete must contain a specified water-reducing admixture or a specified high-range water-reducing admixture (Superplasticizer) or both. All self-consolidating concrete shall contain the specified high-range water-reducing admixture and viscosity-enhancing admixture as required.
- 2. All concrete, 8" thick or less, placed at air temperatures below 50 degrees F, shall contain the specified non-corrosive, non-chloride accelerator. Provide accelerator elsewhere as required based on concrete configurations, protection methods and anticipated ambient conditions.
- 3. All concrete required to be air entrained shall contain an approved air entraining admixture.

2.2 CURING METHODS AND MATERIALS

- A. Sheet Materials: Waterproof curing paper or opaque polyethylene film, both conforming to ASTM C-171.
- B. Curing and Sealing Compound (VOC Compliant 700 g/l*): Liquid type membrane-forming curing compound, clear styrene acrylate type, complying with ASTM C1315, Type I, Class B, 25% solids content minimum. Moisture loss shall be not more than 0.30 kg/m² when applied at 300 sq. ft./gal. Manufacturer's certification is required. Subject to project requirements provide one of the following products:
 - 1. Products: Provide one of the following:
 - a. "Super Rez Seal"; Euclid Chemical Company

- b. "Masterseal 30"; Master Builders
- c. "Kure N Seal 30"; Sonneborn
- C. Curing Compound (Strippable) VOC Compliant, 350 g/l: The water based compound shall conform to ASTM C309. Provide "Kurez DR VOX" by The Euclid Chemical Company. Use the specified strippable curing compound only on surfaces to be covered with finish or coating material applied directly to concrete, such as liquid densifier/sealer, waterproofing, damp proofing, membrane roofing, flooring, painting, and other coatings and finishing materials.

2.3 ACCESSORIES FOR CONCRETE WORK

The following accessories are available for Contractor use as specified or as may be necessary during the construction and as field conditions warrant:

- A. Joint Filler:
 - 1. Expansion joint filler's shall extend the full depth of slab or joint and be of the thickness shown on the drawings. Filler shall be asphalt-impregnated fiberboard conforming to ASTM D1751 for interior work and self-expanding cork board conforming to ASTM D1752 for exterior work.
 - 2. Control joint shall be filled with field molded sealant or filler.
 - 3. Isolation joint filler's shall consist of 1/8-inch wide strips of neoprene, synthetic rubber, or approved substitute, extending the full depth of the slab.
- B. Vapor Barrier: Where required by drawings or specifications under slab on grade, provide vapor barrier which conforms to ASTM E1745, Class A, placed over prepared base. The membrane shall have a water-vapor transmission rate no greater than 0.008 gr./ft²/hr when tested in accordance with ASTM E96. Vapor barrier shall be no less than 15 mil thick in accordance with ACI 302.1R-96.
 - 1. Products: Provide one of the following or approved equal:
 - a. Florprufe 120 by WR Grace
 - b. Stego Wrap (15 mil) Vapor Barrier by Stego Industries LLC,
- C. Porous Fill: Porous fill under concrete slabs shall consist of clean crushed rock, crushed or uncrushed gravel, or other similar free draining material of such size as will pass a 1" inch screen with not more than 5 percent passing a No. 4 screen. Porous fill shall comply with AASHTO No.57 gradation.
- D. Compressible filler shall be expanded polystyrene beadboard of 1.0 pcf min. density conforming to FSHH-1-524B.
- E. Non-Shrink Grout:
 - 1. The non-shrink grout shall be "Euco NS" by the Euclid Chemical Co., or "Masterflow 713" by Master Builders. The factory pre-mixed grout shall conform to ASTM C1107. In addition, the grout manufacturer shall furnish test data from

- an independent laboratory indicating that the grout shall achieve 95% bearing contact under a 48" x 48" base plate when placed at a fluid consistency.
- 2. Where high fluidity and/or increased placing time is required use "Euco Hi-Flow Grout" by the Euclid Chemical Co. or "Masterflow 928" by Master Builders. In addition, the grout manufacturer shall furnish test data from an independent laboratory indicating that the grout shall achieve 95% contact when placed under an 18" x 36" base plate.
- F. Polymer Repair Mortar: "Thin Top Supreme/Concrete Top Supreme (horizontal repairs), "Verticoat or Verticoat Supreme" (vertical and overhead repairs) by The Euclid Chemical Co. or "Sikatop 121 or 122" (horizontal repairs), "Sikatop 123" (vertical and overhead repairs) by Sika Chemical Corp. These patching mortars may be used when color match of the adjacent concrete is not required. Prior approval by the Engineer is required.
- G. Bonding Compound: "Euco Weld" by the Euclid Chemical Company or "Weldcrete" by the Larsen Company. The compound shall be polyvinyl acetate, rewettable type. Interior use only. Not to be used where subject to continuous wetting.
- H. Bonding Admixture: To be included in the mix of concrete or mortar toppings, patches and thin set applications where specified. The compound shall be a latex, non-rewettable type.
 - 1. Products: Provide one of the following or approved equal:
 - a. "SBR Latex" or "Flex-Con" by the Euclid Chemical Co.
 - b. "Daraweld C" by W.R. Grace.
- I. Adjustable Inserts, Expansion Bolts and Drilled-In Anchors:
 - 1. Adjustable Inserts: Anchorage to the concrete for lintels, shelf angles, clips which require adjustability shall be by means of Hot Dipped (Galvanized) Malleable Iron, long wedge type adjustable inserts and matching skew-head bolts, washers and nuts, as made by Hohmann and Barnard, Inc., Heckmann Building Products, or by Richmond Screw Anchor Co. Unless otherwise shown, the bolt diameters shall be 3/4 inch. Unless specifically noted otherwise on drawings, the inserts and matching bolts, washers, nuts and shims shall be galvanized.
 - 2. Wedge Anchors (Expansion Bolts): Type and size as indicated on drawings. If not indicated, minimum diameter is ³/₄" and minimum embedment is 6". Wedge type, torque-controlled, with impact section to prevent thread damage and wedge dimples to prevent spinning during installation, complete with required nuts, washers and manufacturer's installation instructions. All wedge anchors shall be equipped with length identification markings conforming to ICBO ES AC01. Type and size as indicated on Drawings.
 - a. Type 304 or Type 316 stainless steel with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform with ASTM A563 Grade A unless

- otherwise specified. Stainless steel anchors shall not be installed in contact with galvanized steel, aluminum, or other galvanically dissimilar metals.
- b. Cored Holes: Where wedge anchors are to be installed in cored holes, anchors and core bits have matched tolerances.
- c. Products: Provide one of the following or approved equal:
 - 1) Hilti Kwik Bolt 3 Expansion Anchor.
- 3. Cartridge Injection Adhesive Anchors and rebar doweling: Threaded steel rod or inserts, complete with nuts, washers, polymer, cementitious or hybrid mortar adhesive injection system, and manufacturer's installation instructions. Type and size as indicated on Drawings.
 - d. Interior Use: For use in conditioned environments free from potential moisture provide threaded carbon steel rods conforming to ASTM A36.
 - e. Exposed Use: In exposed, potentially wet or otherwise corrosive environments, provide anchors of Type 304 or Type 316 stainless steel with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener. All nuts shall conform with ASTM F594 unless otherwise specified. Stainless steel anchors shall not be installed in contact with galvanized steel, aluminum, or other galvanically dissimilar metals.
 - f. Products: Provide one of the following or approved equal:
 - 1) Hilti HAS-E, HIT, HIT-TZ threaded rods or rebar (by others) for doweling with Hilti HIT HY-150 Adhesive for anchorage to concrete or stone. Hilti HIT HY-20 Adhesive System for anchorage to brick or concrete masonry (with screen tubes).
- J. Support Plates and Angles: Refer to Division 05 Section "Miscellaneous Metals."
- K. All anchor rods (bolts) for structural steel shall be ASTM F1554, Grade 55 unless otherwise noted on drawings.
- L. Joint Sealant: The sealant shall be a two (2) part, polyurethane sealant conforming to Federal Spec TT-S-00227E:
 - 1. "Eucolastic II" by the Euclid Chemical Company
 - 2. "Vulkem 245" by Mameco International

PART 3 - EXECUTION

3.1 MIXING AND PLACING CONCRETE

A. Measurement of Materials: Materials for controlled concrete shall be measured by weighing the aggregates and cement using equipment that is suitable, designed, and constructed for this purpose. Each size of aggregate and the cement shall be weighed

- separately. The accuracy of all measuring devices shall be such that quantities be measured to within the following percentages of the desired amount: 1% for cement and water, 2% for aggregates, and 3% for admixtures. Mixing water and all admixtures shall be measured by volume. Batching plant shall have a proven performance record as indicated by a standard deviation no greater than 500 psi.
- B. Mixing Concrete: All concrete shall be machine mixed. The time of mixing shall not be less than 1 minute with a peripheral speed of the drum of about 200 feet per minute for batches of one cubic yard. For larger batches, mixing shall be in accordance with ASTM C94.
 - 1. Transit mix concrete may be used provided it conforms to the specifications and tests herein described and ASTM C94, and further provided that the central plant producing the concrete and equipment transporting it are, in the opinion of the Owner's testing laboratory and contractor, suitable for production and transportation of controlled concrete.
 - a. The maximum elapsed time between the time of the introduction of water and discharging shall be 1-1/2 hours and the maximum temperature of the concrete at discharge shall be 90 degrees F.
 - b. The minimum time of mixing shall be one minute per cubic yard after all material, including water, has been placed in the drum. The drum shall be reversed for an additional two minutes.
 - c. Mixing water for controlled concrete shall be added only in the presence of the Owner's inspector.
 - d. The size of the batch shall not exceed the rated capacity of the mixer as stated by the manufacturer.
 - 2. Admixtures: All admixtures shall be used in strict accordance with the directions of the manufacturer. The water reducing and air entraining admixtures shall be accurately dispensed at the ready-mix plant. The high-range water-reducing admixture (superplasticizer) shall be accurately dispensed from truck mounted tanks or approved field dispensers at the job site.

C. Placing Concrete:

- 1. Preparation: Before placing concrete, all equipment for mixing and transporting the concrete shall be cleaned, all debris and ice shall be removed from the places to be occupied by the concrete, wood forms shall be thoroughly wetted except in freezing weather, and forms shall be oiled. Aluminum chutes or pipes shall not be used to convey or place concrete. Concrete on earth or fill shall not be placed until the as-placed earth and fill have been approved.
- 2. Conveying: Concrete shall be conveyed from mixer to forms as rapidly as practicable and by methods which will prevent segregation or loss of ingredients. It shall be deposited as nearly as practicable in its final position. Chutes shall have a slope of less than 1 Vertical to 2 Horizontal and shall be arranged in such fashion that the concrete slides in them and does not flow. Where a vertical drop

- greater than five feet is necessary, placement shall be through elephant trunks or similar devices to prevent segregation.
- 3. Pumping: The pumping operation shall be done in strict accordance with ACI Committee 304 report, "Placing Concrete by Pumping Methods". The mix design, slumps at the pump and at the discharge end of the line, type of pump to be used, and re-dosage with the high-range water-reducing (superplasticizer) shall be discussed at the Pre-Concrete Conference.

a. Pump and Pump System:

- 1) Pump lines shall be of 5" minimum size, clean with mortar tight joints, and be securely anchored to prevent movement during pumping. The pump shall produce the required volume at a pumping pressure lower than 1500 psi.
- 2) Maximum pump piston size shall be 8".
- 3) Rubber hose is permitted only at the discharge end of the line, and with the minimum length needed for placing.
- 4) Special attention is called to the need to minimize bends in the pump line and to keep placing rates low (50-70 cy/hr) to minimize pumping pressure.
- 5) Pump operator must have previous successful experience pumping structural lightweight concrete and normal weight concrete.
- 4. Sequence and Timing: Concrete shall be placed before initial set has occurred, but not more than 30 minutes after it has been discharged from the mixer. All concrete shall be placed upon clean, damp surfaces, free from 18uddle water, or upon proper consolidated fills and never upon soft mud or dry earth. The concrete shall be compacted and worked into all corners and angles of the forms and around the reinforcement. Construction for forms for the lifts of vertical walls shall be such as to make all parts of the walls easily accessible for the placement, spading, vibration, and consolidation of the concrete as herein specified. Retempering of partly set concrete will not be permitted.
- 5. Vibrating: All structural concrete including supported slabs and slabs on ground shall be placed with the aid of mechanical vibrators. Use and type of vibrators shall be in strict accordance with ACI 309, "Recommended Practice for Consolidation of Concrete" and with sufficient intensity to visibly affect the concrete over a radius of at least two feet around the point of application. Vibrators shall be used in sufficient quantity to cause all concrete to flow or settle rapidly into place. Vibration application shall be brief enough to avoid segregation. The vibrators shall be of the internal type, applied directly to the concrete, except in sections too thin to permit insertion, in which case form vibrators may be employed. A spare vibrator shall be kept on the job during all concrete placing operations. Lower frequency vibrators shall be used with "flowing" concrete.
- 6. Vertical Construction Joints: All concrete in vertical members shall have been in place not less than 2-1/2 hours before concrete in horizontal or vertical members

- resting thereon is placed. Joints in piers shall be made at the underside of the deepest beam or girder framing hereto.
- 7. Protection of Green Concrete: After the concrete has taken its initial set, care shall be exercised to avoid jarring the forms or placing any strain in the end of projecting reinforcement. Materials shall not be placed or loads imposed upon slabs during the period of setting.
- 8. Rain: Concrete shall not be placed during rain. Sufficient coverings shall be provided and kept on hand for protection during rainstorms.
- 9. Wind: Prior to placing concrete Wind speed and Dew point shall be monitored and recorded to control plastic shrinkage cracking. The guidelines of ACI 318-99,ACI 305R-91,and ACI 306R-88 as applicable, shall be followed. The contractor, at a minimum, shall provide wind screens as required to minimize this condition.

D. Cold Weather Concreting:

- 1. Refer to ACI 306R-97 "Cold Weathering Concreting".
- 2. 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.
- 3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
- 4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

E. Hot Weather Concreting:

- 1. Refer to ACI 305R-98 "Hot Weathering Concreting".
- 2. 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.
- 3. Using liquid nitrogen to cool concrete is Contractor's option.
- 4. 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.
- 5. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
- 6. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

F. Construction Joints:

1. Vertical Joints: Vertical construction joints shall be located within the central third of the span and shall be located to provide a 60-foot maximum length of

- pour. Any concrete spilling over or through the bulkhead shall be removed at the completion of the pour. All surfaces of the concrete shall have reinforcing extending through the joint. Where not otherwise shown on drawings, provide #4 bars at 12 inch o.c. x 4'-6" long.
- 2. Horizontal Joints: Horizontal construction joints other than those shown on the drawings will not be permitted unless approved by the Engineer.
- 3. Joint Preparation: Forms shall be removed in time to permit roughening of construction joints of structural members by chipping and wire brushing to remove all loose and foreign material. The joints shall be dampened and the specified bonding compound applied. New concrete shall be placed after the rewettable bonding compound has dried or while the bonding grout or epoxy adhesive is still tacky. The anti-corrosive epoxy cementitious adhesive has a 20-hour open time.

G. Floor Slabs on Grade:

- 1. Floor slabs on grade shall be placed to the thickness shown on the drawings.
- 2. Vapor barrier shall be as specified above and provided where specified and at all slabs on ground receiving subsequent applied finishes. All joints shall be lapped 6 inches and taped.
- 3. Placement: Slabs on grade shall be placed by the long strip cast method. Refer to ACI 302 and 360 for recommended methods of placement.
- 4. Embedded Pipes: Maximum outside diameter of pipe or conduit placed in slabs on grade shall be limited to one-third the thickness of the slab. The minimum concrete cover top and bottom shall be one-third the thickness of the slab. Separate parallel pipes to permit concreting between and below them.
- 5. Construction Joints: Butt joint with dowels shall be provided. For details, refer to typical concrete detail drawing.
- 6. Contraction (Control) Joints: Provide control joints in the pattern shown on the drawings, or where not specifically shown, provide at maximum 20 feet. Joints must be aligned and continuous. Do not continue reinforcing across joints. Control joints shall be formed by saw cutting by one of the following methods:
 - a. The Soff-Cut System method, by Soff-Cut International, Corona, CA (800)776-3328. Finisher must have documented successful experience in the use of this method prior to this project. Install cuts within 2 hours after final finish at each saw cut location. Use 1/8 inch thick blade, cutting 1/4 into slab depth.
 - b. Optional Method (Where Soff-Cut System Method Equipment is Not Available): Properly time cutting with the set of the concrete. Saw-cut control joints within 12 hours after finishing. Start cutting as soon as the concrete has hardened sufficiently to prevent aggregates being dislodged by the saw. Complete cutting before shrinkage stresses become sufficient to produce cracking. Use 1/8 inch thick blade, cutting 1/4 slab depth.
 - c. Joints shall be filled with the specified epoxy joint filler once contraction has occurred.

3.2 CURING AND FINISHING

A. Curing Concrete:

- 1. Concrete, after it is placed and until the expiration of 7 days, shall not be allowed to dry out. Surfaces exposed to deicer salts, brackish water, etc, such as parking level slabs, shall be cured using the water curing method only. For other surfaces, the other methods listed below may be used. For all methods, action must be initiated as soon as the concrete has attained its initial set. Where wood forms are left in place, they shall be kept wet, or when forms are removed the concrete shall be cured for a total of seven days from the time of placing has elapsed. Prior to placing concrete, the contractor shall submit his proposed curing method or methods for the various components of the structure to the Architect for approval. Curing method shall be compatible with finishes to be applied.
 - a. Water curing shall be accomplished by keeping the surface of the concrete wet by covering with water, or with an approved water saturated covering. (Note that this method precludes work upon surface for seven (7) days.)
 - b. Waterproofed Curing Paper: Curing may be accomplished by sealing in the water as above specified by covering with an approved waterproofed curing paper laid with airtight joints. Paper must be securely positioned to prevent displacement by wind and protected from tearing or other injury. (Note that this method precludes work upon surface for seven (7) days.)
 - c. Curing and Sealing Compound: All exposed interior slabs not receiving a liquid densifier, and troweled slabs receiving mastic applied adhesives or "shake-on" hardeners, shall be cured with the specified curing and sealing compound. Exterior slabs, sidewalks, curbs, and architectural concrete not receiving a penetrating sealer shall be cured with the specified clear, non-yellowing curing and sealing compound. Maximum coverage of the curing/sealing compound shall be 400 ft 2/gallon on steel troweled surfaces and 300 ft 2/gallon on floated or broomed surfaces.
 - d. All other interior steel troweled slabs shall be cured with the specified strippable curing compound. Maximum coverage shall be 300 ft 2/gallon.

B. Finishing Formed Concrete:

- 1. Exposed Surfaces To Be Finished: Formed concrete surfaces scheduled to receive plaster or a painted finish shall, as soon as the forms are removed, have all fins and projections removed, off-sets leveled, and all voids and damaged places saturated immediately with water, filled with neat cement mortar mixture, and brought to an even surface by means of a wood spatula or float. Where necessary to provide a smooth, even finish, the surface shall be rubbed with a carborundum brick
- 2. Exposed Concrete Without Additional Finish: Formed concrete surfaces exposed in unfinished areas shall have all fins and projections removed, and all voids filled with neat cement mortar. All concrete exposed to view shall be formed to provide

- a smooth, even surface free from visible bulges, indentations, nail heads, joints, cracks, honeycombs, or other imperfections.
- 3. Concealed Concrete: Formed concrete surfaces in hung ceilings shall have all voids filled with neat mortar.
- 4. Concrete Surface to Receive Waterproofing Membrane: Surfaces shall be finished in accordance with the waterproofing manufacturers requirements for applying waterproofing membrane including specified texture and cleanliness.

C. Concrete Slab Finishes:

1. Floated Finish:

- a. Sequence: After the concrete has been placed, struck off, consolidated, and leveled, the concrete shall not be worked further until ready for floating. Floating shall begin when the water sheen has disappeared, and/or when the mix has stiffened sufficiently to permit the proper operation of a power-driven float.
- b. Method: The surface shall then be consolidated with power-driven floats. Hand floating shall be used in locations inaccessible to the power-driven machine. Trueness of surface shall be rechecked at this stage with a 10 foot straightedge applied at not less than two different angles. All high spots shall be cut down and all low spots filled during this procedure. The slabs shall then be refloated immediately to a uniform, smooth, granular texture and an FF and FL as specified below.
 - 1) Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20 for slab on grade.
- 2. Broomed Finish: The surface shall be given a coarse transverse scored texture, by drawing a broom or burlap belt across the surface. The operation shall follow immediately after floating. Texture shall be as approved by Architect from sample panels.
 - a. Provide the following finishes:
 - Floated Finish Dissipating sealer compound at all areas except specified below or as indicated on Architectural drawings and Specifications.
 - 2) Broomed Finish Exterior walks and driveways, exterior Club side egress stairs and landings, and exterior landings at stair towers and slabs to receive concrete topping.

3.3 NON-SHRINK GROUT

A. All column base plates, equipment bases and other locations noted on the structural drawings shall be grouted with the specified non-metallic, non-shrink grout.

B. Where high fluidity and/or increased placing time is required use the specified high flow grout. This grout shall be used for all base plates larger than 10 sq.ft.

3.4 COORDINATION AND CORRECTIVE MEASURES

- A. Conflicts: The contractor shall be solely responsible for errors of detailing, fabrication, and placement of reinforcement steel; placement of inserts and other embedded items; and the structural adequacy of all formwork.
- B. Reimbursement for Additional Services: Should additional work and/or visits be required which are necessitated by failure of the Contractor to perform his work in accordance with the contract documents, or if additional design or drafting time is required for corrective measures caused by failure to perform in accordance with the contract documents, the Contractor shall reimburse the Architect and Engineer at the rate of direct personnel expense plus 150% and out-of-pocket traveling expenses incurred plus 10% overhead.

3.5 REPAIR OF DEFECTIVE AREAS

- A. With prior approval of the Engineer, as to method and procedure, all repairs of defective areas shall conform to ACI 301, Section 5.3.7, except that the specified bonding compound must be used.
- B. All structural repairs shall be made with prior approval of the Engineer, as to method and procedure, using the specified epoxy adhesive and/or epoxy mortar. Where epoxy injection procedures must be used, an approved low viscosity epoxy made by the manufacturers previously specified shall be used.
- C. Leveling of floors for subsequent finishes shall be achieved by use of the specified underlayment material.
- D. All exposed floors shall be leveled, where required, with the specified self-leveling repair topping.
- E. Repair methods not specified above may be used, subject to acceptance of Architect.

END OF SECTION 033000

SECTION 042200 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 **SUMMARY**

A. Section Includes:

- 1. Concrete masonry units.
- 2. Brick
- 3. Mortar and grout.
- 4. Steel reinforcing bars.
- 5. Masonry joint reinforcement.
- 6. Ties and anchors.
- 7. Embedded flashing.
- 8. Materials accessories.
- 9. Masonry-cell insulation.

B. Related Sections:

- 1. Division 03 Section "Cast-in-Place Concrete".
- 2. Division 06 Section "Rough Carpentry" for installing anchor sections of adjustable masonry anchors for connecting to wood framing.
- 3. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 **DEFINITIONS**

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

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2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Initial Selection:
 - 1. Standard masonry units with insulation inserts
 - 2. Colored mortar.
 - 3. Weep holes/vents.
 - 4. Face Brick
- D. Samples for Verification: For each type and color of the following:
 - 1. Exposed CMUs
 - 2. Face Brick
 - 3. Pigmented and colored mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 - 4. Accessories embedded in masonry.
- E. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- F. Qualification Data: For testing agency.
- G. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include material test reports substantiating compliance with requirements.

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- b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
- 2. Cementitious materials. Include brand, type, and name of manufacturer.
- 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
- 4. Grout mixes. Include description of type and proportions of ingredients.
- 5. Reinforcing bars.
- 6. Joint reinforcement.
- 7. Anchors, ties, and metal accessories.
- H. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- I. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ ASCE 6.
- J. Cold-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6.unless modified by requirements in the Contract Documents.
- E. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Division 01 Section "Quality Requirements" for mockups.

- 1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness, including brick.
- 2. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
- 3. Protect approved sample panels from the elements with weather-resistant membrane.
- 4. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.8 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

- B. Do not apply roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. 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 higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Regional Materials: Provide CMUs that have been manufactured within 500 miles of Project site from aggregates and cement that have been extracted, harvested, or recovered.
- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

- 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- 2. Provide square-edged units for outside corners unless otherwise indicated.

C. CMUs: ASTM C 90.

- 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
- 2. Density Classification: Lightweight unless otherwise indicated.
- 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
- D. Basis of CMU design; 8" Omni Block with insulating inserts capable of delivering r-20 Wall construction, as manufacturers by Westbrook block or approved equal.

2.3 BRICK

- A. Regional Materials: Provide brick that has been manufactured within 600 miles of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 600 miles of Project site.
- B. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color and size of exposed faces of adjacent existing units.
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- C. Face Brick: Facing brick complying with ASTM C 216 or hollow brick complying with ASTM C 652, Class H40V (void areas between 25 and 40 percent of gross cross-sectional area).
 - 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. Bowerston Ohio Quality Brick, #1625 Red Flash Sand Face Modular.
 - b. Other match to existing building brick.

2. Grade: SW.

- 3. Type: FBS or HBS.
- 4. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested per ASTM C 67.
- 5. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
- 6. "Match existing," provide face brick matching color range, texture, and size of existing adjacent brickwork.

2.4 MORTAR AND GROUT MATERIALS

- A. Use only ready-mixed mortar and grout, from a single manufacturer.
 - 1. Spec Mix, Inc: 2025 Centre Pointe Blvd., Suite 150, Mendota Heights, MN 55120; Telephone: (888) 773-2649; Fax: (888) 329-7732; E-mail: webmaster@specmix.com; website: www.specmix.com
- B. Mortar Color: Match Existing
- C. Mortar Mix Designs: ASTM C270, Proportion Specification.
 - 1. Exterior, Non-loadbearing Masonry: Type N.
 - 2. Or approved equal.
 - a. Average compressive strength at 28 days: 750 psi.
 - 3. Interior, Non-loadbearing Masonry: Type N.
 - a. Average compressive strength at 28 days: 750 psi.
- D. Packaged Dry Material for Mortar for Unit Masonry: Premixed Portland cement, hydrated lime, and sand; complying with ASTM C387/C387M and capable of producing mortar of the specified strength in accordance with ASTM C270 with the addition of water only.
 - 1. Type: Type N.
 - 2. Mortar Type:
 - a. Types S for reinforced masonry and bearing walls.
 - b. Type N for veneer and non-loading masonry units.
 - 3. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 - 4. Hydrated Lime: ASTM C 207 Types S.
 - 5. Aggregate for Mortar: ASTM C 144; except for joints less than ¼ inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.

- 6. Aggregate for Grout: ASTM C 404.
- 7. Color: Match existing.
- E. Packaged Dry Material for Grout for Masonry: Premixed cementitious materials and dried aggregates; capable of producing grout of the specified strength in accordance with ASTM C476 with the addition of water only.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 5 dimensions of grout spaces and pour height.
 - 2. Provide grout with a slump of 8 to 11 inches (without segregation of aggregate) as measured according to ASTM C 143.
 - 3. Provide min. compressive strength of 2,5000 PSI as measured according to ASTM C1019.
 - 4. Water: Clean and potable.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951 M.
 - 1. Exterior Walls: Hot-dip galvanized, carbon steel.
 - 2. Wire Size for Side Rods: 4.76-mm diameter.
 - 3. Wire Size for Cross Rods: 4.76-mmdiameter.
 - 4. Wire Size for Veneer Ties: 4.76-mm diameter.
 - 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c
 - 6. Provide in lengths of not less than 10 feet.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
- B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch diameter, hot-dip galvanized steel wire.

C. Anchor Bolts: L-shaped steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

2.7 EMBEDDED FLASHING MATERIALS

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Cheney Flashing Company; Cheney 3-Way Flashing, Do not use saw tooth flashing
 - 2. Keystone Flashing Company, Inc.; Keystone 3-Way Interlocking Thru wall Flashing.
 - 3. Sandell Manufacturing Co., Inc.; Mechanically Keyed Flashing.
 - 4. Or approved equal
- B. Fabricate through-wall flashing with hemmed edge on exterior face where.
- C. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).
 - 1. Products: Subject to compliance with requirements, provide the following provide one of the following:
 - 1) Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - 2) Dayton Superior Corporation, Dur-O-Wal Division; Dur-O-Barrier Thru-Wall Flashing.
 - 3) Grace Construction Products, W.R. Grace & Co. Conn.; Perm-A-Barrier Wall Flashing.
 - 4) Heckmann Building Products Inc.; No. 82 Rubberized-Asphalt Thru-Wall Flashing.
 - 5) Hohmann & Barnard, Inc.; Textroflash.
- D. Application: Unless otherwise indicated, use the following:
 - 1. Where flashing is indicated to receive counterflashing, use metal flashing.
 - 2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
 - 3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing or flexible flashing with a metal drip edge or flexible flashing with a metal sealant stop.
 - 4. Where flashing is fully concealed, use metal flashing.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 ACCESSORIES

- A. Performed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc;-: ww.h-b.com/sle.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self-expanding; in maximum lengths available.
 - 1. Manufacturers:
 - a. Hohmann & Barnard, Inc;-: www.h-b.com/sle.
 - b. Substitutions: See Section 01 6000 Product Requirements.
- C. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
 - 1. #NS Hohmann & Barnard, Inc. or equal for use between bottom of lintel and top of masonry wall under steel.
 - 2. #BS Hohmann & Barnard, Inc. or equal under bearing plates.
- D. Cavity Mortar Control: Semi-rigid mesh designed for installation at flashing locations.
 - 1. Mortar Diverter: Semi-rigid mesh designed for installation at flashing locations.
 - a. Manufacturers:
 - a) Mortar new Solutions; -: www.mortarnet.com.
 - b) "Mortar net" with insect barrier. -Thickness: 1-1/1"
- E. Weeps:
 - 1. Type: Molded PVC grilles, insect resistant.
 - a. Manufacturers:
 - 1) Hohman & Barnard, Inc; -: www.h-b.com/sle.
 - 2) Or approved equal

F. Cavity Vents:

- 1. Type: Molded PVC grilles, insect resistant.
 - a. Manufacturers:
 - 1) Hohmann & Barnard, Inc; -: www.h-b.com/sle.
 - 2) Heckmann Building Products, Inc. Locations: brick cavity walls.
 - 3) Or approved equal.
- G. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60 deformed bars epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm0 bar length.
- H. Cleaning Solutions: Non-aide, not harmful to masonry work or adjacent materials.
 - 1. Prepare 1 set of prisms for testing at 7 days and 1 set for testing at 28 days.
 - a. Dimensional Stability: 2.0 as per ASTM D-2126.
 - b. Linear Coefficient of thermal expansion: 2.7 x 105
 - c. Flame Spread: 5 as per ASTM E-84.
 - d. Smoke Developed: 45-175 as per ASTM E084.
 - e. Oxygen Index: 24 Min. as per ASTM D-2863.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Pre-molded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AAA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
 - 1. Products: Subject to compliance with requirements, provide the following:
 - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.

2.10 MASONRY-CELL INSULATION

- A. Molded-Polystyrene Insulation Units: Rigid, cellular thermal insulation formed by the expansion of polystyrene-resin beads or granules in a closed mold to comply with ASTM C 578, Type I. Provide specially shaped units designed for installing in cores of masonry units. Basis of design is Westbrook Omni Block.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Omni Block Inserts: By Omni Block Corporation
 - b. Concrete Block Insulating Systems; Korfil.
 - c. Shelter Enterprises Inc.; Omni Core.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
 - 1. For dimensions in cross section or elevation do not vary by more than plus or minus 1/4 inch (6 mm).

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to match existing.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in stack bond and bond pattern indicated on Drawings; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar and mortar smears as work progresses.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Cut mortar joints flush where wall tile is scheduled, resilient base is scheduled, cavity insulation vapor barrier adhesive is applied, or bitumen damp proofing is applied.
- H. Isolate masonry partitions from vertical structural framing members with a control joint as indicated.
- I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint.

3.6 WEEPS/CAVITY VENTS

- A. Install weeps in veneer and cavity walls at 24 inches (600 mm) on center horizontally directly above through-wall flashing, above shelf angles and lintels, and at bottom of walls.
- B. Install cavity vents in veneer and cavity walls at 24 inches (600 mm) on center horizontally below shelf angles and lintels and near top of walls.

3.7 CAVITY MORTAR CONTROL

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.
- D. Installing Cavity-Wall Insulation;
 - 1. For attachment to metal framing backup anchor thru insulation and sheathing into the metal stud using masonry anchors specified. Butt joints tightly both ways. Install tongue and groove panels with tongue in the up position.
 - a. Seal all joints between insulation board units in cavity with joint sealing tape, to form a tight seal at all joints, including areas around masonry anchors and other openings. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

3.8 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.

3.9 LINTELS

- A. Provide steel lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.10 FLASHING

- A. General: Whether or not specification indicated, install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated to the exterior.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At lintels, extend flashing a minimum of 8 inches into masonry at each end. At heads and sills, extend flashing 8 inches at ends and turn up not less than 2 inches to form end dams.
 - 3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
 - 4. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
 - 5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.

- 6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
- 7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 FIELD QUALITY CONTROL

A. Tolerances

- 1. Install masonry per acceptable site tolerances in TMS 402/602-16 Building Code Requirements and Specification for Masonry Structures, Section 3.3F, page S-64 of Specification for Masonry Structures (TMS 602).
- B. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.12 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.13 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042200

SECTION 055000- MISCELLANEOUS METALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following metal fabrications:
 - 1. Loose steel lintels and bearing plates.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 3 Section "Cast-In-Place Concrete".
 - 2. Division 4 Section "Masonry"

1.3 SUBMITTALS

- A. General: submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Shop drawings detailing fabrication and erection of each metal fabrication indicated, including steel lintels and pipe bollards.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Check actual locations of walls and other construction to which metal fabrications must fit by accurate field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabricating products without field measurements. Coordinate construction to dimensions. Allow for trimming and fitting.

PART 2 - PRODUCTS

2.1 FERROUS METALS

A. Metal Surfaces, General: For metal fabrications exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Steel Plates, Shapes, and Bars: ASTM A 36 (ASTM A 36M).

2.2 PAINT

- A. Shop Primer for Ferrous Metal: SSPC-Paint 20, organic zinc-rich primer compatible with topcoat.
 - 1. Projects: subject to compliance with requirements, provide once of the following:
 - a. Carboline Company; Carboline 621.
 - b. Tnemec Company, Inc.; Tneme-Zinc 90-97.
- B. Galvanizing Repair Paint: SSPC-Paint 20, high-zinc-dust-content paint for regalvanizing welds in steel.

2.3 FABRICATION, GENERAL

- A. Form metal fabrications from materials of size, thickness, and shapes indicated but not less than that needed to comply with performance requirements indicated. Work to dimensions indicated or accepted on shop drawings, using proven details of fabrication and support. Use type of materials indicated or specified for various components of each metal fabrication.
- B. Fabricate steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- C. Weld adjoining members together to form a single unit where indicated.
- D. Size loose lintels for equal bearing of 1 inch per foot of clear span but not less than 8 inches bearing at each side of openings, unless otherwise indicated.
- E. Galvanize loose and attached steel lintels located in exterior walls.

2.4 STEEL FINISHES

- A. Galvanizing: For those items indicated for galvanizing, apply zinc coating by the ht-dip process complying with the following requirements:
 - 1. ASTM A 153 for galvanizing iron and steel hardware.
 - 2. ASTM A 123 for galvanizing both fabricated and unfabricated iron and steel products made of uncoated rolled presses, and forged shapes, plates, bars, and strip 0.0299 inch thick or thicker.

PART 3 - EXECUTION

3.1 SETTING LOOSE LINTELS

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials and roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
- B. Set loose leveling and bearing plates on non-shrinking grout bed. After the bearing members have been positioned and plumbed, tighten the anchor bolts.

- 1. Use non-shrink, nonmetallic grout in exposed locations, unless otherwise indicated.
- 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.2 ADJUSTING AND CLEANING

A. For galvanized surfaces, clean welds, bolted connections, and abraded areas, and apply galvanizing repair paint to comply with ASTM A 780.

3.3 REFURBISH EXISTING LINTELS

A. Clean exposed parts of steel lintels and paint.

END OF SECTION 05500

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Framing with dimension lumber.
- 2. Framing with engineered wood products.
- 3. Wood blocking, cants, and nailers.
- 4. Plywood backing panels.
- 5. Sheathing

B. Related Requirements:

1. Division 06 Section "Wood Trusses" for wood trusses made from dimension lumber.

1.3 **DEFINITIONS**

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches' nominal or greater but less than 5 inches' nominal in least dimension.
- C. Timber: Lumber of 5 inches' nominal or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NLGA: National Lumber Grades Authority.
 - 3. RIS: Redwood Inspection Service.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with

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- requirements. Indicate type of preservative used and net amount of preservative retained.
- 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 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. Engineered wood products.
 - 3. Shear panels.
 - 4. Power-driven fasteners.
 - 5. Powder-actuated fasteners.
 - 6. Expansion anchors.
 - 7. Metal framing anchors.

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.

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- 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
- 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.
- C. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.
 - 1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items required or indicated on Drawings, and the following:
 - 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 and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 WALL SHEATHING

- A. Plywood Wall Sheathing: Exterior, Structural I sheathing.
 - 1. Span Rating: Not less than 16/0.
 - 2. Nominal Thickness: Not less than 1/2 inch.

2.4 ROOF SHEATHING

- A. Plywood Roof Sheathing: Exterior, Structural I.
 - 1. Span Rating: Not less than 16.
 - 2. Nominal Thickness: Not less than 3/4 inch.

2.5 DIMENSION LUMBER FRAMING

- A. Exterior and Interior Partitions: Standard, Stud.
 - 1. Application: All partitions.
 - 2. Species:
 - a. Douglas fir-larch; WCLIB or WWPA.
- B. Joists, Rafters, and Other Framing: Construction, Stud.
 - 1. Species:
 - a. Douglas fir-larch; WCLIB or WWPA.

2.6 ENGINEERED WOOD PRODUCTS

- A. Engineered Wood Products, General: Products shall contain no urea formaldehyde.
- B. Source Limitations: Obtain each type of engineered wood product from single source from a single manufacturer.
- C. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Roseburg Forest Products Co.
 - b. Boise Cascade Corporation.
 - c. Finnforest USA.

- 2. Extreme Fiber Stress in Bending, Edgewise: 3100 psi.
- 3. Modulus of Elasticity, Edgewise: 2,000,000 psi.

2.7 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants
 - 5. Furring.
 - 6. Grounds.
 - 7. Utility shelving.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber.
- C. For utility shelving, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
 - 1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Standard or No. 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 - 2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 - 3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
- D. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
 - 1. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 - 2. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 - 3. Eastern softwoods; No. 2 Common grade; NeLMA.
 - 4. Northern species; No. 2 Common grade; NLGA.
 - 5. Western woods; Construction or No. 2 Common grade; WCLIB or WWPA.
- E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used if it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.8 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.
 - 1. Plywood 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."

2.9 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153 of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1. By Simpson Strong Tie.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.10 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4-inch-thick, selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spun-bonded polyolefin to produce an overall thickness of not less than 0.025 inch.
- C. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

- 1. Adhesives shall have a VOC content of 70 g/L or less when calculated per 40 CFR 59, Subpart D (EPA Method 24).
- 2. Adhesives 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."
- D. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chloropyrifos as its active ingredient.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- 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. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- I. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking

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- is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- thickness.
- 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
- 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- J. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- K. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- L. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
- M. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- N. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground

to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal- size furring vertically at 16 inches o.c.

3.4 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
 - 1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal- size or 2-by-4-inch nominal- size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
 - 1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
 - 2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.
- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions if any.

3.5 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

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- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's "International Residential Code for One- and Two-Family Dwellings."
- D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.
- E. Coordinate wall and roof sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.6 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

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SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Framing with dimension lumber.
- 2. Rooftop equipment bases and support curbs.
- 3. Wood blocking, and nailers.
- 4. Wood furring and grounds.
- 5. Wood sleepers.
- 6. Utility shelving.
- 7. Plywood backing panels.

B. Related Requirements:

1. Division 06 Section "Wood Trusses."

1.3 **DEFINITIONS**

- A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NHLA: National Hardwood Lumber Association.
 - 3. NLGA: National Lumber Grades Authority.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with

- requirements. Indicate type of preservative used and net amount of preservative retained.
- 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
- 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Preservative-treated wood.
 - 2. Power-driven fasteners.
 - 3. Powder-actuated fasteners.
 - 4. Expansion anchors.
 - 5. Metal framing anchors.
 - 6. Preservative treated plywood
 - 7. Fire retardant treated plywood

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Certified Wood: Lumber and plywood shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- B. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.

- 2. For exposed lumber indicated to receive a 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. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
- 4. Provide dressed lumber, S4S, unless otherwise indicated.
- C. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat all indicated on Drawings, and the following:
 - 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 and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
 - 4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawl spaces or unexcavated areas.
 - 5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade and any of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Mixed southern pine; SPIB.
 - 3. Hem-fir; WCLIB or WWPA.
 - 4. Northern species; NLGA.
- B. Other Framing: Construction or No. 2 grade and any of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Douglas fir-larch; WCLIB or WWPA.
 - 3. Mixed southern pine; SPIB.
 - 4. Douglas fir-south; WWPA.
 - 5. Hem-fir; WCLIB or WWPA.
 - 6. Douglas fir-larch (north); NLGA.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.
 - 6. Grounds.
 - 7. Utility shelving.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber and any of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Mixed southern pine; SPIB.
 - 3. Hem-fir; WCLIB or WWPA.
 - 4. Western woods; WCLIB or WWPA.
 - 5. Northern species; NLGA.
- C. For utility shelving, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
 - 1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 - 2. Mixed southern pine, No. 1 grade; SPIB.

- 3. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, C-C Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.
 - 1. Plywood 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."

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

2.7 METAL FRAMING ANCHORS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following 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:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide comparable product by one of the following:
 - 1. Cleveland Steel Specialty Co.
 - 2. KC Metals Products, Inc.
 - 3. Phoenix Metal Products, Inc.
 - 4. Simpson Strong-Tie Co., Inc.
 - 5. USP Structural Connectors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.
 - 1. Use for interior locations unless otherwise indicated.

2.8 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
 - 1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Adhesives 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."
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt 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).

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit.

- Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Do not splice structural members between supports unless otherwise indicated.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
 - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal (38-mm actual) thickness.
 - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
 - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.
- I. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- J. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.

- K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Gypsum Board Plaster Lath: Install 1-by-2-inch nominal-size (19-by-38-mm actual-size) furring vertically at 16 inches (406 mm) 400 mm o.c.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061310- WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The general provisions of this Contract, including the General and Supplementary Conditions, apply to the work specified in this Section.

1.2 SCOPE OF WORK

- A. The work of this section includes all labor, supervision, material and equipment necessary for the completion of wood trusses in place, as shown on the Contract Drawings and as specified:
 - 1. Wood roof trusses.
 - 2. Wood truss bracing.
- B. All the miscellaneous parts, including: bridging, temporary and permanent bracing, and all related items of hardware, metal hangers necessary for the proper prefabrication, erection, assembly, supporting and anchoring of the wood trusses shall be provided in accordance with local, state, and federal standards.

1.3 RELATED WORK

A. Section 06100 - Rough Carpentry.

1.4 REFERENCE STANDARDS

- A. All trusses shall be designed, fabricated and erected in accordance with the following publications:
 - 1. Truss Plate Institute's "National Design Standard for Metal-Plate-Connected Wood Truss Construction."
 - 2. American Institute of Timber Construction (AITC) 102-72 "Appendix A, Trusses and Bracing."
 - 3. American Institute of Timber Construction (AITC) 102-72 "Standards for the Design of Structural Timber Framing."
 - 4. "National Design Specifications for Stress Grade Lumber and its Fastening" by National Forest Products Association.
 - 5. "Bracing Wood Trusses" by the Truss Plate Institute.

1.5 SUBMITTALS

A. The Contractor shall submit six (6) copies of Truss Shop Drawings showing:

- 1. All truss locations, spacing, bearing details, member sizes, pitch, spans and dimensions.
- 2. Sizes, species and stress grade of lumber.
- 3. Loading conditions and stress increases.
- 4. Nominal sizes and locations of connector plates at all joints.
- 5. Actual axial loads in each member.
- 6. Camber requirements.
- 7. Location of permanent lateral bracing as required by the truss design and overall framing stability.
- 8. Location of temporary lateral bracing as required for erection.

1.6 TRUSS ENGINEERING DESIGN

- A. All truss designs shall be prepared by a Professional Engineer licensed to practice in the State where the work is being installed.
- B. All submissions shall bear registration seal of Design Engineer.
- C. All truss designs shall include dead load and live load in accordance with the State Building Code.
 - Roof Live Load 36psf
 - Bottom Chord Live Load 10psf
 - Shingle Dead Load 7psf.

1.7 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.
- B. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
- C. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- D. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- E. Source Limitations for Connector Plates: Obtain metal connector plates from a single manufacturer.
- F. Comply with applicable requirements and recommendations of the following publications:
 - 1. TPI 1 "National Design Standard for Metal Plate Connected Wood Truss Construction."
 - 2. TPI DSB "Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses."
 - 3. TPI HIB "Commentary and Recommendations for Handling, Installing and Bracing Metal Plate Connected Wood Trusses."

4. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and it's "Supplement."

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations of TPI HIB, "Commentary and Recommendations for Handling, Installing and Bracing Metal Plate Connected Wood Trusses."
- B. Store trusses flat, off of ground, and adequately supported to prevent lateral bending.
- C. Protect trusses from weather by covering with waterproof sheeting, securely anchored.
- D. Provide for air circulation around stacks and under coverings.
- E. Inspect trusses showing discoloration, corrosion, or other evidence of deterioration. Discard and replace trusses that are damaged or defective.

1.9 COORDINATION

- A. Time delivery and erection of trusses to avoid extended on-site storage and to avoid delaying progress of other trades whose work must follow erection of trusses.
 - 1. Deliver and handle trusses in a manner to avoid deforming member and excessive stresses. Roll-off delivery will be cause for rejection of entire delivery.
 - 2. If trusses are stockpiled prior to erection, sufficient bearing points and/or bracing shall be provided to prevent excessive lateral bending that might result in distortion of truss joints.
 - 3. New trusses shall match abutting existing wood trusses that employ a 2"x8" top chord and 2"x6" bottom chord.

PART 2 - PRODUCTS

2.1 LUMBER MATERIALS

- A. All truss materials shall be subject to approval by the Engineer and Owner, and shall conform to the Lumber Grade Use Guide of the National Lumber Manufacture's Association.
- B. Truss Lumber shall conform to commercial association grades and dimensions based on American Lumber Standards as described in the latest edition of Department of Commerce Simplified Practice Recommendation R16. Sizes shown or specified are minimal dimensions required.
- C. All truss lumber shall bear the grade and trademark of the association under which rules and standards it was graded, or each shipment shall be accompanied with a certificate of inspection issued by that association.
- D. Truss lumber for framing shall be kiln dried to moisture content not greater than 19% by weight.
- E. Truss Lumber shall be No. 1 Douglas Fir.

2.2 CONNECTORS

- A. All truss connector plates shall be manufactured from ASTM A446-72 Grade A prime commercial quality galvanized sheet steel of no less than 20-gauge thickness which has a minimum yield of 33,000 PSI and a minimum ultimate tensile strength of 45,000 PSI. The corrosive resistant coating shall be ASTM A525-71 G90 or G60 commercial class hot dipped galvanized before stamping.
- B. Where field assembly of truss sub-components is necessary, the connections shall be in accordance with details shown on the truss design drawings approved by the Engineer.

2.3 FABRICATION

- A. All floor and roof truss components shall be fabricated in a properly equipped manufacturing facility of a permanent nature. They shall be manufactured by experienced workmen, using precision cutting and truss fabricating equipment, under the direct supervision of a qualified foreman. All trusses shall be fabricated under strict rules of inspection and quality control, open to the inspection of the Owner or his representatives at all times.
- B. All truss members shall be accurately cut to length, angle and be true to line to assure tight joints for finished truss.
- C. All truss members and connector plates shall be properly placed in special jigs and the members tightly clamped in place, remaining in that position until the connector plates have been completely installed.
- D. Camber shall be built into trusses, as noted on the engineering truss designs, by properly positioning the members in the fabricating jig.
- E. Each truss shall be stamped with the name and address of the truss manufacturer.
- F. New truss shall match existing abutting truss (2"x8" top chord and 2"x6" bottom chord).

PART 3 - EXECUTION

3.1 ERECTION AND BRACING

- A. Framing anchors and/or truss hangers shall be provided by the Contractor in accordance with the engineering truss design.
- B. Field erection of the trusses, including items such as proper handling, safety precautions, temporary bracing to prevent toppling or dominoing of the trusses during erection, and any other safeguards or procedures consistent with good building erection practices, shall be the responsibility of the General Contractor and/or the Erection Contractor.
- C. During the entire construction period, all Contractors shall provide means for adequate distribution of concentrated loads so that the carrying capacity of any one truss and/or other component is not exceeded.
- D. Proper erection bracing shall be installed to hold the trusses true and plumb and in safe condition until permanent bracing and bridging can be solidly nailed in place to form a structurally sound framing system. All erection and permanent bracing shall be installed and all components permanently fastened as soon as possible before the application of any loads.

- E. The Permanent structural cross-bracing, to ensure the overall rigidity of the framing system, shall be in accordance with the "Bracing Wood Trusses" by the Truss Plate Institute.
- F. All trusses shall be installed plumb at the specified spacing, in plane and adequately braced.
- G. Cutting of truss members or field alteration of any trusses is not permitted.
- H. Trusses shall be designed and installed to accommodate work of other trades as required.

END OF SECTION 061310

SECTION 064013 - EXTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior standing and running trim.
 - 2. Exterior frames and jambs.
 - 3. Shop priming exterior woodwork.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for exposed framing.
 - 2. Division 06 Section "Interior Architectural Woodwork" for interior trim, wood cabinets, utility shelving, and solid-surfacing materials.
 - 3. Division 06 Section "Miscellaneous Rough Carpentry" for other wood applications.

1.3 SUBMITTALS

- A. Product Data: For each type of product and process indicated and incorporated into items of exterior architectural woodwork during fabrication, finishing, and installation.
 - 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.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 - 1. Show details full size.
 - 2. Show locations and sizes of blocking and nailers, including concealed blocking and reinforcement specified in other Sections.
 - 3. Apply WI-certified compliance label to first page of Shop Drawings.
- C. Samples for Verification:

- 1. Lumber for exterior wood stain finish, not less than 50 sq. in. (300 sq. cm), for each species, with 1/2 of exposed surface finished.
- 2. Lumber for transparent finish, not less than 50 sq. in. (300 sq. cm), for each species, with 1/2 of exposed surface finished.
- 3. Lumber and panel products for shop-applied opaque finish, 8 by 10 inches (200 by 250 mm) for panels and 50 sq. in. (300 sq. cm) for lumber, for each finish system and color, with 1/2 of exposed surface finished.
- D. Product Certificates: For each type of product, signed by product manufacturer.
- E. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- F. Qualification Data: For Installer and fabricator.

1.4 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.
- B. Installer Qualifications: Certified participant in AWI's Quality Certification Program.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of exterior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. Provide AWI Quality Certification Program labels and 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. Forest Certification: Provide exterior architectural woodwork produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.
- 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.
- 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.6 COORDINATION

A. Coordinate sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.
 - 2. Softwood Plywood: DOC PS 1, Exterior.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Nonpressure Process: Comply with AWPA N1 using the following preservative for woodwork items indicated to receive water-repellent preservative treatment:
 - 1. Water-Repellent Preservative: Formulation made specifically for dip treatment of woodwork items and containing 3-iodo-2-propynyl butyl carbamate (IPBC) complying with AWPA P8 as its active ingredient.
 - 2. Water-Repellent Preservative/Insecticide: Formulation made specifically for dip treatment of woodwork items and containing 3-iodo-2-propynyl butyl carbamate (IPBC) as its active ingredient, combined with an insecticide containing chlorpyrifos as its active ingredient, both complying with AWPA P8.
- B. Preservative Treatment by Pressure Process: AWPA C2 (lumber) and AWPA C9 (plywood) and the following:

- 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
- 2. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Do not use materials that are warped or do not comply with requirements for untreated materials.
- 3. Mark each treated item with treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- C. Extent of Treatment: Treat blocking and nailers by pressure process and treat other exterior architectural woodwork either by pressure or nonpressure process.

2.3 INSTALLATION MATERIALS

- A. Blocking, Shims, and Nailers: Softwood or hardwood lumber, pressure-preservative treated, kiln dried to less than 15 percent moisture content.
- B. Nails: hot-dip galvanized or stainless steel.
- C. Screws: hot-dip galvanized or stainless steel.
 - 1. Provide self-drilling screws for metal framing supports, as recommended by metal-framing manufacturer.
- D. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.4 FABRICATION, GENERAL

- A. Wood Moisture Content: 10 to 15 percent.
- B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
 - 1. Edges of Solid-Wood (Lumber) Members 3/4 Inch (19 mm) Thick or Less:.
 - 2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick:.
- C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- D. Shop cut openings, to maximum extent possible, to receive hardware, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Smooth edges of cutouts and seal with a water-resistant coating suitable for exterior applications.

2.5 EXTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- C. Assemble casings in plant except where shipping limitations require field assembly.
- D. Wood Species: Western red cedar, Eastern white pine, sugar pine, or western white.
 - 1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

2.6 EXTERIOR FRAMES AND JAMBS FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Wood Species: Western red cedar, Ponderosa pine Eastern white pine, or western white pine, Any closed-grain hardwood.
 - 1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

2.7 EXTERIOR ORNAMENTAL WORK FOR OPAQUE FINISH

- A. Exterior ornamental work for opaque finish includes the following:
 - 1. Columns.
 - 2. Pediment heads.
- B. Grade: Custom.
- C. Wood Species: Any closed-grain hardwood.
 - 1. Do not use plain-sawn lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

2.8 SHOP PRIMING

- A. Woodwork for Opaque Finish: Shop prime woodwork for paint finish with one coat of wood primer specified in Division 09 painting Sections.
- B. Woodwork for Transparent Finish: Shop seal woodwork for transparent finish with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 painting Sections:
- C. Preparations 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. Back priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

2.9 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. Grade: Custom.
- C. General: Entire finish of exterior architectural woodwork is specified in this Section. To greatest extent possible, finish architectural woodwork at fabrication shop. Defer only final touchup and cleaning until after installation.
- D. Preparations 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. Back priming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.

E. Opaque Finish:

- 1. AWI Finish System: Conversion varnish.
- 2. AWI Finish System: Catalyzed polyurethane.
- 3. WI Finish System 4: Conversion varnish.
- 4. WI Finish System 5: Catalyzed polyurethane.
- 5. Color: As selected by Architect from manufacturer's full range.
- 6. Sheen: Semigloss 46-60 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition woodwork to average prevailing humidity conditions in installation areas.
- B. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built.
- C. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.2 INSTALLATION

- A. Quality Standard: Install woodwork to comply with same grade specified in Part 2 for type of woodwork involved.
- B. Install woodwork true and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- C. Scribe and cut woodwork to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

- D. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- E. Preservative-Treated Wood: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.
- F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork.
- G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 36 inches (900 mm) long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- H. Complete finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with matching filler where exposed.
- I. Refer to Division 09 Sections for final finishing of installed architectural woodwork.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; replace woodwork where not possible to repair. Adjust joinery for uniform appearance.
- B. Clean woodwork on exposed and semi exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064013

SECTION 064023 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior standing and running trim.
 - 2. Wood cabinets.
 - 3. Closet and utility shelving.
 - 4. Plastic-laminate countertops.
- B. Related Sections include the following:
 - 1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
 - 2. Division 06 Section "Exterior Architectural Woodwork" for all exterior trim applications.
 - 3. Division 06 Section "Miscellaneous Rough Carpentry" for other wood applications.

1.3 **DEFINITIONS**

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

1.4 SUBMITTALS

Product Data: For each type of product indicated, including cabinet hardware and accessories handrail brackets and finishing materials and processes.

- A. Product Data: For panel products high-pressure decorative laminate adhesive for bonding plastic laminate solid-surfacing material fire-retardant-treated materials cabinet hardware and accessories handrail brackets and finishing materials and processes.
 - 1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

- 1. Show details full size.
- 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
- 3. Show locations and sizes of cutouts and holes for plumbing fixtures faucets soap dispensers and other items installed in architectural woodwork.
- 4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
- 5. Apply WI-certified compliance label to first page of Shop Drawings.

C. Samples for Initial Selection:

- 1. Shop-applied transparent finishes.
- 2. Shop-applied opaque finishes.
- 3. Plastic laminates.
- 4. PVC edge material.
- 5. Thermoset decorative panels.
- 6. Solid-surfacing materials.
- D. Product Certificates: For each type of product, signed by product manufacturer.
- E. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
- F. Qualification Data: For Installer fabricator.

1.5 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. 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.
- 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 and certificates indicating that woodwork complies with requirements of grades specified.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. 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.
 - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.8 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.
- B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's, quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species and Cut for Transparent Finish: White oak, rift sawn or cut, White ash, plain sawn or sliced.
- C. Wood Species for Opaque Finish: Any closed-grain hardwood.
- D. Wood Products: Comply with the following:
 - 1. Hardboard: AHA A135.4.

- 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD, made with binder containing no urea formaldehyde.
- 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1, made with adhesive containing no urea formaldehyde.
- E. 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. Arborite; Division of ITW Canada, Inc.
 - b. Formica Corporation.
 - c. Nevamar Company, LLC; Decorative Products Div.
 - d. Panolam Industries International Incorporated.
 - e. Wilsonart International; Div. of Premark International, Inc.

2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 100 degrees of opening, self-closing.
- C. Wire Pulls: Back mounted, solid metal plastic, 5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter.
- D. Catches: Push-in magnetic catches, BHMA A156.9, B03131.
- E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112.
- F. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.
- G. Drawer Slides: BHMA A156.9, B05091.
 - 1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.
 - 2. Trash Bin Slides: Grade 1HD-200; for trash bins not more than 20 inches (500 mm) high and 16 inches (400 mm) wide.
- H. Door Locks: BHMA A156.11, E07121.
- I. Drawer Locks: BHMA A156.11, E07041.
- J. Grommets for Cable Passage through Countertops: 2-inch (51-mm) OD, black, molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Product: Subject to compliance with requirements, provide "OG series" by Doug Mockett & Company, Inc.
- K. 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.
- L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.3 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- D. Handrail/Bumper Rail Brackets: Pairs of extruded-aluminum channels; one for fastening to back of rail and one for fastening to face of wall. They are then assembled in overlapping fashion and fastened together top and bottom with self-tapping screws. Sized to provide 1-1/2-inch (38-mm) clearance between handrail and wall.
- E. Adhesives, General: Do not use adhesives that contain urea formaldehyde.
- F. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - 1. Wood Glues: 30 g/L.
 - 2. Contact Adhesive: 250 g/L.
- G. Adhesive for Bonding Plastic Laminate: Unpigmented contact cement.
 - 1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. 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).
- 3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch (1.5 mm).
- E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- F. 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.
- G. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.5 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH

- A. Grade: Custom.
- B. Wood Species: Eastern white pine, sugar pine, or western white pine.
- C. PVC: AZEK or Approved Equivalent
- D. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- E. Assemble casings in plant except where limitations of access to place of installation require field assembly.
- F. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.

2.6 WOOD CABINETS

- A. Grade: Custom
- B. Structural Performance: Duty Level 3
- C. AWI Type of Cabinet Construction: Flush overlay.

- D. WI Construction Style: Style A, Frameless.
- E. WI Door and Drawer Front Style: Flush overlay.
- F. Panel Product for Exposed Surfaces: Full overlay.
- G. Semiexposed Surfaces: Provide surface materials indicated below:
 - 1. Surfaces Other Than Drawer Bodies: Match materials indicated for exposed surfaces.
 - 2. Drawer Sides and Backs: 3/4" Double wall metal drawer.
 - 3. Drawer Bottoms: Wood.
- H. Provide dust panels of 1/4-inch (6.4-mm) plywood or tempered hardboard above compartments and drawers, unless located directly under tops.
- I. Basis-of-design: CNC Cabinetry or an Approved Equivalent
 - 1. Style: Milano, Matrix or an Approved Equivalent.
 - 2. Finish: As selected by architect from the manufacturer's standard line of finishes.
- J. Shelves: 3/4" thick, full depth plywood; fully adjustable.
- K. Box Construction:
 - 1. Back: ½" back panel with ¾"x4" supporting braces top and bottom, constructed with wood dowels glued and clamped.
 - 2. End Panels: ³/₄" thick, plywood sides constructed with wood dowels glued and clamped.
 - 3. Toe Kick: 4" toe kick with 3" inset.
- L. Special Warranty: Standard form in which manufacturer or installer agrees to repair or replace cabinetry that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - b. Installer errors.
 - 2. Material & Workmanship Warranty Period: 5 years from date of Substantial Completion.
 - 3. Installation Warranty Period: 1 year from date of Substantial Completion.

2.7 CLOSET AND UTILITY SHELVING

- A. Grade: Premium.
- B. Shelf Material: 3/4-inch (19-mm) solid lumber.
- C. Cleats: 3/4-inch (19-mm) solid lumber.
- D. Wood Species: Match species indicated for other types of transparent-finished architectural woodwork located in same area of building, unless otherwise indicated. Match species indicated for door to closet where shelving is located.

2.8 PLASTIC-LAMINATE COUNTERTOPS

- A. High-Pressure Decorative Laminate Grade: HGP.
- B. 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 Architect from manufacturer's full range in the following categories:
 - a. Wood grains, matte finish.
 - b. Patterns, matte finish.
- C. Grain Direction: Parallel to cabinet fronts.
- D. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- E. Core Material: Fire-retardant Particleboard or medium-density fiberboard.
- F. Core Material at Sinks: exterior-grade plywood.
- G. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.
- H. Paper Backing: Provide paper backing on underside of countertop substrate.

2.9 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 Division 09 painting Sections 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 Division 09 painting Sections for finishing architectural woodwork not indicated to be shop finished.
- E. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finished items specified to be field finished. Refer to Division 09 painting Sections for material and application requirements.
- F. 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.

G. Opaque Finish:

1. Grade: Custom.

- 2. AWI Finish System: Catalyzed polyurethane.
- 3. Color: As selected by Architect from manufacturer's full range.
- 4. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches (1500 mm) long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
 - 1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 - 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 - 3. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- G. 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.
- H. 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 tops with concealed metal brackets at 16 inches (400 mm) o.c. and to walls with adhesive.
 - 4. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- I. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- J. Refer to Division 09 Sections for final finishing of installed architectural woodwork not indicated to be shop finished.

3.3 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 semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

SECTION 071113 - BITUMINOUS DAMP-PROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes the following:
 - 1. Cold-applied, emulsified-asphalt damp-proofing.

1.2 SUBMITTALS

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

1.3 PROJECT CONDITIONS

A. Ventilation: Provide adequate ventilation during application of damp-proofing in enclosed spaces. Maintain ventilation until damp-proofing has cured.

PART 2 - PRODUCTS

2.1 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Karnak Corporation.
 - 2. Koppers Inc.
 - 3. Tamms Industries, Inc.
- C. Trowel Coats: ASTM D 1227, Type II, Class 1.
- D. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
- E. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
- F. VOC Content: 0.25 lb/gal.

2.2 MISCELLANEOUS MATERIALS

- A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.
- B. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

3.2 APPLICATION - GENERAL

- A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of damp-proofing.
- B. Apply damp-proofing to footings and foundation walls where opposite side of wall faces building interior.
 - 1. Apply from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches (150 mm) over outside face of footing.
 - 2. Extend 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
 - 3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- (200-mm-) wide strip of asphalt-coated glass fabric in a heavy coat of damp-proofing. Dampproofing coat for embedding fabric is in addition to other coats required.
- C. Apply damp-proofing to provide continuous plane of protection on exterior face of inner wythe of exterior masonry cavity walls.

3.3 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Concrete Foundations: Apply 2 brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat, 1 fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m), or 1 trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).

END OF SECTION 071113

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Foam-plastic board insulation.
- 2. Loose-fill insulation.
- 3. Glass-fiber blanket insulation.
- 4. Blown-in cellulosic insulation.
- 5. Vapor retarders

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
 - 3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 FOAM-PLASTIC BOARD INSULATION

- A. Expanded-Polystyrene Board Insulation: ASTM C 578 and D6817, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 20 and 300, respectively, per ASTM E 84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following;
 - a. Shelter Enterprises Inc.
 - b. Atlas Roofing Corporation
 - c. Carlise Construction Materials Company
 - 2. Minimum Compressive Resistance: 25 psi (173 kPa) @ 10% deformations per ASTM# D1621, Type IX
 - 3. Total R-Value: as indicated on drawings.
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

2.2 LOOSE-FILL INSULATION

A. Cellulosic-Fiber Loose-Fill Insulation: ASTM C 739, chemically treated for flame-resistance, processing, and handling characteristics.

2.3 GLASS- FIBER BLANKET INSULATION

- A. 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:
 - 1. Certain Teed Corporation. -CertaSound Attenuation Batts
 - 2. Owens-Corning Fiberglass Corporation.
 - 3. Manville Corporation.
- B. Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics, R-value of 19 for wall, 30 for residential floors and 49 for roof.
- C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
 - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
 - 2. Low Emitting: Insulation tested per ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

2.4 BLOWN-IN 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 chemically treated for flame-resistance, processing, and handling characteristics.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Green Fiber
 - 2. Hamilton Manufacturing Inc.
 - 3. International Cellulose Corp.

2.5 VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D 4397, 10 mils (0.25 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).
- B. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.
- D. Single-Component Nonsag Urethane Sealant: ASTM C 920, Type I, Grade NS, Class 25, Use NT related to exposure, and Use O related to vapor-barrier-related substrates.
- E. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.

2.6 INSULATION FASTENERS

A. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical footing and foundation wall surfaces, set insulation units using manufacturer's recommended adhesive or loosely laid according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces under slabs, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Loose-Fill Insulation: Apply according to ASTM C 1015 and manufacturer's written instructions. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
 - 1. For cellulosic-fiber loose-fill insulation, comply with CIMA's Bulletin #2, "Standard Practice for Installing Cellulose Insulation."
- C. Blown-in 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.
- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
- E. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

- 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
- 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
- 3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

3.5 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- B. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs.
 - 1. Fasten vapor retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space fasteners 16 inches (406 mm) o.c.
 - 2. Before installing vapor retarders, apply urethane sealant to flanges of metal framing including runner tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-retarder tape. Locate all joints over framing members or other solid substrates.
 - 3. Firmly attach vapor retarders to metal framing and solid substrates with vapor-retarder fasteners as recommended by vapor-retarder manufacturer.
- C. 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 retarders.
- D. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.6 PROTECTION

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

3.7 INSULATION SCHEDULE

A. Insulation Type Expanded-Polystyrene Rigid Panels: Foundation/slab edge, attic access door.

- B. Insulation Type Expanded-Polystyrene Inserts (see section 042200): Concrete masonry units
- C. Insulation Type Loose-Fill Cellulose Batt: Dropbox Pass-Through
- D. Insulation Type Blown-in Cellulose: Attic above gypsum wallboard ceiling
- E. Insulation Type Glass-Fiber Blanket: In framed interior demising and hallway walls.

END OF SECTION 072100

SECTION 072500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Building paper.
 - 2. Building wrap.
 - 3. Flexible flashing.

B. Related Requirements:

1. Division 06 Section "Rough Carpentry" for sheathing joint and penetration treatment.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

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

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 Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smokedeveloped 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 the following provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap.

- b. Pactiv, Inc.; GreenGuard Ultra Wrap.
- c. Raven Industries Inc.; Fortress Pro Weather Protective Barrier.
- d. Reemay, Inc.; Typar HouseWrap.
- 2. Water-Vapor Permeance: Not less than 125 g through 1 sq. m of surface in 24 hours per ASTM E 96/E 96M, Desiccant Method (Procedure A).
- 3. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg (0.02 L/s x sq. m at 75 Pa) when tested according to ASTM E 2178.
- 4. Allowable UV Exposure Time: Not less than three months.
- C. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

2.2 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch (1.0 mm).
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - 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. Raven Industries Inc.; Fortress Flashshield.
 - d. Carlisle Coatings & Waterproofing; CCW-705-TWF Thru-Wall Flashing.
 - e. Grace Construction Products, a unit of W. R. Grace & Co. Conn.; Vycor Plus Self-Adhered Flashing.
 - f. Polyguard Products, Inc.; Polyguard JT-20 Tape Polyguard JT-30 Tape.
- B. Primer for Flexible Flashing: Product recommended by manufacturer of flexible flashing for substrate.
- C. Nails and Staples: ASTM F 1667.

PART 3 - EXECUTION

3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
 - 1. Cut back barrier 1/2 inch (13 mm) 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 (100-mm) overlap unless otherwise indicated.

- C. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.
- D. Building Wrap: Comply with manufacturer's written instructions.
 - 1. Seal seams, edges, fasteners, and penetrations with tape.
 - 2. Extend into jambs of openings and seal corners with tape.

3.2 FLEXIBLE FLASHING INSTALLATION

- A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.
 - 1. Prime substrates as recommended by flashing manufacturer.
 - 2. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
 - 3. Lap flashing over water-resistive barrier at bottom and sides of openings.
 - 4. Lap water-resistive barrier over flashing at heads of openings.
 - 5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 072500

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SECTION 073113 - ASPHALT SHINGLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Asphalt shingles.
 - 2. Underlayment.
- B. Related Sections:
 - 1. Division 06 Section "Rough Carpentry" for wood framing.
 - 2. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration, flashings, counterflashing's and flashings.

1.3 **DEFINITION**

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

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of asphalt shingle ridge and hip cap shingles ridge vent and exposed valley lining indicated.
 - 1. Include similar Samples of trim and accessories involving color selection.
- C. Samples for Verification: For the following products, of sizes indicated, to verify color selected:
 - 1. Asphalt Shingle: Full size.
 - 2. Ridge and Hip Cap Shingles: Full size.
 - 3. Ridge Vent: 12-inch- (300-mm-) long Sample.
 - 4. Exposed Valley Lining: 12 inches (300 mm) square.
 - 5. Self-Adhering Underlayment: 12 inches (300 mm) square.

D. Qualification Data: For qualified Installer.

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- E. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for asphalt shingles.
- F. Research/Evaluation Reports: For each type of asphalt shingle required, from the ICC.
- G. Maintenance Data: For each type of asphalt shingle to include in maintenance manuals.
- H. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain ridge and hip cap shingles from single source from single manufacturer.
- C. Fire-Resistance Characteristics: Where indicated, provide asphalt shingles and related roofing materials identical to those of assemblies tested for fire resistance per test method below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing agency.
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108 or UL 790, for application and roof slopes indicated.
- D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install asphalt shingles until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
 - 1. Install self-adhering sheet underlayment within the range of ambient and substrate temperatures recommended by manufacturer.

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1.8 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Manufacturing defects.
 - b. Structural failures including failure of asphalt shingles to self-seal after a reasonable time.
 - 2. Material Warranty Period: 30 years from date of Substantial Completion, prorated, with first five years nonprorated.
 - 3. Wind-Speed Warranty Period: Asphalt shingles will resist blow-off or damage caused by 120 mph for 10 years from date of Substantial Completion.
 - 4. Algae-Discoloration Warranty Period: Asphalt shingles will not discolor 10 years from date of Substantial Completion.
 - 5. Workmanship Warranty Period: 10 years from date of Substantial Completion.
- B. Special Project Warranty: Roofing Installer's Warranty, or warranty form at end of this Section, signed by roofing Installer, covering the Work of this Section, in which roofing Installer agrees to repair or replace components of asphalt shingle roofing that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Asphalt Shingles: 100 sq. ft (9.3 sq. m) of each type, in unbroken bundles.

PART 2 - PRODUCTS

2.1 GLASS-FIBER-REINFORCED ASPHALT SHINGLES

- A. Multitab-Strip Asphalt Shingles: ASTM D 3462, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by the following to match existing roofing. GAF Materials Corporation, Timberline, Ultra HD Architectural Shingle, Biscayne blue color.

2.2 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226, Type I, asphalt-saturated organic felts, nonperforated.

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- B. Self-Adhering Sheet Underlayment, Polyethylene Faced: ASTM D 1970, minimum of 40-mil- (1.0-mm-) thick, slip-resisting, polyethylene-film-reinforced top surface laminated to SBS-modified asphalt adhesive, with release paper backing; cold applied. Provide primer for adjoining concrete or masonry surfaces to receive underlayment.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Carlisle Coatings & Waterproofing, Inc.
 - b. Grace, W. R. & Co. Conn.
 - c. Henry Company.
 - d. Johns Manville.
 - e. Owens Corning.
- C. Granular-Surfaced Valley Lining: ASTM D 6380, Class M, organic ASTM D 3909, mineral-granular-surfaced, glass-felt-based, asphalt roll roofing; 36 inches (914 mm) wide.
- D. Flexible Ridge Vent: Manufacturer's standard, compression-resisting, three-dimensional, open-nylon or polyester-mat filter bonded to a nonwoven, nonwicking, geotextile fabric cover.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. GAF Materials Corporation Cobra Ridge Vent.
 - b. Obdyke, Benjamin Incorporated Similar.
 - c. TAMKO Roofing Products, Inc. Similar.
 - 3. Minimum Net Free Area: 50%.
 - 4. Width: 12".
 - 5. Thickness: $1\frac{1}{2}$ ".

2.3 ACCESSORIES

- A. Asphalt Roofing Cement: ASTM D 4586, Type II, asbestos free.
- B. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch- (3-mm-) diameter, barbed shank, sharp-pointed, with a minimum 3/8-inch- (9.5-mm-) diameter flat head and of sufficient length to penetrate 3/4 inch (19 mm) into solid wood decking or extend at least 1/8 inch (3 mm) through OSB or plywood sheathing or required by manufacturers warrantee.

- 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.

2.4 METAL FLASHING AND TRIM

- A. General: Comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
 - 1. Sheet Metal: Zinc-tin alloy-coated steel.
- 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 the item.
 - 1. Apron Flashings: Fabricate with lower flange a minimum of 4 inches (100 mm) over and 4 inches (100 mm) beyond each side of downslope asphalt shingles and 6 inches (150 mm) up the vertical surface.
 - 2. Step Flashings: Fabricate with a headlap of 2 inches (50 mm) and a minimum extension of 4 inches (100 mm) over the underlying asphalt shingle and up the vertical surface.
 - 3. Cricket Flashings: Fabricate with concealed flange extending a minimum of 18 inches (450 mm) beneath upslope asphalt shingles and 6 inches (150 mm) beyond each side of chimney and 6 inches (150 mm) above the roof plane.
 - 4. Open-Valley Flashings: Fabricate in lengths not exceeding 10 feet (3 m) with 1-inch- (25-mm-) high, inverted-V profile at center of valley and equal flange widths of 12 inches (300 mm)3
 - 5. Drip Edges: Fabricate in lengths not exceeding 10 feet (3 m) with 5-inch roof-deck flange and 1-1/2-inch (38-mm) fascia flange with 3/8-inch (9.6-mm) drip at lower edge.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Examine roof sheathing to verify that sheathing joints are supported by framing and blocking or metal clips and that installation is within flatness tolerances.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and completely anchored; and that provision has been made for flashings and penetrations through asphalt shingles.

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

3.2 UNDERLAYMENT INSTALLATION

- A. General: Comply with underlayment manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
- B. Single-Layer Felt Underlayment: Install on roof deck parallel with and starting at the self-adhering sheets. Lap sides a minimum of 3 inches over underlying course. Lap ends a minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). 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 (75 mm) in direction to shed water. Lap ends of felt not less than 6 inches (150 mm) over self-adhering sheet underlayment.
 - 2. Install fasteners at no more than 36 inch (900 mm) 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 and on drawings, lapped in direction to shed water. Lap sides not less than 3-1/2 inches (89 mm). Lap ends not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Roll laps with roller. Cover underlayment within seven days.
 - 1. Prime concrete and masonry surfaces to receive self-adhering sheet underlayment.
 - 2. Eaves: Extend from edges of eaves 36 inches (914 mm) beyond interior face of exterior wall.
 - 3. Rakes: Extend from edges of rake 36 inches (914 mm) beyond interior face of exterior wall.
 - 4. Valleys: Extend from lowest to highest point 18 inches (450 mm) on each side.
 - 5. Hips: Extend 18 inches (450 mm) on each side.
 - 6. Ridges: Extend 36 inches (914 mm) on each side.
 - 7. Sidewalls: Extend beyond sidewall 32 inches, and return vertically against sidewall not less than 4 inches (100 mm).
 - 8. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches (450 mm), and return vertically against penetrating element not less than 18 inches (450 mm), and return vertically against penetrating element not less than 4 inches (100 mm.
 - 9. Roof Slope Transitions: Extend 18 inches (450 mm) on each roof slope.
- D. Concealed, Woven Valley Lining: Comply with NRCA's recommendations. Install a 36-inch- (914-mm-) wide felt underlayment centered in valley. Fasten to roof deck with roofing nails.

- 1. Lap roof-deck felt underlayment over valley felt underlayment at least 6 inches (150 mm).
- E. Metal-Flashed, Open-Valley Underlayment: Install two layers of 36-inch- (914-mm-) wide felt underlayment centered in valley. Stagger end laps between layers at least 72 inches (1830 mm). Lap ends of each layer at least 12 inches (300 mm) in direction to shed water, and seal with asphalt roofing cement. Fasten each layer to roof deck with roofing nails.
 - 1. Lap roof-deck felt underlayment over first layer of valley felt underlayment at least 6 inches (150 mm).
- F. Granular-Surfaced, Open-Valley Lining: Comply with NRCA's recommendations. Install a 36-inch- (914-mm-) wide felt underlayment centered in valley. Fasten to roof deck with roofing nails.
 - 1. Lap roof-deck felt underlayment over valley felt underlayment at least 6 inches (150 mm).
 - 2. Install an 18-inch- (450-mm-) wide strip of valley lining centered in valley, with granular-surface face down. Install a second 36-inch- (914-mm-) wide strip of valley lining centered in valley, with granular-surface face up. Lap ends of each strip at least 12 inches (300 mm) in direction to shed water, and seal with asphalt roofing cement. Stagger end laps between succeeding strips at least 72 inches (1830 mm). Fasten each strip to roof deck with roofing nails.

3.3 METAL FLASHING INSTALLATION

- A. General: Install metal flashings and other sheet metal to comply with requirements in Division 07 Section "Sheet Metal Flashing and Trim."
 - 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. Apron Flashings: Extend lower flange over and beyond each side of downslope asphalt shingles and up the vertical surface.
- C. Step Flashings: Install with a headlap of 2 inches (50 mm) and extend over the underlying asphalt shingle and up the vertical surface. Fasten to roof deck only.
- D. Cricket Flashings: Install against the roof-penetrating element extending concealed flange beneath upslope asphalt shingles and beyond each side.
- E. Open-Valley Flashings: Install centered in valleys, lapping ends at least 8 inches (200 mm) in direction to shed water. Fasten upper end of each length to roof deck beneath overlap.
 - 1. Secure hemmed flange edges into metal cleats spaced 12 inches (300 mm) apart and fastened to roof deck.

- 2. Adhere 9-inch- (225-mm-) wide strip of self-adhering sheet to metal flanges and to self-adhering sheet underlayment.
- F. Rake Drip Edges: Install rake drip edge flashings over underlayment and fasten to roof deck.
- G. Eave Drip Edges: Install eave drip edge flashings below underlayment and fasten to roof sheathing.
- H. Pipe Flashings: Form flashing around pipe penetrations and asphalt shingles. Fasten and seal to asphalt shingles as recommended by manufacturer.

3.4 ASPHALT SHINGLE INSTALLATION

- A. General: 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."
- B. Install starter strip along lowest roof edge, consisting of an asphalt shingle strip with tabs removed at least 7 inches (175 mm) wide with self-sealing strip face up at roof edge.
 - 1. Extend asphalt shingles 3/4 inch (19 mm) over fasciae at eaves and rakes.
 - 2. Install starter strip along rake edge.
- C. Install first and remaining courses of asphalt shingles stair-stepping diagonally across roof deck manufacturer's recommended offset pattern at succeeding courses, maintaining uniform exposure. Match existing shingle overlap pattern.
- D. 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.
- E. Install asphalt shingles by single-strip column or racking method, maintaining uniform exposure. Install full-length first course followed by cut second course, repeating alternating pattern in succeeding courses.
- F. Fasten asphalt shingle strips with a minimum of six roofing nails located according to manufacturer's written instructions.
 - 1. Where roof slope exceeds 20:12, seal asphalt shingles with asphalt roofing cement spots after fastening with additional roofing nails.
 - 2. Where roof slope is less than 4:12, seal asphalt shingles with asphalt roofing cement spots.
 - 3. When ambient temperature during installation is below 50 deg F (10 deg C), seal asphalt shingles with asphalt roofing cement spots.
- G. Woven Valleys: Extend succeeding asphalt shingle courses from both sides of valley 18 inches (300 mm)] beyond center of valley, weaving intersecting shingle-strip courses over each other. Use one-piece shingle strips without joints in valley.
 - 1. Do not nail asphalt shingles within 6 inches (150 mm) of valley center.

- H. Closed-Cut Valleys: Extend asphalt shingle strips from one side of valley 12 inches (300 mm) beyond center of valley. Use one-piece shingle strips without joints in valley. Fasten with extra nail in upper end of shingle. Install asphalt shingle courses from other side of valley and cut back to a straight line 2 inches (50 mm) short of valley centerline. Trim upper concealed corners of cut-back shingle strips.
 - 1. Do not nail asphalt shingles within 6 inches (150 mm) of valley center.
 - 2. Set trimmed, concealed-corner asphalt shingles in a 3-inch- (75-mm-) wide bed of asphalt roofing cement.
- I. Open Valleys: Cut and fit asphalt shingles at open valleys, trimming upper concealed corners of shingle strips. Maintain uniform width of exposed open valley Widen exposed portion of open valley 1/8 inch in 12 inches (1:96) from highest to lowest point.
 - 1. Set valley edge of asphalt shingles in a 3-inch- (75-mm-) wide bed of asphalt roofing cement.
 - 2. Do not nail asphalt shingles to metal open-valley flashings.
- J. 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.
- K. 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.
 - 1. Fasten ridge cap asphalt shingles to cover ridge vent without obstructing airflow.

3.5 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS TBD of TBD, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: City of Middletown.
 - 2. Address: 245 DeKoven Drive, Room 112, Middletown, CT 06457.
 - 3. Building Name/Type: South Fire District Facility.
 - 4. Address: 445 Randolph Rd. Middletown, CT 06457.
 - 5. Area of Work: New addition and blending to exist roof.
 - 6. Acceptance Date: TBD.
 - 7. Warranty Period: 10 years.
 - 8. Expiration Date: TBD.
- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to

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correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

- D. This Warranty is made subject to the following terms and conditions:
 - 1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. Lightning;
 - b. Peak gust wind speed exceeding 130 mph (m/sec);
 - c. Fire:
 - d. Failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - e. Faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - f. Vapor condensation on bottom of roofing; and
 - g. Activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 - 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 - 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 - 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 - 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
 - 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

END OF SECTION 073113

SECTION 074646 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 **SUMMARY**

A. Section Includes:

- 1. Fiber-cement siding.
- 2. Fiber-cement trim.
- 3. Accessories.

B. Related Sections:

- 1. Division 6 Section "Rough Carpentry" for wood furring, grounds, nailers, and blocking.
- 2. Division 7 Section "Joint Sealants"

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Samples for Initial Selection: For siding and soffit including related accessories.
- C. Samples for Verification: For each type, color, texture, and pattern required.
 - 1. 12-inch long-by-actual-width Sample of siding.
 - 2. 12-inch long-by-actual-width Sample of soffit.
 - 3. 12-inch long-by-actual-width Samples of trim and accessories.
- D. Qualification Data: For qualified fiber-cement siding Installer.
- E. Product Certificates: For each type of siding and soffit, from manufacturer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fiber-cement siding.
- G. Maintenance Data: For each type of siding and soffit and related accessories to include in maintenance manuals.
- H. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Labeling: Provide fiber-cement siding that is tested and labeled per ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.
- B. Source Limitations: Obtain each type, color, texture, and pattern of siding and soffit, including related accessories, from single source from single manufacturer.
- C. Pre-installation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store materials in a dry, well-ventilated, weather tight place.

1.6 PROJECT CONDITIONS

A. Weather Limitations: Proceed with siding installation only if substrate is completely dry and if existing and forecasted weather conditions permit siding to be installed per manufacturer's written instructions.

1.7 COORDINATION

A. Coordinate installation with flashings and other adjoining construction to ensure proper sequencing.

1.8 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace siding and soffit that fail(s) in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracking, deforming and fading.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - 2. Fading is defined as loss of color, after cleaning with product recommended by manufacturer, of more than 5 Hunter color-difference units as measured per ASTM D 2244.
 - 3. Warranty Period: 10 years from date of Substantial Completion.

1.9 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish full lengths of siding and soffit including related accessories, in a quantity equal to 2 percent of amount installed.

PART 2 - PRODUCTS

2.1 FIBER CEMENT SIDING

- A. Fiber-Cement Siding: Siding made from fiber-cement board that does not contain asbestos fibers; complies with ASTM C 1186, Type A, Grade II; is classified as noncombustible when tested per ASTM E 136; and has a flame-spread index of 25 or less when tested according to ASTM E 84.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings: Hardi Plank by James Hardie, Inc or comparable product by one of the following:
 - a. MaxiTile, Inc; a California corporation.
 - b. GAF Materials Corporation.
 - 2. Horizontal Pattern: Boards 6-1/4 to 6-1/2 inches wide in style, with 5" exposure or as shown on Drawings.
 - a. Texture: Wood grained.
 - 3. Vertical Pattern: 48" wide sheets with wood grain texture-straight edge notched.
 - 4. Factory Finish: Color as selected by Architect from manufacturer's full range of colors, including all standard and premium options.

2.2 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 adjacent siding unless otherwise indicated.
- B. Aluminum Accessories: Where aluminum accessories are indicated, provide accessories complying with AAMA 1402.
- C. Vinyl Accessories: Integrally colored vinyl accessories complying with ASTM D 3679 except for wind-load resistance.
- D. Fiber Cement Accessories: Provide the following fiber-cement accessories as indicated:
 - 1. Moldings and trim: Color as selected by the Architect from the manufacturer's full range of industry colors.

E. Flashing: Provide aluminum or stainless-steel flashing complying with Division 07 Section "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

F. Fasteners:

- 1. For fastening to wood, use siding nails or ribbed bugle-head screws of sufficient length to penetrate a minimum of 1 inch into substrate.
- 2. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
- 3. For fastening aluminum, use aluminum fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
- 4. For fastening fiber cement, use hot-dip galvanized fasteners.
- 5. For fastening vinyl, use aluminum hot-dip galvanized stainless-steel fasteners. Where fasteners will be exposed to view, use prefinished aluminum fasteners in color to match item being fastened.
- G. Insect Screening for Soffit Vents: Aluminum, mesh

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of siding and soffit and related accessories. Provide with installation only after unsatisfactory conditions have been corrected.
- B. Verify that substrate surface wall openings and framing are ready to receive work.
- C. Acceptable Substrate:
 - 1. Nominal 2-inch wood framing selected for minimal shrinkage and complying with local building codes, including the use of weather resistive barriers and/or vapor barriers where required. Minimum 1-1/2-inch face and straight, true, of uniform dimensions and properly aligned.
 - 2. Plywood sheathing installed over wood framing, of thickness as required by siding manufacturer's instructions.

3.2 PREPARATION

- A. Examine existing structure for damage due to rot, termite, water, etc. Remove damaged areas to sound condition. Replace with matching material.
- B. Acclimate wood to installation conditions.
- C. Clean substrates of projections and substances detrimental to application.
- D. Install weather-resistive barrier and claddings to dry surfaces.

- E. Repair any punctures or tears in the weather resistive barrier prior to the installation of the siding.
- F. Protect siding from other trades.

3.3 INSTALLATION

- A. General: Comply with siding and soffit manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Do not install damaged components.
 - 2. Center nails in elongated nailing slots without binding siding to allow for thermal movement.
 - 3. Overlap joints to shed water away from direction of prevailing wind.
- B. Starting: Install a minimum 1/4-inch-thick lath starter strip at the bottom course of the wall. Apply planks horizontally with 1-1/4-inch-wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
- C. Install fiber-cement siding and related accessories.
 - 1. Install fasteners no more than 24 inches o.c.
- D. Install vinyl soffit and related accessories according to ASTM D 4756.
- E. Allow minimum 1-inch vertical clearance between roofing and bottom edge of siding.
- F. Allow 1/8-inch gap between trim and siding.
- G. Seal gap with high quality, paintable caulk.
- H. Shim frieze board as required to align with corner trim.
- I. Install trim fascia over structural subfascia.
- J. At plywood sheathing:
 - 1. Face nail to sheathing.
 - 2. Locate splice at least 12 inches away from window and door openings.
- K. Wind Resistance: Where a specified level of wind resistance is required lap, siding is installed to framing members and secured with fasteners described in Table No. 2 in National Evaluation Service Report No. NER 405.

3.4 FINISHING

A. Finish siding coated by the PrimePlus system with two coats high quality, either 100% acrylic or latex or oil based exterior grade paint within 180 days of installation. Follow paint manufacturer's written product recommendation and written application instructions.

3.5 INSTALLATION TOLERANCES

- A. Maximum Variation from Level: 1/8 inch per 10 feet.
- B. Maximum Offset from Joint Alignment: 1/32 inch.

3.6 CAULKING

- A. Seal all joints and perimeter of windows, doors, eaves and trim edges.
- B. Use caulk recommended and approved by siding manufacturer.

3.7 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.
- C. Protect finished work under provisions of Section 01770.

END OF SECTION 074646

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Manufactured Products:
 - a. Manufactured through-wall flashing and counterflashing.
 - b. Manufactured reglets and counterflashing.

2. Formed Products:

- a. Formed roof drainage sheet metal fabrications.
- b. Formed low-slope roof sheet metal fabrications.
- c. Formed steep-slope roof sheet metal fabrications.

B. Related Sections:

- 1. Division 06 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
- 2. Division 07 Section "Asphalt shingles" for installing sheet metal flashing and trim integral with roofing.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Fabricate and install roof edge flashing capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:
 - 1. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44 kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-lbf/sq. ft. (1.44-kPa) outward force.
 - 2. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft. (1.48 to 2.15 kPa): 90-lbf/sq. ft. (4.31-kPa) perimeter uplift force, 120-lbf/sq. ft. (5.74-kPa) corner uplift force, and 45-lbf/sq. ft. (2.15-kPa) outward force.

- 3. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft. (2.20 to 4.98 kPa): 208-lbf/sq. ft. (9.96-kPa) perimeter uplift force, 312-lbf/sq. ft. (14.94-kPa) corner uplift force, and 104-lbf/sq. ft. (4.98-kPa) outward force.
- C. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient;, material surfaces.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 - 2. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 - 3. Details of connections to adjoining work.
- C. Samples for Initial Selection: For each type of sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
 - 2. Accessories and Miscellaneous Materials: Full-size Sample.
- E. Qualification Data: For qualified fabricator.
- F. Warranty: Sample of special warranty.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
 - 1. Exposed Coil-Coated Finishes:
 - a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Siliconized Polyester: Epoxy primer and silicone-modified, polyesterenamel topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.
 - c. Plastisol: Epoxy primer and vinyl plastisol topcoat; with a dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 3.8 mils (0.97 mm) for topcoat.
 - 2. Color: As selected by Architect from manufacturer's full range.

3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil (0.013 mm).

2.2 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
 - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
 - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
 - 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Owens Corning; WeatherLock Metal High Temperature Underlayment.
- B. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal[or manufactured item].
- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane, silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch (75-mm) intervals along length of flashing to provide an integral mortar bond.
 - 1. Copper: 10 oz. (0.34 mm thick) minimum for fully concealed flashing; 16 oz. (0.55 mm thick) elsewhere.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Cheney Flashing Company; Cheney Flashing (Sawtooth).
 - 2) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - 3) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" and by FMG Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- I. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- J. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Hanging Gutters: Fabricate to cross section indicated, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum seamless long sections. Furnish flat-stock gutter spacers and gutter brackets fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters.
 - 1. Gutter Style: SMACNA designation K.
 - 2. Expansion Joints: Butt type with cover plate.
 - 3. Accessories: Continuous removable leaf screen with sheet metal frame and hardware cloth screen, Valley baffles.
 - 4. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following materials:
 - a. Match existing girth and profile.
- B. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Match existing style and color.
 - 2. Size: As shown on drawings.
- C. Base Flashing: Fabricate from the following materials:
 - 1. Copper: 20 oz./sq. ft. (0.68 mm thick).
 - 2. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 3. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.
- D. Counterflashing: Fabricate from the following materials:
 - 1. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - 2. Aluminum: 0.032 inch (0.81 mm) thick.
 - 3. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 4. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.

- 5. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).
- E. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - 2. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 3. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).
- F. Drip Edges: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
 - 2. Stainless Steel: 0.016 inch (0.40 mm) thick.
- G. Eave, Rake, Flashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
 - 2. Zinc-Tin Alloy-Coated Stainless Steel: 0.015 inch (0.38 mm) thick.
 - 3. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).
- H. Counterflashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.
 - 2. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).
- I. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Copper: 16 oz./sq. ft. (0.55 mm thick).
 - 2. Stainless Steel: 0.019 inch (0.48 mm) thick.
 - 3. Zinc-Tin Alloy-Coated Stainless Steel: 0.018 inch (0.46 mm) thick.
 - 4. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. (0.55 mm thick).

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with

temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 5. Install sealant tape where indicated.
 - 6. Torch cutting of sheet metal flashing and trim is not permitted.
 - 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Coat back side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws.
- E. Seal joints as shown and as required for watertight construction.

- 1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
- 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- F. Rivets: Rivet joints in uncoated aluminum and zinc where indicated and where necessary for strength.

3.4 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Hanging Gutters: Join sections with riveted and soldered joints or with lapped joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets, and straps, spaced not more than 36 inches (900 mm) apart. Provide end closures and seal watertight with sealant. Slope to downspouts.
 - 1. Fasten gutter spacers to front and back of gutter.
 - 2. Loosely lock straps to front gutter bead and anchor to roof deck.
 - 3. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
 - 4. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches (600 mm) apart.
 - 5. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m) apart. Install expansion-joint caps.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.
 - 1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c. in between.
 - 2. Provide elbows at base of downspout to direct water away from building.
 - 3. Connect downspouts to underground drainage system indicated.
- D. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints a minimum of 4 inches (100 mm) in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where

- possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant. Secure in a waterproof manner by means of interlocking folded seam or blind rivets and sealant.
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Division 04 Section "Unit Masonry."
- C. Opening Flashings in Frame Construction: Install
- D. continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.7 MISCELLANEOUS FLASHING INSTALLATION

- A. Overhead-Piping Safety Pans: Suspend pans independent from structure above as indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.
- B. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

3.8 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.9 CLEANING AND PROTECTION

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

END OF SECTION 076200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Penetrations in fire-resistance-rated walls.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Qualification Data: For qualified Installer.
- C. Installer Certificates: From Installer indicating penetration fire stopping has been installed in compliance with requirements and manufacturer's written recommendations.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Installer Qualifications: A firm experienced in installing penetration firestopping similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful performance. Qualifications include having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Manufacturer's willingness to sell its penetration firestopping products to Contractor or to Installer engaged by Contractor does not in itself confer qualification on buyer.
- C. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
 - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
 - b. Classification markings on penetration firestopping correspond to designations listed by the following:

- 1) UL in its "Fire Resistance Directory."
- 2) Intertek ETL SEMKO in its "Directory of Listed Building Products."
- 3) FM Global in its "Building Materials Approval Guide."

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 MANUFACTURE'S:

- 1. Grace Construction Products.
- 2. Hilti, Inc.
- 3. OR Equal.

2.2 PENETRATION FIRESTOPPING

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Penetrations in Fire-Resistance-Rated Walls: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
 - 1. Fire-resistance-rated walls include smoke-barrier walls and fire partitions.
 - 2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

- D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- E. VOC Content: Provide penetration firestopping that complies 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.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
 - 1. Permanent forming/damming/backing materials, including the following:
 - a. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
 - b. Fire-rated form board.
 - c. Fillers for sealants.
 - 2. Temporary forming materials.
 - 3. Substrate primers.
 - 4. Collars.
 - 5. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Putties: Non-hardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- E. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- F. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- G. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.

- H. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
 - 1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and non-sag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of non-sag grade for both opening conditions.

2.4 MIXING

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire stopping's seal with substrates.

3.3 INSTALLATION

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
 - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
 - 1. The words "Warning Penetration Firestopping Do Not Disturb. Notify Building Management of Any Damage."
 - 2. Contractor's name, address, and phone number.
 - 3. Designation of applicable testing and inspecting agency.
 - 4. Date of installation.
 - 5. Manufacturer's name.
 - 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- B. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category.
- B. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."
- C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."
- D. Provide system capable of maintaining fire rating integrity for duration required rating time.

END OF SECTION 078413

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Urethane joint sealants.
- 2. Preformed joint sealants.

B. Related Sections:

- 1. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
- 2. Division 07 Section "Penetration Firestopping" for sealing joints in fire-resistance-rated construction.
- 3. Division 09 Section "Gypsum Board" for sealing perimeter joints.
- 4. Division 09 Section "Tiling" for sealing tile joints.
- C. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - 4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

- 5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
- 6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.3 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.
- E. Qualification Data: For qualified Installer.
- F. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- G. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- I. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- J. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- D. Preinstallation Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.6 WARRANTY

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

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):
 - 1. Architectural Sealants: 250 g/L.
 - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
 - 3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 URETHANE JOINT SEALANTS

- A. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolastic NP1, Sonalastic TX1, Sonolastic Ultra.
 - b. Pecora Corporation; Dynatrol I-XL.
 - c. Sika Corporation, Construction Products Division; Sikaflex 1a.
 - d. Tremco Incorporated; Dymonic.

2.3 PREFORMED JOINT SEALANTS

- A. Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of precured low-modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral-curing silicone sealant for bonding extrusions to substrates.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 123 Silicone Seal.
 - b. GE Advanced Materials Silicones; UltraSpan US1100.
 - c. May National Associates, Inc.; Bondaflex Silbridge 300.
 - d. Pecora Corporation; Sil-Span.
- B. Preformed Foam Joint Sealant: Manufacturer's standard preformed, precompressed, open-cell foam sealant manufactured from urethane foam with minimum density of 10 lb/cu. ft. (160 kg/cu. m) and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths indicated; coated on one side with a pressure-sensitive adhesive and covered with protective wrapping.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dayton Superior Specialty Chemicals; Polytite Standard.
 - b. EMSEAL Joint Systems, Ltd.; Emseal 25V.
 - c. Sandell Manufacturing Co., Inc.; Polyseal.
 - d. Willseal USA, LLC; Willseal 150, Willseal 250.

2.4 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.

- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.

- 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Installation of Preformed Silicone-Sealant System: Comply with the following requirements:
 - 1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 - 2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead 1/4 inch (6 mm) inside masking tape.
 - 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 - 4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- I. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 FIELD QUALITY CONTROL

- A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
 - 1. Extent of Testing: Test completed, and cured sealant joints as follows:
 - a. Perform 3 tests for the first 1,000 feet (300 m) of joint length for each kind of sealant and joint substrate.
 - 2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

- 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.
- 4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
- 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

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

3.6 PROTECTION

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

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Standard hollow metal frames.
- 2. Hollow metal doors.

B. Related Sections:

- 1. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
- 2. Division 08 Section "Door Hardware" for door hardware for hollow metal doors.
- 3. Division 09 Sections "Painting" for field painting hollow metal doors and frames.
- 4. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 **DEFINITIONS**

- A. Minimum Thickness: Minimum thickness of base metal without coatings: .067"
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.
- C. Custom Hollow Metal Work: Hollow metal work fabricated according to ANSI/NAAMM-HMMA 861.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 2. Locations of reinforcement and preparations for hardware.
 - 3. Details of each different wall opening condition.
 - 4. Details of anchorages, joints, field splices, and connections.
 - 5. Details of accessories.
 - 6. Details of moldings, removable stops, and glazing.
 - 7. Details of conduit and preparations for power, signal, and control systems.

C. Samples for Verification:

- 1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 125 mm).
- 2. For the following items, prepared on Samples about 12 by 12 inches (305 by 305 mm) to demonstrate compliance with requirements for quality of materials and construction:
 - a. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow metal panels and glazing if applicable.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of hollow metal door and frame assembly.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.
- B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive as close to neutral pressure as possible according to NFPA 252.
 - 1. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
- C. Fire-Rated, Borrowed-Light Frame 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 257 or UL 9. Label each individual glazed lite.
- D. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to finish of factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch-(102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
 - 1. Ceco Door Products; an Assa Abloy Group company.
 - 2. Curries Company; an Assa Abloy Group company.
 - 3. Kewanee Corporation (The).
 - 4. Steelcraft; an Ingersoll-Rand company.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow metal frames of type indicated.
- G. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- H. Glazing: Comply with requirements as indicated on drawings.

I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.3 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.
 - 1. Fabricate frames as face welded unless otherwise indicated.
 - 2. Frames for Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.
- C. Interior Frames: Fabricated from cold-rolled steel sheet unless metallic-coated sheet is indicated.
 - 1. Fabricate frames as face welded unless otherwise indicated.
 - 2. Frames for Steel Doors: 0.067-inch- (1.7-mm-) thick steel sheet.
 - 3. Frames for Wood Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
 - 4. Frames for Borrowed Lights: Same as adjacent door frame.
- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcement plates from same material as frames.

2.4 STANDARD HOLLOW METAL DOORS

- A. General: Provide doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/SDI A250.8.
 - 1. Design: As shown on drawings.
 - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
 - a. Thermal-Rated (Insulated) Doors: Where indicated, provide doors fabricated with thermal-resistance value (U-value) of not more than 0.63 when tested according to ASTM C 1363.
 - 3. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
 - 1. Level 2 and Physical Performance Level B (Heavy Duty).
- C. Provide doors not less than 1-3/4 inches (44.5 mm) thick, of seamless hollow construction unless otherwise indicated. Construct doors with smooth surfaces without visible joints or seams on exposed faces. Comply with ANSI/NAAMM-HMMA 861.

- D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.
- E. Fabricate concealed stiffeners and hardware reinforcement from either cold- or hot-rolled steel sheet.
- F. Door Face Sheets: Fabricated from metallic-coated steel sheet, minimum 0.053 inch (1.3 mm) thick
- G. Top and Bottom Channels: Closed with continuous channels, minimum 0.053 inch (1.3 mm) thick, of same material as face sheets and spot welded to both face sheets.

2.5 FRAME ANCHORS

A. Jamb Anchors:

- 1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
- 2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
- 3. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
- 4. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
- B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:
 - 1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
 - 2. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (50-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.6 STOPS AND MOLDINGS

- A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as door face sheet in which they are installed.
- B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.
- C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, fabricated from same material as frames in which they are installed.

2.7 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

- B. Ceiling Struts: Minimum 1/4-inch-thick by 1-inch- (6.4-mm-thick by 25.4-mm-) wide steel.
- C. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

2.8 FABRICATION

- A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/NAAMM-HMMA 861.
- C. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
 - 2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
 - 3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
 - 6. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Two anchors per jamb up to 60 inches (1524 mm) high.
 - 2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
 - 3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
 - b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
 - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
 - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.

- 3) Two anchors per head for frames above 42 inches (1066 mm) wide and mounted in metal-stud partitions.
- 7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- D. Fabricate concealed stiffeners, edge channels, and hardware reinforcement from either cold- or hot-rolled steel sheet.
- E. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
 - 1. Locate hardware as indicated, or if not indicated, according to ANSI/NAAMM-HMMA 861.
 - 2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
 - 3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
 - 4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.
- F. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
 - 4. Provide loose stops and moldings on inside of hollow metal work.
 - 5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

2.9 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
 - 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer

manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:
 - 1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - 2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - 3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - 4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

- A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.
- B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with HMMA 840.
 - 1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

- a. At fire-protection-rated openings, install frames according to NFPA 80.
- b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
- c. Install frames with removable glazing stops located on secure side of opening.
- d. Install door silencers in frames before grouting.
- e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
- f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
- g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
- 2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with post installed expansion anchors.
 - a. Floor anchors may be set with powder-actuated fasteners instead of post installed expansion anchors if so indicated and approved on Shop Drawings.
- 3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
- 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
- 5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
- 6. In-Place Concrete or Masonry Construction: Secure frames in place with post installed expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 7. In-Place Gypsum Board Partitions: Secure frames in place with post installed expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
- 8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
- 9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

- d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.
- C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.
 - 1. Non-Fire-Rated Standard Steel Doors:
 - a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
 - b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
 - c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
 - d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Remove grout and other bonding material from hollow metal work immediately after installation.
- C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with wood-veneer.
 - 2. Shop priming flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate doors to be factory finished and finish requirements.
 - 4. Indicate fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish.
 - 2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide samples for each species of veneer and solid lumber required.
 - b. Finish veneer-faced door samples with same materials proposed for factory-finished doors.
 - 3. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Source Limitations: Obtain flush wood doors from single manufacturer.
- C. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
 - 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
 - 2. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
- D. Forest Certification: Provide doors made with all wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing as close to neutral pressure as possible according to NFPA 252.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
- F. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch (6.4 mm) in a 42-by-84-inch (1067-by-2134-mm) section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 76.2-mm) span.
 - 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 3. Warranty Period for Solid-Core Exterior Doors: Five years from date of Substantial Completion.
 - 4. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. 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:
 - 1. Algoma Hardwoods, Inc.
 - 2. Eggers Industries.
 - 3. Graham; an Assa Abloy Group company.
 - 4. Lambton Doors.
 - 5. Marshfield Door Systems, Inc.
 - 6. Mohawk Flush Doors, Inc.; a Masonite company.
 - 7. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- B. WDMA I.S.1-A Performance Grade:
 - 1. Heavy Duty unless otherwise indicated.
- C. Structural-Composite-Lumber-Core Doors:
 - 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf (3100 N).

- D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
 - 1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
 - 2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. [Provide stiles with concealed intumescent seals.] Comply with specified requirements for exposed edges.

E. Mineral-Core Doors:

- 1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.
- 2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
 - a. 5-inch (125-mm) top-rail blocking.
 - b. 5-inch (125-mm) bottom-rail blocking, in doors indicated to have protection plates.
 - c. 5-inch (125-mm) midrail blocking, in doors indicated to have armor plates.
 - d. 4-1/2-by-10-inch (114-by-250-mm) lock blocks, 5-inch (125-mm) midrail blocking, in doors indicated to have exit devices.
- 3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors:

- 1. Grade: Premium, with Grade A faces.
- 2. Species: Select white birch.
- 3. Cut: Plain sliced flat sliced.
- 4. Match between Veneer Leaves: Book match.
- 5. Assembly of Veneer Leaves on Door Faces: Balance match.
- 6. Pair and Set Match: Provide for doors hung in same opening.
- 7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet (6 m) or more.
- 8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
- 9. Exposed Vertical and Top Edges: Same species as faces or a compatible species.
- 10. Core: Either glued wood stave or structural composite lumber.

- 11. Construction: Seven plies, either bonded or nonbonded construction.
- 12. WDMA I.S.1-A Performance Grade: Heavy Duty.

2.4 DOORS FOR OPAQUE FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Premium.
 - 2. Faces: Select white birch.
 - a. Apply medium-density overlay to standard-thickness, closed-grain, hardwood face veneers.
 - b. Hardboard Faces: AHA A135.4, Class 1 (tempered) or Class 2 (standard).
 - c. MDF Faces: ANSI A208.2, Grade 150 or 160.
 - 3. Exposed Vertical Edges: Any closed-grain hardwood.
 - 4. Core: Either glued wood stave or structural composite lumber.
 - 5. Construction: Seven plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
 - 6. WDMA I.S.1-A Performance Grade: Heavy Duty.

2.5 LIGHT FRAMES

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.
 - 1. Wood Species: Same species as door faces.
 - 2. Profile: Manufacturer's standard shape.
 - 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

2.6 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.

- 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels: Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles.
 - 1. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings: Cut and trim openings through doors in factory.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
 - 3. Louvers: Factory install louvers in prepared openings.
- E. Exterior Doors: Factory treat exterior doors with water repellent after fabrication has been completed but before shop priming.
 - 1. Flash top of out swinging doors (with manufacturer's standard metal flashing).

2.7 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime doors with one coat of wood primer specified in Division 09 Section "Exterior Painting" and "Interior Painting". Seal all four edges, edges of cutouts, and mortises with primer.
- B. Doors for Transparent Finish: Shop prime doors with stain (if required), other required pretreatments, and first coat of finish as specified in Division 09 Section "Exterior Painting, Interior Painting and Staining and Transparent Finishing." Seal all four edges, edges of cutouts, and mortises with first coat of finish.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors. Provide 1/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated.
 - a. Comply with NFPA 80 for fire-rated doors.
 - 2. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
 - 3. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Access doors and frames for walls and ceilings.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, materials, individual components and profiles, and finishes.

B. Shop Drawings:

- 1. Include plans, elevations, sections, details, and attachments to other work.
- 2. Detail fabrication and installation of access doors and frames for each type of substrate.
- C. Samples: For each door face material, at least 3 by 5 inches (75 by 125 mm) in size, in specified finish.
- D. Product Schedule: Provide complete access door and frame schedule, including types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 - 1. Access Doors & Panels.
 - 2. Acudor Products, Inc.
 - 3. Best Access Doors.
- C. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.

D. Flush Access Doors with Exposed Flanges:

- 1. Basis-of-Design Product
 - a. Best Access Doors' General Purpose Access Door with Neoprene gasket (BA-AHD-60)
 - b. Or equal

2. Assembly Description

- a. Installation: Walls and ceilings
- b. Material: Cold rolled steel
- c. Locking Mechanism: Key operated cylinder cam latch in cold rolled steel
- d. Hinge: Hot rolled and stamped steel pin hinge
- e. Flange: Exposed flange
- f. Sizes: 22" x 30" and 22" x 22"
- 3. Locations: Ceiling.
- 4. Uncoated Steel Sheet for Door: Nominal 0.036 inch (0.91 mm), 20 gauge.
 - a. Finish: High quality white powder coat, primer
- 5. Frame Material: Cold rolled steel, 16 gauge thick, and finish as door.
- 6. Hinges: Manufacturer's standard.
- 7. Hardware: Lock.
- 8. Size: 22"x30".
- 9. Air-tightness; weatherstrip opening.

E. Hardware:

1. Latch/Lock: key operated cylinder cam latch.

2.2 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with coldrolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- D. Frame Anchors: Same type as door face.
- E. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. Provide mounting holes in frames for attachment of units to metal or wood framing.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
 - 1. For cylinder locks, furnish two keys per lock and key all locks alike.
- E. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 085313 VINYL WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes operable vinyl-double hung windows.

1.3 **DEFINITIONS**

- A. Performance class designations according to AMA/WDMA 101/I.S.2/NAFS:
 - 1. C: Commercial.
- B. Performance grade number according to AAMA/WDMA 101/I.S.2/NAFS:
 - 1. Design pressure number in pounds' force per square foot (pascals) used to determine the structural test pressure and water test pressure.
- C. Structural Test Pressure: For uniform load structural test, is equivalent to 150 percent of the design pressure.
- D. Minimum Test Size: Smallest size permitted for performance class (gateway test size). Products must be tested at minimum test size or at a size larger than minimum test size to comply with requirements for performance class.
- E. AAMA 506: "Voluntary Specifications for Hurricane Impact & Cycle Testing of Fenestration products".
- F. ASTM E1886 Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by Missile(s) and Exposed to Cyclic Pressure Differentials.
- G. E1996 Standard Specification for performance of Exterior Windows, Curtain Walls, Doors and Impact Protective Systems Impacted by windborne debris in Hurricanes.
- H. Glass Association of North America (GANA)
 - 1. GANA Glazing manual
 - 2. GANA Laminated Glazing Reference Manual
 - 3. Bulletin 01-0300- Proper Procedures for Cleaning Architectural Glass Products

1.4 PERFORMANCE REQUIREMENTS

A. General: Provide vinyl windows capable of complying with performance requirements indicated, based on testing manufacturer's windows that are representative of those specified, and that are of test size indicated below:

- 1. Size required by AAMA/WDMA 101/I.S.2/NAFS for gateway performance optional performance grade gateway performance for both gateway performance and optional performance grade.
- 2. Size indicated in a schedule.
- B. Structural Performance: Provide vinyl windows capable of withstanding the effects of the following loads, based on testing unit's representative of those indicated for Project that pass AAMA/WDMA 101/I.S.2/NAFS, Uniform Load Structural Test:
 - 1. Component & Cladding Design Wind Loads: Determine design wind loads applicable to Project from basic wind speed indicated in miles per hour at 33 feet above grade, according to ASCE 7, Section 6.5, "Method 2-Analytical Procedure," based on mean roof heights above grade indicated on Drawings.

a. Ultimate Wind Speed: 120mph.

b. Importance Factor: 1.15

c. Exposure Category: B.

1.5 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, fabrication methods, dimensions of individual components and profiles, hardware, finishes, and operating instructions for each type of vinyl window indicated.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware, attachments to other work, operational clearances, installation details, and the following:
 - 1. Mullion details, including reinforcement and stiffeners.
 - 2. Joinery details.
 - 3. Expansion provisions.
 - 4. Flashing and drainage details.
 - 5. Weather-stripping details.
 - 6. Glazing details, including laminations & Interlayer.
 - 7. Window cleaning provisions.
 - 8. For installed products indicated to comply with design loads, include structural analysis data prepared by or under the supervision of a qualified professional engineer detailing fabrication and assembly of vinyl windows, and used to determine structural test pressures and design pressures from basic wind speeds indicated.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
 - 1. Include similar Samples of hardware and accessories involving color selection.
- D. Samples for Verification: For vinyl windows and components required, prepared on Samples of size indicated below.
 - 1. Main Framing Member: 12-inch- long, full-size sections of window frame with factory-applied color finish.

- 2. Window Corner Fabrication: 12-by-12-inch long, full-size window corner including full-size sections of window frame with factory-applied color finish, weather stripping, and glazing.
- 3. Operable Window: Full-size unit with factory-applied finish.
- 4. Hardware: Full-size units with factory-applied finish.
- 5. Weather Stripping: 12-inch long sections.
- E. Product Schedule: For vinyl windows. Use same designations indicated on Drawings.
- F. Qualification Data: For Installer manufacturer.
- G. Product Test Reports: Based on evaluation of comprehensive tests performed within the last four years by a qualified testing agency for each type, class, grade, and size of vinyl window. Test results based on use of downsized test units will not be accepted.
- H. Maintenance Data: For operable window sash, operating hardware, weather stripping and finishes to include in maintenance manuals.
- I. Warranty: Special warranty specified in this Section.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to vinyl window manufacturer for installation of units required for this Project.
 - 1. Installer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 - 2. Engineering Responsibility: Preparation of data for vinyl windows, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Manufacturer Qualifications: A manufacturer capable of fabricating vinyl windows that meet or exceed performance requirements indicated and of documenting this performance by inclusion in lists and by labels, test reports, and calculations.
- C. Source Limitations: Obtain vinyl windows through one source from a single manufacturer.
- D. Product Options: Information on Drawings and in Specifications establishes requirements for vinyl windows' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
- E. Product Options: Drawings indicate size, profiles, and dimensional requirements of vinyl windows and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements." Do not modify size and dimensional requirements.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

- F. Fenestration Standard: Comply with AAMA/WDMA 101/I.S.2/NAFS, "North American Fenestration Standard Voluntary Performance Specification for Windows, Skylights and Glass Doors," for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Provide AAMA-certified vinyl windows with an attached label. Label shall indicate compliance with ASTM E 1996, Large Missile Test.
- G. Glazing Publications: Comply with published recommendations of glass manufacturers and with GANA's "Glazing Manual" unless more stringent requirements are indicated.
- H. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup for type(s) of window(s) indicated, in location(s) shown on Drawings.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify vinyl window openings by field measurements before fabrication and indicate measurements on Shop Drawings.
 - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish opening dimensions and proceed with fabricating vinyl windows without field measurements. Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, air infiltration, or condensation.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of vinyl, other materials, and finishes beyond normal weathering.
 - e. Failure of insulating glass.

2. Warranty Period:

- a. Window: 10 years from date of Substantial Completion.
- b. Glazing: 10 years from date of Substantial Completion.
- c. Vinyl Finish: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Double Glazed Low-E, Min Harvey- Classi Windows or a comparable product by one of the following:
 - 1. Harvey Industries
 - 2. Anderson Corporation
 - 3. Marvin Windows and Doors

2.2 MATERIALS

- A. Vinyl Extrusions: Rigid hollow PVC extrusions, formulated and extruded for exterior applications, complying with AAMA/WDMA 101/I.S.2/NAFS and the following:
 - 1. PVC Resins: 100 percent virgin resin.
 - 2. PVC Formulation: High impact, low heat buildup, lead free, non-chalking, and color and UV stabilized.
 - 3. Extrusion Wall Thickness: Not less than .070".
 - 4. Multi-chamber Extrusions: Profile designed with between interior and exterior faces of the extrusions.
- B. Vinyl Trim and Glazing Stops: Material and finish to match frame members.
- C. Fasteners: Aluminum, nonmagnetic stainless steel, epoxy adhesive, or other materials warranted by manufacturer to be noncorrosive and compatible with vinyl window members, cladding, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Unless unavoidable for applying hardware, do not use exposed fasteners. For application of hardware, use fasteners that match finish of member or hardware being fastened, as appropriate.
- D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- E. Reinforcing Members: Aluminum, or nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated.
- F. Compression-Type Weather Stripping: Provide compressible weather stripping designed for permanently resilient sealing under bumper or wiper action, and for complete concealment when vinyl window is closed.
 - 1. Weather-Stripping Material: Elastomeric cellular preformed gaskets complying with ASTM C 509.
 - 2. Weather-Stripping Material: Dense elastomeric gaskets complying with ASTM C 864.

- 3. Weather-Stripping Material: Manufacturer's standard system and materials complying with AAMA/WDMA 101/I.S.2/NAFS.
- G. Sliding-Type Weather Stripping: Provide woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric. Comply with AAMA 701/702.
- H. Weather Seals: Provide weather stripping with integral barrier fin or fins of semi rigid, polypropylene sheet or polypropylene-coated material. Comply with AAMA 701/702.
- I. Replaceable Weather Seals: Comply with AAMA 701/702.
- J. Inter Layer: Polyvinyl Butyral, min. 0.030 inches in thickness, clear.

2.3 WINDOWS

- A. Window Type: Double hung.
- B. AAMA/WDMA Performance Requirements: Provide vinyl windows of performance indicated that comply with AAMA/WDMA 101/I.S.2/NAFS.
 - 1. Performance Class: C.
- C. Thermal Transmittance: Provide vinyl windows with a whole-window, U-factor maximum indicated at 15-mph exterior wind velocity and winter condition temperatures when tested according to AAMA 1503.
 - 1. Maximum U-Factor: 0.27 Btu/sq. ft. x h x deg F.
- D. Solar Heat-Gain Coefficient (SHGC): Provide vinyl windows with a whole-window SHGC determined according to NFRC 200 procedures.
- E. Sound Transmission Class (STC): Provide glazed windows rated for not less than 34 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
- F. Air Infiltration: Maximum rate not more than indicated when tested according to AAMA/WDMA 101/I.S.2/NAFS, Air Infiltration Test.
 - 1. Maximum Rate: .17 cfm sq. ft. of area at an inward test pressure of 1.57 lb./sq. ft.
- G. Water Resistance: No water leakage as defined in AAMA/WDMA referenced test methods at a water test pressure equaling that indicated, when tested according to AAMA/WDMA 101/I.S.2/NAFS, Water Resistance Test.
 - 1. Test Pressure: Min: 5.4 PSF
- H. Forced-Entry Resistance: Comply with Performance Type B Grade 10 requirements when tested according to ASTM F 588.
- I. Life-Cycle Testing: Test according to AAMA 910 and comply with AAMA/WDMA 101/I.S.2/NAFS.
- J. Operating Force and Auxiliary (Durability) Tests: Comply with AAMA/WDMA 101/I.S.2/NAFS for operating window types indicated.

K. GLAZING

- L. Glass Clear, insulating-glass units, argon gas filled, with Low-E coating pyrolytic on second surface or sputtered on second or third surface. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal and complies with requirements for windborne-debris resistance.
- M. Laminated Glass: Provide laminated glass to meet impact-resistant project parameters.

2.4 HARDWARE

- A. General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with vinyl; designed to smoothly operate, tightly close, and securely lock vinyl windows, and sized to accommodate sash or ventilator weight and dimensions. Do not use aluminum in frictional contact with other metals. Where exposed, provide extruded, cast, or wrought aluminum.
- B. Counterbalancing Mechanism: Comply with AAMA 902.
 - 1. Sash-Balance Type: Concealed, spring-loaded, block-and-tackle type, of size and capacity to hold sash stationary at any open position.
- C. Sill Cap/Track: Rigid PVC or other weather-resistant plastic track with manufacturer's standard integral color, of thickness, dimensions, and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.
- D. Locks and Latches: Designed to allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.
- E. Roller Assemblies: Low-friction design.
- F. Push-Bar Operators: Provide telescoping-type, push-bar operator designed to open and close ventilators with fixed screens.

2.5 INSECT SCREENS

- A. General: Design windows and hardware to accommodate screens in a tight-fitting, removable arrangement, with a minimum of exposed fasteners and latches. Fabricate insect screens to fully integrate with window frame. Locate screens on outside of window and provide for each operable exterior sash or ventilator.
 - 1. Aluminum Tubular Frame Screens: Comply with SMA 1004, "Specifications for Aluminum Tubular Frame Screens for Windows," Residential R-20 class.
- B. Glass-Fiber Mesh Fabric: 18-by-14 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration, in the following color. Comply with ASTM D 3656.

1. Mesh Color: Charcoal gray.

2.6 FABRICATION

- A. Fabricate vinyl windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
 - 1. Welded Frame and Sash/Ventilator Corners: Miter-cut and fusion chemically welded.
- B. Fabricate vinyl 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.
 - 1. Double-Hung Windows: Provide weather stripping only at horizontal rails of operable sash.
- D. Sub-frames: Provide sub-frames with anchors for window units as shown, of profile and dimensions indicated but not less than 0.062-inch hick extruded aluminum. Miter or cope corners, and weld and dress smooth with concealed mechanical joint fasteners. Provide manufacturer's standard finish to match window units. Provide sub-frames capable of withstanding design loads of window units.
- E. Factory-Glazed Fabrication: Except for light sizes in excess of 100 united inches, glaze vinyl windows in the factory where practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing" and with AAMA/WDMA 101/I.S.2/NAFS. Fabricate laminated glass to be free of foreign substances and air or glass pockets.
- F. Glazing Stops: Provide nailed or snap-on glazing stops coordinated with Division 8 Section "Glazing" and glazing system indicated. Provide glazing stops to match sash and ventilator frames.
- G. Hardware: Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant steel reinforcement complying with requirements for reinforcing members, or do both.
- H. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

2.7 VINYL FINISHES

- A. Integral Finish and Color: Uniform, solid, homogeneous white interior and exterior.
- B. Organic Pigmented Finish: Manufacturer's standard finish, interior and exterior, complying with AAMA 613 and paint manufacturer's written specifications for cleaning and painting.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure a coordinated, weathertight window installation.
 - 1. Wood Frame Walls: Dry, clean, sound, well nailed, free of voids, and without offsets at joints. Ensure that nail heads are driven flush with surfaces in opening and within 3 inches of opening.
 - 2. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing windows, hardware, accessories, and other components.
- B. Install laminated glass in accordance with recommendations of GANA Glazing Manual and GANA Glazing Reference Manual.
- C. 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.
- D. Set sill members in bed of sealant or with gaskets, as indicated, for weathertight construction.
- E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and ventilators, screens, hardware, and accessories for a tight fit at contact points and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
- C. Clean factory-glazed glass immediately after installing windows. Comply with manufacturer's written recommendations for final cleaning and maintenance. Remove nonpermanent labels, and clean surfaces.
- D. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- E. Protect window surfaces from contact with contaminating substances resulting from construction operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact

window surfaces, remove contaminants immediately according to manufacturer's written recommendations.

END OF SECTION 085313

SECTION 086223 - TUBULAR DAYLIGHTING DEVICES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Tubular daylighting devices (TDD) and accessories.

1.2 RELATED SECTIONS

- A. Section 06 10 00 Wood Framing; Site built wood curbs and nailers.
- B. Section 07 31 00 Roof Shingles and Shakes: Flashing of skylight base.
- C. Section 07 32 00 Roof Tiles: Flashing of skylight base.
- D. Section 07 51 00 Built-Up Bituminous Roofing: Flashing of skylight base.
- E. Section 07 52 00 Modified Bituminous Membrane Roofing: Flashing of skylight base.
- F. Section 07 53 00 Electrometric Membrane Roofing: Flashing of skylight base.
- G. Section 07 54 00 Thermoplastic Membrane Roofing: Flashing of skylight base.
- H. Section 07 60 00 Flashing and Sheet Metal: Metal curb flashings.
- I. Section 08 60 00 Unit Skylights: Skylights without reflective tube.
- J. Section 08 63 00 Metal Framed Skylights.
- K. Section 23 30 00 HVAC Air Distribution: Fan vent duct and connections.
- L. Section 25 50 00 Integrated Automation Facility Controls. Lighting controllers.
- M. Section 26 05 00 Common Work Results Electrical. Power cable, power supply and electrical connections.
- N. Section 26 50 00 Lighting Equipment and Controls. Control cable, dimming controls, light bulbs, and lamps.

1.3 REFERENCES

- A. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA/WDMA/CSA 101/I.S.2/A440 Standard/Specification for Windows, Doors, and Unit Skylights; 2011.
- B. American National Standards Institute (ANSI):
 - 1. ANSI C63.4-2014 American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
- C. ASTM International (ASTM):
 - 1. ASTM A463/A463M Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process.
 - 2. ASTM A653/A653M Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process.

- 3. ASTM A792/A792M Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- 4. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- 5. ASTM D635 Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position.
- 6. ASTM D1929 Test Method for Ignition Properties of Plastics.
- 7. ASTM D2843 Standard Test Method for Density of Smoke from the Burning or Decomposition of Plastics.
- 8. ASTM F1642 Standard Test Method for Glazing and Glazing Systems Subject to Airblast Loading.
- 9. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
- 10. ASTM E108 Standard Test Methods for Fire Tests of Roof Coverings.
- 11. ASTM E283 Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- 12. ASTM E308 Standard Practice for Computing the Colors of Objects by Using the CIE System.
- 13. ASTM E330 Structural Performance of Exterior Windows, Curtain Walls, and Doors.
- 14. ASTM E547 Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain walls by Cyclic Air Pressure Difference.
- 15. ASTM E1886 Standard Test Method for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Missiles and Exposed to Cyclic Pressure Differentials.
- ASTM E1996 Standard Specification for Performance of Exterior Windows, Curtain Walls, Doors, and Impact Protective Systems Impacted by Windborne Debris in Hurricane.
- 17. ASTM F2912 Standard Specification for Glazing and Glazing Systems Subject to Airblast Loading.

D. Code of Federal Regulations (CFR):

1. CFR 47 - Code of Federal Regulations (CFR) Rules and Regulations for FCC, FCC Part 15 - Radio Frequency Devices, Subpart B - Unintentional Radiators, Section 15.107 - Conducted Limits, and 15.109 - Radiated Emission Limits

E. CSA Group (CSA):

- 1. CSA C22.2 No. 250.0 Luminaires.
- F. Factory Mutual (FM):
 - 1. FM Standard 4431 The Approval Standard for Skylights.

- G. Federal Emergency Management Agency (FEMA):
 - 1. FEMA P-361 Safe Rooms for Tornadoes and Hurricanes.
- H. General Services Administration (GSA):
 - 1. GSA-TS01-2003: Standard Test Method for Glazing and Window Systems Subject to Dynamic Overpressure Loadings.
- I. International Building Code (IBC):
 - 1. IBC Section 1710 Load Test Procedure for Wind Load Testing on Rooftop Daylight Collecting System Structural Performance Testing Devised by ATI PE); 2012.
 - 2. IBC Section 2606.7.2 Installation Diffuser Fall Out Test (Devised by PE); 2012.
- J. OSHA 29 CFR 1910.23 (e)(8) (Guarding Requirements for Skylights); 1926 Subpart M (Fall Protection); 1926.501(b)(4)(i); 1926.501(i)(2); 1926.501(b)(4)(ii).
- K. Unified Facilities Criteria (UFC):
 - 1. UFC 4-010-01, Change October 2013, DoD Minimum Antiterrorism Standards for Buildings.
- L. Underwriters' Laboratories (UL):
 - 1. UL 2108 Low Voltage Lighting Systems.

1.4 PERFORMANCE REQUIREMENTS

- A. Daylight Reflective Tubes: Spectralight Infinity with INFRAREDuction Technology combines ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance. Patented spectrally-selective optical surface yields an average total- and specular-reflectance for the Visible Light spectrum (400 nm to 700 nm) providing maximized visible light transmission and less than 25 percent reflectance for Infrared (IR) heat wavelengths (750 nm to 2500 nm) for minimized heat transmission, resulting in a spectrally-selective Total Solar Spectrum (250 nm to 2500 nm) reflectance less than 37 percent, as measured using a Perkin Elmer Lambda 1050 spectrophotometer with a Universal Reflectance Accessory. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance with ASTM
- B. SOLAMASTER 750 DS-O / 750 DS-C (OPEN/CLOSED CEILING)
 - 1. AAMA/WDMA/CSA 101/IS2/A440, Class CW-PG70, size tested 21 inch (530 mm) diameter, Type TDDOC and Type TDDCC.
 - a. Air Infiltration Test:

1) Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E283.

b. Water Resistance Test:

- Passes water resistance; no uncontrolled water leakage with a pressure differential of 10.7 psf (512 Pa) or 15 percent of the design load (whichever is greater) and a water spray rate of 5 gallons/hour/sf for 24 minutes when tested in accordance with ASTM E547 and ASTM E331.
- c. Uniform Load Test: All units tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E330.
 - 1) No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 70 psf (3.35 kPa).

2. Fall Protection Performance:

- a. Passes fall protection test: No penetration of dome or curb cap when subject to 400 lb (160 Kg)/42 inch (1066 mm) impact drop test when tested in accordance with OSHA 29 CFR 1926.506(c) Safety Net Systems.
- b. Passes fall protection test: California State OSHA Fall Protection Code of Regulations, Title 8, Section 3212 (e)(1) Skylight Screens.
- 3. Blast Resistance: ASTM F1642, ASTM F2912, GSA-TS01-2003, and UFC 4-010-01:
 - a. Airblast Loading ASTM Hazard Rating: Passes: No Hazard Rating
 - b. Airblast Loading UFC Level of Protection: Passes Medium Level of Protection
 - c. Dynamic Overpressure Loading ASTM Hazard Rating: Passes: No Hazard Rating
 - d. Dynamic Overpressure Loading UFC Level of Protection: Passes Medium Level of Protection

1.5 SUBMITTALS

- A. Submit under provisions of Section 13 00 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.

- 3. Data sheets showing roof dome assembly, flashing base, reflective tubes, diffuser assembly, and accessories.
- 4. Installation requirements.
- C. Shop Drawings. Submit shop drawings showing layout, profiles, and product components, including rough opening and framing dimensions, anchorage, roof flashings and accessories.
- D. Electrical wiring diagrams and recommendations for power and control wiring.
- E. Verification Samples: As requested by Architect.
- F. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.
- G. Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features:
 - 1. LED Luminaires: Include estimated useful life, calculated based on IES LM-80 test data.
 - 2. To meet LM-80 lifetime projections, LM-80 Max Drive Current must not be exceeded. Lumen maintenance and lifetime predictions are valid for drive current and case temperature conditions used for LM-80 testing as included in the applicable LM-80 test report for these products.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of twenty years experience in the top lighting industry. Secondary products shall be acceptable to the primary manufacturer.
- B. Installer Qualifications: All products shall be installed by a single installer with a minimum of five years demonstrated experience, with adequate equipment, skilled workers, and practical experience to meet the project schedule.
- C. Skylights shall conform with authorities having jurisdiction and be designed to meet design criteria of the project location and the following:
 - 1. Skylights must be certified by NFRC.
 - 2. Skylights must be Tested and labeled in accordance with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 3. Skylights must have Factory Mutual (FM) Approval Class Number 4431.
 - 4. On projects which fall under the jurisdiction of the Florida Building Code, Skylights are required to have a current Florida Building Code (FBC) Number to meet the High Velocity Hurricane Zone (HVHZ) requirements and are required for acceptance of Work specified in this section. Skylight must comply with the jurisdictional code body's submittal data and supporting drawings and documentation. Where the code body's acceptance criteria differs from these specifications regarding components and hardware, the code body's requirements shall govern.

- 5. Meet or exceed OSHA 200 pound (90 kg) Drop Tests expressed in 29 CFR 1910.23(e)(8)
- 6. Skylights shall provide minimum 69 psf (3.30 kPa) design load.
- D. Pre-Installation Meeting: Contractor shall convene a pre-installation meeting on the project site minimum one week before beginning work of this Section. The meeting shall include the Architect or Owner's Representative and representatives of all related trades to:
 - 1. Coordinate between the at least the following trades.
 - a. Roofing to install the flashing, skylight, and LED Light Kit (when specified). Cut holes in roof deck, and flash curb to deck.
 - b. Ensure clear paths for TDD units and coordinate with mechanical so not to interfere with pathways.
 - c. Electrical to wire components and program lighting controls.
 - 2. Verify project requirements and site logistics.
 - 3. Assess integrity of the roofing system and building structure.
 - 4. Review manufacturer's installation instructions and warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in a cool dry location protected from the weather and in the manufacturer's original unopened containers until ready for installation.
- B. Store products in manufacturer's unopened packaging until ready for installation.

1.8 PROJECT CONDITIONS

- A. Coordinate delivery schedule with the Contractor and project schedule to minimize on site storage.
- B. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
- C. Store materials in a dry area, protected from freezing, staining, contamination or damage.

1.9 WARRANTY

- A. Daylighting Device: Manufacturer's standard warranty for 10 years.
- B. Electrical Parts: Manufacturer's standard warranty for 5 years, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturer: Solatube International, Inc., which is located at: Solatube International 2210 Oak Ridge Way; Vista, CA 92081-8341; Toll Free Tel: 888-765-2882; Tel: (760) 477-1120; Fax: (760) 597-4488; Email: commsales@solatube.com; Web: http://www.solatube.com Commercial Distributor for New England Willco Sales www.willcosales.com ph (203) 366-3895 or an Approved Equivalent.
- B. Substitution requests must be accompanied by a photometric light study based on historical weather data to prove design intent.

2.2 TUBULAR DAYLIGHTING DEVICES

- A. Tubular Daylighting Devices General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16.
- B. SolaMaster Series: Solatube Model 750 DS (or Approved Equivalent), 21 inch (530 mm) Daylighting System:

1. Model:

a. Solatube Model 750 DS-C Closed (Penetrating) Ceiling. AAMA Type TDDCC.

2. Capture Zone:

- a. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.
 - 1) Outer Dome Glazing: Type DA, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend.
 - a) Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.
 - 2) Acrylic Dome plus Inner Dome Glazing: Type DAI, Inner Dome is 0.115 inch (3 mm) minimum thickness acrylic classified as CC2 material.
- b. Tube Ring: 0.090 inch (2.3 mm) nominal thickness injection molded ASA. Prevents thermal bridging between base flashing and tubing and channel condensed moisture. Attached to base of dome ring with butyl glazing rope 0.24 inch (6 mm) diameter; to minimize air infiltration.

c. Dome Seal: Adhesive backed weatherstrip, 0.63 inch (16 mm) tall by 0.28 inch (7 mm) wide.

3. Flashings:

- a. Roof Flashing Base:
 - 1) One Piece: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube. Sheet steel, corrosion resistant conforming to ASTM A653/A653M or ASTM A463/A463M or ASTM A792/A792M, 0.028 inch (0.7 mm) plus or minus .006 inch (.015 mm) thick.
 - a) Base Style: Type F8, Self-Mounted, 8 inches (203 mm) high.

b. Flashing Options:

1) Flashing Insulator: Type FI, Thermal isolation material is for use under the following flashing types: Type F4, F8, or F11.

4. Transfer Zone:

- a. Extension Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm) conforming to ASTM B 209.
 - 1) Reflective Tubes:
 - a) Reflective extension tube, Type EXX and Type EL with total length of run as indicated on the Drawings.
 - b) Interior Finish: Spectralight Infinity with INFRAREDuction Technology combining ultra-high Visible Light reflectance with Ultra-low Infrared (IR) reflectance.

2) Tube Options

a) Top Tube Angle Adapter and Bottom Tube Angle Adapter Kit: Type AK, Reflective 45 degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long

5. Delivery Zone:

a. Diffuser Assemblies for Tubes Penetrating Ceilings: Solatube Model 750 DS-C. Ceiling mounted box transitioning from round tube to square ceiling assembly, supporting light transmitting surface at bottom termination of tube; 23.8 inches by 23.8 inches (605 mm by 605 mm) square frame to fit standard suspended ceiling grids or hard ceilings.

- 1) Polymeric Transition Box: Type TP, round-to-square transition box made of opaque polymeric material, classified as CC2, Class C, 0.110 inch (2.8 mm) thick.
- 2) Lens: Type L5 (Wide), OptiView Micro-replicated lens design to maximize light output and diffusion. Visible Light Transmission shall be greater than 90 percent at 0.022 inch (0.6 mm) thick. Classified as CC2.
- 3) Supplemental Natural Effect Lens Type LN, Lens made of acrylic, classified as CC2, Class C, 0.060 inch (1.5 mm) thick, with open cell foam seal to minimize condensation and bug, dirt, and air infiltration per ASTM E283.

2.3 ACCESSORIES

- A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.
- B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.
- C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Examine openings, substrates, structural support, anchorage, and conditions for compliance with requirements for installation tolerances and other conditions.
- C. If substrate and rough opening preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Coordinate requirements for power supply, conduit, and wiring.
- C. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions.
- B. Installer must wear sunglasses.
- C. Coordinate installation with substrates, air and vapor retarders, roof insulation, roofing membrane, and flashing to ensure that each element of the Work performs properly, and that finished installation is weather tight.

- 1. Install flashing to produce weatherproof seal with curb and overlap with roofing system termination at top of curb.
- 2. Provide thermal isolation when components penetrate or disrupt building insulation. Pack fibrous insulation in rough opening to maintain continuity of thermal barriers.
- 3. Coordinate attachment and seal of perimeter air and vapor barrier material.
- D. Where metal surfaces of tubular unit skylights will contact incompatible metal or corrosive substrates, including preservative-treated wood, provide permanent separation as recommended by manufacturer
- E. Align device free of warp or twist, maintain dimensional tolerances.
- F. Inspect installation to verify secure and proper mounting. Test each fixture to verify operation, control functions, and performance. Correct deficiencies.

3.4 FIELD QUALITY CONTROL

- A. Provide independent testing and inspection as specified in Section 01 45 23. Inspect installation to verify secure and proper mounting.
 - 1. Test for water leaks in accordance with AAMA 502 after installation and curing of sealants but prior to installation if interior finishes.
 - 2. Perform test for total area of each unit skylight.
 - 3. Notify the Architect and the Contractor of any failed tests.

3.5 CLEANING

A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.

3.6 PROTECTION

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

086223 - END OF SECTION

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Definition: "Finish Hardware" includes items known commercially as finish hardware which are required for swing, sliding and folding doors, except special types of unique and non-matching hardware specified in the same section as the door and door frames.
- B. Extent of finish hardware required is indicated on drawings and in schedules.
- C. Related Work Specified Elsewhere: The following work is not included in this Section and is to be performed under the designated Sections:
 - 1. Division 6 Section, Finish Carpentry.
 - 2. Division 6 Section, Architectural Woodwork.
 - 3. Division 8 Section, Wood Doors.
 - 4. Division 8 Section, Aluminum Doors.
- D. Types of finish hardware required (but are not limited to) include the following:
 - 1. Hinges
 - 2. Key Control System
 - 3. Lock Cylinders and Keys
 - 4. Lock and Latch Sets
 - 5. Bolts
 - 6. Exit Devices
 - 7. Push/Pull Units
 - 8. Closers
 - 9. Overhead Stops and Holders
 - 10. Miscellaneous Door Control Devices
 - 11. Door Trim Units
 - 12. Protection Plates
 - 13. Weather stripping for exterior doors
 - 14. Sound Seal for interior doors
 - 15. Automatic Door Bottoms
 - 16. Astragals
 - 17. Thresholds
 - 18. Silencers.

1.3 QUALITY ASSURANCE:

A. Finish hardware shall be of best grade solid metal entirely free from imperfections in manufacture and finish and shall be guaranteed by the hardware supplier to satisfactorily perform the necessary functions required of it for a period of one (1) year from the date of Substantial Completion of the Project.

- B. Manufacturer: Obtain each type of hardware (latch and locksets, hinges, closers, etc.) from a single manufacturer, although several may be indicated as offering products complying with requirements.
- C. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than five (5) years, and who is, or who employs an experienced architectural hardware consultant (AHC) who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor.
 - Require supplier to meet with Owner to finalize keying requirements and to obtain final instructions in writing.
- D. Fire Rated Openings: Provide hardware for fire rated openings in compliance with the most recent edition of NFPA Standard No. 80, local building code requirements and the authority having jurisdiction. Provide only hardware which has been tested and listed by UL or FM for types and sizes of doors required and complies with requirements of door and door frame labels.
 - 1. Where emergency exit devices are required on fire rated doors (with supplementary marking on doors' UL or FM labels indicating "Fire Exit Hardware") provide UL or FM label on exit devices indicating "Fire Exit Hardware"

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's technical product data for each item of hardware in accordance with Conditions of Contract and Division 1 section "Submittals". Include whatever information may be necessary to show compliance with requirements and include instructions for installation and for maintenance of operating parts and finish.
- B. Hardware Schedule: Submit final hardware schedule in manner indicated below. Coordinate hardware with doors, frames and related work to ensure proper size, thickness, hand, function and finish of hardware.
 - 1. Final Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening.
 - a. Type, style, function, size and finish of each hardware item.
 - b. Name and manufacturer of each item.
 - c. Fastenings and other pertinent information.
 - d. Location of each hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
 - e. Explanation of all abbreviations, symbols and codes contained in schedule.
 - f. Mounting locations for hardware.
 - g. Door and frame sizes and materials.
 - 2. Submittal Sequence: Submit final schedule at earliest possible date particularly where acceptance of hardware schedule must precede fabrication of other work which is critical in the Project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule.
 - 3. Keying Schedule: Submit separate detailed schedule indicating clearly how the Owner's final instructions on keying of locks has ben fulfilled.

C. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware within fifteen (15) days of receipt of approved hardware schedule. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

1.5 PRODUCT HANDLING:

- A. Tag each item or package separately with identification related to final hardware schedule and include basic installation instructions with each item or package.
- B. Packaging of hardware is the responsibility of the supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or more identical sets may be packed in same container.
- C. Inventory hardware jointly with representatives of hardware supplier and hardware installer until each is satisfied that count is correct.
- D. Deliver individually packaged hardware items at the proper times to the proper locations (project site) for installation.
- E. Provide secure lock-up and shelving for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items which are not immediately replaceable, so that completion of the Work will not be delayed by hardware losses, both before and after installation.
- F. The Trade Contractor shall be responsible for all items of hardware after receipt from the hardware supplier and shall replace all lost or damaged items. The Trade Contractor shall furnish the hardware supplier with written receipt of all hardware received.

1.6 MAINTENANCE

A. Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 MATERIALS AND FABRICATION, GENERAL

- A. Base metals: Produce hardware nits of basic metal and forming method indicated using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser (commercially recognized) quality than specified for applicable hardware units for finish designations indicated.
- B. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.
- C. Furnish screws for installation with each hardware item. Provide Phillips flat head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match the hardware finish or, if exposed surfaces of other work, to match finish of this other work as closely as possibly, including "prepared for paint" surfaces to receive painted finish.
- D. Provide concealed fasteners for hardware units which are exposed when door is closed, except to the extent no standard units of type specified are available with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each through bolt or use screw fasteners.

2.2 MANUFACTURERS

Subject to compliance with requirements, provide products by one of the following. Where one manufacturer is listed, no substitution will be allowed for that product category, with no exceptions.

Hinges and Pivots

McKinney

Stanley Hardware

Hager

Locksets, Latch Sets and Deadbolts

Sargent

Corbin

Schlage

Exit Devices

Sargent

Corbin

Von Duprin

Push/Pull Units

Rockwood Manufacturing Company

Ivew

Trimco

Door Closers

Sargent

Corbin

LCN

Kick, Mop, Push, Pull and Armor Plates

Rockwood Manufacturing Company

Ives

Trimco

Weather Stripping and Seals, Thresholds, Astragals

National Guard Products, Inc.

Pemko Manufacturing Company, Inc.

Reese Enterprises, Inc.

2.3 BUTT HINGES:

- A. General: Butt hinges shall be five knuckle, button tip standard weight two bearing McKinney TA, or heavy weight McKinney T4A four bearing full mortise template type with non-rising pins as listed in the hardware sets.
 - a. Height 5: for doors wider than 3'4".
 - b. Height 4-1/2" for doors 3'4" wide and under.
 - c. Width 4-1/2" for standard and heavy weight.

- d. Width 5" for doors more than 1-3/4" in thickness.
- B. Number of Hinges: Furnish 2 hinges for each door up to an including 60 inches or less in height and one hinge for each 30 inches of additional height or fraction thereof. Dutch doors shall be provided with four hinges.
 - Fire Rated Doors: Not less than 3 hinges per door leaf for doors 86 inches or less in height with same rule for additional hinges.
- C. Finish: 652, satin chrome.

2.4 KEYING AND KEY CONTROL SYSTEM

A. Keying: Provide keys of nickel silver only. Furnish 3 change keys for each cylinder. All cylinders shall be keyed as directed by Owner.

2.5 CLOCKS AND LATCH SETS

- A. Bored locks shall be Sargent 10 Line with LL trim design. Mortise locks shall be Sargent 8200 series, LL trim design. Finish shall be 626, satin chrome. Functions shall be as noted in the hardware sets at the end of this Section.
- B. Provide steel wrought strike boxes and curved lip strikes with proper lip length to protect trim of the frame, but not to project more than 1/8" beyond frame trim or the inactive leaf of a pair of doors.
- C. Tactile warning shall be factory machined on the back of the lever, denoted as knurled in the individual hardware groups at the end of this Section. Abrasive tape or coating will not be accepted.
- D. Lock functions shown in the hardware sets represent basic requirements. The Owner shall be the final judge of the lock function required at any given opening.

2.6 EXIT DEVICES

- A. Exit devices shall be Sargent 80 Series with ETL outside trim. Finish shall be stainless steel 630. Functions shall be as noted in the hardware sets at the end of this Section.
- B. Rim exit devices shall be Sargent 8800 Series. All devices shall be furnished with flush end caps (43 prefix).
- C. Exit devices shall be "UL" listed for life safety. All exit devices for labeled doors shall a "UL" label for "Fire Exit Hardware".
- D. Exit device rails shall be sized for each application by the manufacturer. Field modification will not be allowed.
- E. Except on fire rated doors, devices shall be equipped with 16-prefix cylinder operated dogging feature.
- F. Exit device functions shown in the hardware sets represent basic requirements. The Owner shall be the final judge on the lock function required at any given opening.

2.7 DOOR CLOSERS

A. Door Closers shall be Sargent 351 Series with adjustable spring and full cover. Latching speed, closing speed and back check shall be controlled by separate valves. Spring power shall be capable of being increased in each size. Provide necessary arms, brackets, drop plates as required. Closers shall be supplied with mounting hardware in order to be installed in least visible configuration to corridors, public ways, wan to the exterior. Finish shall be 689.

- B. Size of units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use. Where parallel arm mounting will be utilized, provide closer unit one size larger than recommended for use with standard arm applications.
- C. Where manual closers are indicated for doors required to be accessible to the physically handicapped, provide adjustable units complying with ANSI A117.1 provisions for door opening force and delayed action closing.
- D. Closers installed on outswing corridor doors shall be mounted so as to be able to swing 180 degrees, as so noted on the Plans.

2.8 DOOR STOPS AND HOLDERS

- A. Place door stops in such a position that they permit maximum door swing, but do not present a hazard or obstruction.
- B. Where "Door Stop" is specified in schedule, provide stop appropriate to use and surfaces.
- C. Wall stops shall be Rockwood Model 409. Floor stops shall be Rockwood 440 or 442. Finish shall be 630. Provide fasteners suitable for the substrate to which the specified stops are to be applied.
- D. Overhead stops shall be Rixson 10 Series. Finish shall be 6 52.

2.9 KICK PLATES, MOP PLATES, ARMOR PLATES, PULL/PUSH PLATES:

- A. Kick plates shall be Rockwood, 8: high by 2" less than door width. Kick plates shall be 18 gauge (.050") thick. For doors with louvers, narrow bottom rails, or other obstructions, kick plate height shall be 1: less than the dimension shown from the bottom of the door to the bottom of the louver or glass.
- B. Finish: 630, satin stainless steel.

2.10 FLUSH BOLTS, DUST PROOF STRIKES

- A. Manual flush bolts shall be Rockwood Model 550/555/557.
- B. Furnish dust proof strike Model 570 for all bottom bolts.
- C. Finish for flush bolts and strikes shall be 626 satin chrome.

2.11 WEATHERSTRIPPING, GASKETING AND THRESHOLDS

- A. Door bottoms shall be Pemko Model 315DN.
- B. Head and jamb gasketing shall be Pemko Model 305DR.
- C. Meeting stile gasketing shall be Pemko Model S771.
- **D.** Thresholds shall be as listed in the hardware sets.

2.12 EXIT LOCKS AND EXIT ALARMS

A. Furnish door silencers at all openings not specified with weather-stripping or sound seals. Provide four at each pair of doors and three for each single door. Silencers shall be Rockwood 608 type for hollow metal frames, 609 type for wood frames. Stick on silencers are not acceptable.

2.13 FINISH

A. Hardware generally shall be satin chrome 626.

- 1. Thresholds Aluminum
- 2. Door Closers 689
- 3. Hinges -652

PART 3 - EXECUTION

3.1 INSTALLATION

- A. The finish hardware installer shall receive, check and store all finish hardware. A written report of missing hardware shall be submitted to the finish hardware supplier within ten days of receipt of material.
- B. Mount hardware units at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.
 - 1. "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.
 - 2. NWWDA Industry Standard I.S.1.7, "Hardware Locations for Wood Flush Doors".
- C. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface mounted items until finishes have been completed on the substrates involved.
- D. Set units level, plumb, and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operations.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.
- F. Set thresholds for exterior doors in full bed of butyl-rubber or polyisobutylene mastic sealant.
- G. Weather stripping and Seals: Comply with manufacturer's instructions a recommendation to the extent installation requirements are not otherwise indicated.

3.2 ADJUSTING, CLEANING, AND DEMONSTRATING

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made.
- B. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- C. Clean adjacent surfaces soiled by hardware installation.
- D. Instruct Owner's personnel in the proper adjustment and maintenance of door hardware and hardware finishes.
- E. Six-Month Adjustment: Approximately six months after the date of Substantial Completion, the Installer, accompanied by representatives of the manufacturers latch sets and locksets and of door

control devices, and of other major hardware suppliers, shall return to the project to perform the following work:

- 1. Examine and re-adjust each item of door hardware as necessary to restore function of doors and hardware to comply with specified requirements.
- 2. Consult with and instruct Owner's personnel in recommended additions to the maintenance procedures.
- 3. Replace hardware items that have deteriorated or failed due to faulty design, materials, or installation of hardware units.
- 4. Prepare a written report of current and predictable problems (of substantial nature) in the performance of the hardware.

3.3 HARDWARE SCHEDULE

- A. General: Provide hardware for each door to comply with requirements of Section "Finish Hardware", hardware set numbers indicated in door schedule, and in the following schedule of hardware sets.
- B. The following schedule lists typical openings. It is the responsibility of the Finish Hardware Supplier to visit the site, examine the drawings and door schedule and provide all necessary hardware as shown. Where specified hardware is not indicated or scheduled for an opening, provide the same hardware required for similar doors, openings and conditions elsewhere in the building. It shall be the responsibility of the Contractor and finish hardware supplier to furnish and install all such hardware, whether or not indicated herein.
- C. As part of the submittal process, the Contractor and Finish Hardware Supplier shall inspect all doors and frames to confirm that the specified hardware will work in existing conditions. The initial hardware schedule submittal shall show components meeting the above requirements If necessary, the Finish Hardware Supplier shall advise the Contractor of modifications necessary to accept new hardware. The Contractor shall be responsible for making all required modifications. Additional charges will not be accepted for material scheduled and shipped which is not compatible upon installation.
- D. Quantities shown in these hardware sets represent basic requirements for each lear. The finish hardware supplier shall be responsible for adjustments to quantities to suit existing field conditions or these specifications.

HWS 1

	<u>HWS 1</u>				
DOORS C	Offices				
EACH DOOR TO HAVE					
3 EA. BUTTS 1 EA. LOCKSE 1 EA. DOOR C 1 EA. KICK PL 1 EA. DOOR S 3 EA. DOOR S	TT 2 LOSER 3 .ATE 8 TOP 4	ΓA2714 4 1/2" x 4 1/2" 28-10G05LL 351-UO 8" X 2" LTDW X B4E X CSK 442/409 508	652 626 689 630 630 GRAY	MCKINNEY SARGENT SARGENT ROCKWOOD ROCKWOOD ROCKWOOD	
AT DOOR #17					
1 EA. FLOOR T	ΓILE EDGE I	RENO-TK	SATIN ANODIZE ALUM.	SCHLUTER SYTEMS D	
<u>HWS 2</u>					
DOORS C	Sym. Kitchen				
EACH DOOR TO) HAVE				
3 EA. BUTTS 1 EA. PASSAG 1 EA. DOOR C 1 EA. KICK PL 1 EA. DOOR S' 3 EA. DOOR S	E SET 2 LOSER 3 .ATE 8 TOP 4	TA2714 4 1/2" X 4 1/2" 28-10U15LL 351-UO 8" X 2" LTDW X B4E X CSK 442/409 508	652 626 689 630 630 GRAY	MCKINNEY SARGENT SARGENT ROCKWOOD ROCKWOOD	
<u>HWS 3</u>					
DOORS B	Bathroom				
EACH DOOR TO	HAVE				
3 EA. BUTTS 1 EA. PRIVAC 1 EA. DOOR C 1 EA. KICK PL 1 EA. DOOR S' 3 EA. DOOR S	Y	TA2714 4 1/2" X 4 1/2" 49-8265LL 351-UO 8" X 2" LTDW X B4E X CSK 442/409	652 626 689 630 630 GRAY	MCKINNEY SARGENT SARGENT ROCKWOOD ROCKWOOD	

NOTE: PRIVACY SET TO HAVE OCCUPANCY INDICATOR (49 PREFIX).

HWS 4

DOORS Double Flush Closets					
EACH DOOR TO HAVE					
6 EA. BUTTS 2 EA. FLUSH BOLTS 1 EA. DUST PROOF STRIKE	TA2714 4 1/2" X 4 1/2" 550/555 570	652 626 626	MCKINNEY ROCKWOOD ROCKWOOD		
1 EA. LOCKSET 1 EA. DUMMY LEVER 2 EA. OVERHEAD STOPS 2 EA. DOOR SILENCERS	28-10G05LL 10U93LL 10-136 608	626 626 652 GRAY	SARGENT SARGENT RIXSON ROCKWOOD		
<u>HWS 5</u>					
DOORS Single Flush Closets					
EACH DOOR TO HAVE					
3 EA. BUTTS 1 EA. LOCKSET 1 EA. KICK PLATE 3 EA. DOOR SILENCERS	TA2714 4 1/2" x 4 1/2" 28-10G05LL 8" X 2" LTDW X B4E X CSK 608	652 626 630 GRAY	MCKINNEY SARGENT ROCKWOOD ROCKWOOD		
<u>HWS 6</u>					
DOOR Exterior Exit Doors					

EACH DOOR TO HAVE

3 EA.	BUTTS	TA2714 4 1/2" x 4 1/2"	652	MCKINNEY
1 EA. 1 EA. 1 EA. 1 EA.	RIM EXIT DEVICE RIM EXIT DEVICE DOOR CLOSERS DROP PLATES KICK PLATES	43-16-AD8504-ETL 43-16-AD8510-ETLDT 351-CPS 351D 8" X 1" LTDW X B4E X CSK	630 630 689 689	SARGENT SARGENT SARGENT SARGENT ROCKWOOD
I EA.	THRESHOLD	2005AT	AL	PEMKO

NOTE: WEATHERSTRIPPING BY DOOR SUPPLIER.

626

626

652

GRAY

SARGENT

SARGENT

ROCKWOOD

RIXSON

HWS 7

DOORS Single Flush T	ax Closet				
EACH DOOR TO HAVE					
3 EA. BUTTS 1 EA. LOCKSET 1 EA DEADBOLT 1 EA. KICK PLATE 3 EA. DOOR SILENCERS	TA2714 4 1/2" x 4 1/2" 28-10G05LL 485 8" X 2" LTDW X B4E X CSK 608	652 626 626 630	MCKINNEY SARGENT SARGENT ROCKWOOD		
<u>HWS 8</u>					
DOORS Double Flush Closets 7' 0" X 7' 0" DOORS					
EACH DOOR TO HAVE					
8 EA. BUTTS 2 EA. FLUSH BOLTS 1 EA. DUST PROOF STRIKE	TA2714 3 1/2" X 3 1/2" 550/555 570	652 626 626	MCKINNEY ROCKWOOD ROCKWOOD		

1-7605LL

7U93LL

608

1 EA. LOCKSET

1 EA. DUMMY LEVER

2 EA. DOOR SILENCERS

2 EA. OVERHEAD STOPS 10-136

END OF SECTION 087100

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior gypsum board.
 - 2. Tile backing panels.

B. Related Requirements:

1. Division 09 Section "Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying 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 GYPSUM BOARD, GENERAL

- A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- C. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site.
- D. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corp.
 - 2. Georgia-Pacific Gypsum LLC.
 - 3. USG Corporation.
- B. Gypsum Board: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Long Edges: Tapered.
- C. Gypsum Board, Type X: ASTM C 1396/C 1396M.
 - 1. Thickness: 5/8 inch (15.9 mm).
 - 2. Long Edges: Tapered.

- D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
 - 1. Core: 5/8 inch (15.9 mm), Type X.
 - 2. Long Edges: Tapered.
 - 3. Mold Resistance: ASTM D 3273, score of 10.

2.4 TILE BACKING PANELS

- A. Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corp.
 - b. Georgia-Pacific Gypsum LLC.
 - c. USG Corporation.
 - 2. Core: 5/8 inch (15.9 mm), Type X.

2.5 TRIM ACCESSORIES

A. GENERAL: Provide manufacturer's standard trim accessories of types indicated for drywall work, formed of galvanized steel unless otherwise indicated, with either knurled and perforated or expanded flanges for nailing or stapling, and beaded for concealment of flanges in joint compound. Provide corner beads, L-type edge trim-beads, U-type edge trim-beads, and one-piece control joint beads.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape: Perforated type.
- C. Joint Compound: Ready-mix vinyl type for interior use Grade: 2 separate grades: one specifically for bedding tapes and filling depression, and on for topping and sanding.
- D. Joint Compound for Tile Backing Panels:
 - 1. Cementitious Backer Units: As recommended by backer unit manufacturer.
 - 2. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.7 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

- 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
- 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.
- C. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and framing, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc., except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at

- these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: Type X, where indicated on drawings.
 - 2. Wallboard Type: Standard.
 - 3. Moisture- and Mold-Resistant Type: Greenboard.

B. Single-Layer Application:

- 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
- 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
- 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 APPLYING TILE BACKING PANELS

- A. Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at showers, walls with plumbing fixtures, kitchen areas and locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
- F. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.
- G. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 APPLYING TEXTURE FINISHES

- A. 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.
- B. 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.
- C. 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.

3.8 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Ceramic tile.
 - 2. Stone thresholds.
 - 3. Waterproof membrane.
 - 4. Tile backing panels.
 - 5. Metal edge strips.

B. Related Sections:

- 1. Division 07 Section "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
- 2. Division 09 Section "Gypsum Board" for glass-mat, water-resistant backer board.

1.3 **DEFINITIONS**

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM A 137.1:
 - 1. Level Surfaces: Minimum .60.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- D. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches (300 mm) square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
 - 3. Full-size units of each type of trim and accessory for each color and finish required.
 - 4. Stone thresholds in 6-inch (150-mm) lengths.
 - 5. Metal edge strips in 6-inch (150-mm) lengths.
- E. Qualification Data: For qualified Installer.
- F. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- G. Product Certificates: For each type of product, signed by product manufacturer.
- H. Material Test Reports: For each tile-setting and -grouting product and special purpose tile.

1.6 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 - 1. Stone thresholds.
 - 2. Waterproof membrane.
 - 3. Crack isolation membrane.
 - 4. Joint sealants.

- 5. Cementitious backer units.
- 6. Metal edge strips.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.9 EXTRA MATERIALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards

- referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - 1. Where tile is indicated for installation in wet areas, do not use back- or edgemounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful inservice performance.
- E. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

- A. Tile Type CT-1 Floor Tile (bathrooms): Factory-mounted glazed ceramic tile.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile color body porcelain keystones, group 1 & 2.
 - a. American Olean; Division of Dal-Tile International Inc.
 - b. Daltile; Division of Dal-Tile International Inc.
 - c. Lone Star Ceramics Company.
 - d. Seneca Tiles, Inc.
 - 3. Composition: Porcelain.
 - 4. Module Size: 2 by 2 inches (50.8 by 50.8 mm).
 - 5. Thickness: 1/4 inch (6.35 mm).
 - 6. Face: Plain Pattern of design indicated, with cushion edges.
 - 7. Surface: Slip-resistant, with abrasive admixture.
 - 8. Finish: Mat, opaque glaze.
 - 9. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
 - 10. Grout Color: As selected by Architect from manufacturer's full range.
 - 11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:

a. Base Cove: Cove, module size 2 by 2 inch. (6" High)

- b. Base Cap for Portland Cement Mortar Installations: Bead (bullnose), module size 2 by 2 inch.
- c. Base Cap for Thin-Set Mortar Installations: Surface bullnose, module size 2 by 2 inches (50.8 by 50.8 mm).
- d. External Corners for Thin-Set Mortar Installations: Surface bullnose, module size 2 by 2 inches (50.8 by 50.8 mm)].
- e. Internal Corners: Cove, module size 2 by 1 inch (50.8 by 25.4 mm).
- f. Internal Corners: Field-butted square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.
- g. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from 1/2 to 1/4 inch (12.7 to 6.35 mm) across nominal 4-inch (100-mm) dimension.
- B. Tile Type CT-2 Floor Tile (lobby): Factory-mounted glazed ceramic tile.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 2. Basis-of-Design Product: Daltile Articulo product group or approved equivalent from the following manufacturers;
 - a. Daltile; Division of Dal-Tile International Inc.
 - b. Lone Star Ceramics Company.
 - c. Seneca Tiles, Inc.
 - 3. Composition: Porcelain.
 - 4. Module Size: 12 by 24 inches.
 - 5. Thickness: 5/16 inch (6.35 mm).
 - 6. Face: Plain Pattern of design indicated, with cushion edges.
 - 7. Surface: Slip-resistant, with abrasive admixture.
 - 8. Finish: Matte, opaque glaze.
 - 9. Tile Color and Pattern: As selected by Architect from manufacturer's full range .
 - 10. Grout Color: As selected by Architect from manufacturer's full range.
 - 11. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base: 3x24 Bullnose Base.
 - b. Internal Corners: Field-butted square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.
 - c. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from 1/2 to 1/4 inch (12.7 to 6.35 mm) across nominal 4-inch (100-mm) dimension.
- C. Tile Type CT-3: Glazed wall tile.

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide Daltile glazed ceramic mosaic "Permatones and Permabrites, or comparable product by one of the following:
 - a. American Marazzi Tile, Inc.
 - b. American Olean; Division of Dal-Tile International Inc.
 - c. Daltile; Division of Dal-Tile International Inc.
 - d. Florim USA.
 - e. Seneca Tiles, Inc.
- 2. Module Size: 2 by 2.
- 3. Thickness: ½ inch.
- 4. Face: Pattern of design indicated, with manufacturer's standard edges.
- 5. Finish: Bright, opaque.
- 6. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
- 7. Grout Color: As selected by Architect from manufacturer's full range.
- 8. Mounting: Factory, back mounted.
- 9. Mounting: Pregrouted sheets of tiles factory assembled and grouted with manufacturer's standard white silicone rubber.
- 10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:
 - a. Base for Thin-Set Mortar Installations: Straight, module size 2x2.
 - b. Wainscot Cap for Thin-Set Mortar Installations: Surface bullnose, module size 2x2 inches.
 - c. External Corners for Thin-Set Mortar Installations: Surface bullnose, same size as adjoining flat tile.
 - d. Internal Corners: Field-butted square corners. For coved base and cap use angle pieces designed to fit with stretcher shapes.

2.3 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.
 - 1. mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Marble Thresholds: ASTM C 503, with a minimum abrasion resistance of 12 per ASTM C 1353 or ASTM C 241 and with honed finish.
 - 1. Description: Uniform, fine- to medium-grained white stone with gray veining.

2.4 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. C-Cure; C-Cure Board 990.
 - b. Custom Building Products; Wonderboard.
 - c. USG Corporation; DUROCK Cement Board.
 - 2. Thickness: 1/2 inch (12.7 mm) As indicated.

2.5 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.
 - 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. Boiardi Products; a QEP company; Elastiment 323 Cement Based Waterproofing, Anti-Fracture/Crack Suppression Membrane.
 - b. C-Cure; UltraCure 971.
 - c. MAPEI Corporation; Mapelastic (PRP 315).
 - d. Southern Grouts & Mortars, Inc.; Southcrete 1100.
 - e. TEC; a subsidiary of H. B. Fuller Company; Triple Flex Waterproofing, Crack Isolation Membrane & Mortar.

2.6 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.
 - 1. Products: Subject to compliance with requirements, provide the following or approved equal: Basis of design Laticrete Hydroban (2 coats)
 - a. Bostik, Inc.; Hydroment Gold.
 - b. C-Cure; Pro-Red Waterproofing Membrane 963.
 - c. Southern Grouts & Mortars, Inc.; Southerete 1100 Crack Suppression and Waterproofing.

d. Laticrete Hydroban (2 coats)

2.7 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
 - 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:
 - 2. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete 254 platinum adhesive:
 - a. Boiardi Products; a QEP company.
 - b. Bonsal American; an Oldcastle company.
 - c. C-Cure.
 - d. Laticrete International, Inc.
 - e. MAPEI Corporation.
 - 3. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 - 4. Provide prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site.
 - 5. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.8 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Laticrete spectra lock epoxy grout or comparable product by one of the following:
 - a. Boiardi Products; a QEP company.
 - b. Bonsal American; an Oldcastle company.
 - c. C-Cure.
 - d. Laticrete International, Inc.
 - e. MAPEI Corporation.
 - f. Mer-Kote Products, Inc.
 - 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.

2.9 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."

- 1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- 2. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. DAP Inc.; 100 percent Silicone Kitchen and Bath Sealant.
 - b. Dow Corning Corporation; Dow Corning 786.
 - c. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
 - d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
 - e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
 - f. Tremco Incorporated; Tremsil 600 White.

2.10 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
- C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 - 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
 - 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

- 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. Bonsal American; an Oldcastle company; Grout Sealer.
 - b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer Magic Seal Silox 8 Siloxane 220.
 - c. C-Cure; Penetrating Sealer 978.
 - d. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.

2.11 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with adhesives or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.
 - b. Tile floors in laundries.
 - c. Tile floors composed of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.

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- 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
- 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 inch (1.6 mm).
 - 2. Paver Tile: [1/4 inch (6.35 mm)] [3/8 inch (9.5 mm)].
 - 3. Glazed Wall Tile: 1/16 inch (1.6 mm).
- F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
- I. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

A. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use latex-portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

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3.6 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over crack isolation membrane until membrane has cured.

3.7 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove epoxy and latex-portland cement grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 - 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 093000

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SECTION 095123-ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes acoustical tiles and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete at ceilings.

1.3 **DEFINITIONS**

- A. AC: Articulation Class.
- B. CAC: Ceiling Attenuation Class.
- C. LR: Light Reflectance coefficient.
- D. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
 - 1. Ceiling suspension system members.
 - 2. Method of attaching hangers to building structure.
 - a. Furnish layouts for anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
 - 3. Size and location of initial access modules for acoustical tile.
 - 4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access tiles, and special moldings.
 - 5. Minimum Drawing Scale: 1/8 inch = 1 foot (1:96)
- C. Samples for Initial Selection: For components with factory-applied color finishes.
- D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
 - 1. Acoustical Tile: Set of 6-inch- square samples of each type, color, pattern, and
 - 2. Exposed Moldings and Trim: Set of 12-inch long Samples of each type and color.

- 3. Exposed Suspension System Members, Moldings, and Trim: Set of 12-inch long Samples of each type, finish, and color.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each acoustical tile ceiling.
- F. Maintenance Data: For finishes to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Acoustical Testing Agency Qualifications: An independent testing laboratory, or an NVLAP-accredited laboratory, with the experience and capability to conduct the testing indicated. NVLAP-accredited laboratories must document accreditation, based on a "Certificate of Accreditation" and a "Scope of Accreditation" listing the test methods specified.
- B. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system through one source from a single manufacturer.
- C. Fire-Test-Response Characteristics: Provide acoustical tile ceilings that comply with the following requirements:
 - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical tile ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - a. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory"
 - b. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 2. Surface-Burning Characteristics: Provide acoustical tiles with the following surface-burning characteristics complying with ASTM E 1264 for Class C materials as determined by testing identical products per ASTM E 84:
 - a. Smoke-Developed Index: 450 or less.
- D. Seismic Standard: Provide acoustical tiles ceilings designed and installed to withstand the effects of earthquake motions according to the following:
 - 1. Standard for Ceiling Suspension Systems Requiring Seismic Restraint: Comply with ASTM E 580.
 - 2. CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-Hung Acoustical Tile and Lay-in Tile Ceilings-Seismic Zones 0-2."
 - 3. CISCA's Guidelines for Systems Requiring Seismic Restraint: Comply with CISCA's "Guidelines for Seismic Restraint of Direct-Hung Suspended Ceiling Assemblies--Seismic Zones 3 & 4."

- 4. UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Layin Tile Ceilings."
- 5. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical tiles, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

1.8 COORDINATION

A. Coordinate layout and installation of acoustical tiles and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILES, GENERAL

- A. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectance's, unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface per ASTM E 795.
- B. Broad Spectrum Antimicrobial Fungicide and Bactericide Treatment: Provide acoustical tiles treated with manufacturer's standard antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21

C. Antimicrobial Fungicide Treatment: Provide acoustical tiles with face and back surfaces coated with antimicrobial treatment consisting of manufacturer's standard formulation with fungicide added to inhibit growth of mold and mildew and showing no mold or mildew growth when tested according to ASTM D 3273 and evaluated according to ASTM D 3274 or ASTM G 21.

2.2 ACOUSTICAL TILES FOR ACOUSTICAL TILE CEILING

- A. Manufacturer's:
 - 1. USG Interiors
 - 2. Armstrong World Industries, Inc.
 - 3. OR Equal
- B. Color: White.
- C. Classification: Provide fire-resistance-rated tiles complying with ASTM E 1264 for type, form, and pattern as follows:
 - 1. Type III, mineral base with painted finish; Form 2, water felted.
 - 2. Fire Class: C
 - 3. Pattern: CE, perforated, small holes and lightly textured.
- D. LR: Not less than 0.80
- E. NRC: Not less than 0.50
- F. CAC: Not less than 20.
- G. AC: Not less than 170
- H. Thickness: 5/8 inch
- I. Modular Size: 24" X 24"

2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.
- B. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied finish for type of system indicated.
- C. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

- 2. Power actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency
- D. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304, nonmagnetic.
 - 3. Nickel-Copper-Alloy Wire: ASTM B 164, nickel-copper-alloy UNS No. N04400.
 - 4. Size: Select wire diameter so its stress at 3 times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.135-inch diameter wire.
- E. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- F. Angle Hangers: Angles with legs not less than 7/8-inch-wide; formed with 0.04-inch-thick, galvanized steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch diameter bolts.
- G. Seismic Struts: Manufacturer's standard compression struts designed to accommodate seismic forces.
- H. Seismic Clips: Manufacturer's standard seismic clips designed and spaced to secure acoustical tiles in-place.
- I. Hold-Down Clips: If indicated or required, provide manufacturer's standard hold-down clips spaced 24 inches o.c. on all cross tees.

2.4 METAL SUSPENSION SYSTEM FOR ACOUSTICAL TILE CEILING

- A. Manufacturer's:
 - 1. USG Interiors
 - 2. Armstrong World Industries, Inc.
 - 3. OR Equal
- B. General: Exposed Tee System 15/16". Cap Finish: Painted in color as selected from manufacturer's full range

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturer's:
 - 1. USG Interiors
 - 2. Armstrong World Industries, Inc.

3. OR Equal

- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners, unless otherwise indicated.
 - 2. For lay-in tiles with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of tile and flange at exposed suspension member.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical tile ceilings.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION

- A. General: Install acoustical tile ceilings to comply with ASTM C 636 and seismic design requirements indicated, per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, counter splaying, or other equally effective means.
 - 3. Splay hangers only where required and, if permitted with fire-resistance-rated ceilings, to miss obstructions; offset resulting horizontal forces by bracing; counter splaying, or other equally effective means.

- 4. Where width of ducts and other construction within ceiling plenum produces hanger spacing that interfere with location of hangers, required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
- 5. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
- 6. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure to which hangers are attached and type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
- 7. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
- 8. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
- 9. Do not attach hangers to steel deck tabs.
- 10. Do not attach hangers to steel roof deck. Attach hangers to structural members.
- 11. Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
- 12. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or post installed anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical tiles.
 - 1. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet Miter corners accurately and connect securely.
 - 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Install acoustical tiles with undamaged edges and fit accurately into suspension system runners and edge moldings. Scribe and cut tiles at borders and penetrations to provide a neat, precise fit.
- G. Arrange directionally patterned acoustical tiles as follows:

- 1. As indicated on reflected ceiling plans.
- 2. Install tiles with pattern running in one direction parallel to short axis of space.
- H. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
 - 1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
 - 2. If and where required by authorities having jurisdiction, hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches o.c.
 - 3. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

3.4 FIELD QUALITY CONTROL

- A. Tests and Inspections: Testing and inspecting of completed installations of acoustical tile ceiling hangers and anchors and fasteners shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with installations of acoustical tile ceiling hangers for the next area until test results for previously completed installations of acoustical tile ceiling hangers show compliance with requirements.
 - 1. Extent of Each Test Area: When installation of ceiling suspension systems on each floor has reached 20 percent completion but no tiles have been installed.
 - a. Within each test area, testing agency will select 1 of every 10 power-actuated fasteners and post installed anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every 2 post installed anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
 - b. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.
- B. Remove and replace acoustical tile ceiling hangers and anchors and fasteners that do not pass tests and inspections and retest as specified above.

3.5 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim, edge moldings, and suspension system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition floor tile.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of floor tile indicated.
- C. Samples for Verification: Full-size units of each color and pattern of floor tile required.
- D. Product Schedule: For floor tile. Use same designations indicated on Drawings.
- E. Qualification Data: For qualified Installer.
- F. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.
- B. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE

- A. Products: Subject to compliance with requirements, provide one of the following:
 - 1. Armstrong World Industries, Inc.; Standard Excelon.
 - 2. Mannington Mills, Inc.; Essentials or Designer Essentials.
 - 3. Johnsite; Azrock VCT
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch (3.2 mm).
- E. Size: 12 by 12 inches (305 by 305 mm).
- F. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

- 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a. VCT and Asphalt Tile Adhesives: Not more than 50 g/L.
 - b. Rubber Floor Adhesives: Not more than 60 g/L.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.
- D. Sealers and Finish Coats for Resilient Terrazzo Floor Tile: Premium-type products as recommended by manufacturer for resilient terrazzo floor tile.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer and as follows. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75% relative humidity level measurement.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- F. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor 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 tile at perimeter.
 - 1. Lay tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).0
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Seamless Installation:
 - 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and heat weld with welding bead to permanently fuse sections into a seamless floor covering. Prepare, weld, and finish seams to produce surfaces flush with adjoining floor covering surfaces.

2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to permanently fuse sections into a seamless floor covering. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on floor covering surfaces.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coat(s).
- E. Joint Sealant: Apply sealant to resilient terrazzo floor tile perimeter and around columns, at door frames, and at other joints and penetrations.
- F. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096520 – SOLID VINYL TILE FLOORING PART 1 - PART 1 GENERAL

1.1 SUMMARY

A. Section includes: Solid Vinyl Floor Tile

1.2 SUBMITTALS

- A. Product Data: Submit product data, including manufacturer's specification summary sheet for specified products
- B. Samples: Submit 6" selection and verification samples for finishes, colors, designs and textures
- C. Quality Assurance Submittals: Submit the following:
 - 1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties

D. Submit the following:

- 1. Maintenance Data: Maintenance data for installed products in accordance with Division 1 sections. Include methods for maintaining installed products, and precautions against cleaning materials and methods detrimental to finishes and performance
- 2. Warranty: Warranty documents specified herein
- 3. Qualification Data
 - a. For a qualified resilient flooring Installer specified herein

1.3 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain vinyl floor covering and adhesive from a single supplier
- B. Installer Qualifications:
 - 1. Installer experienced in performing work of this section who has specialized in installing work similar to that required for this project
 - 2. At least five years' experience in the installation of resilient flooring
 - 3. Experience on at least five projects of similar size, type and complexity of current project
 - 4. Employer of tradesmen for current project who are competent in techniques required by manufacturer for resilient flooring installation indicated

C. Pre-Installation Meetings: Conduct pre-installing meeting to confirm project requirements, substrate conditions, manufacturer's installation instructions and warranty requirements comply with requirements in Division 1

1.4 DELIVERY, STORAGE AND HANDLING

- A. General: Comply with requirements in Division 1
- B. Ordering: Comply with manufacturer's ordering and lead-time requirements to avoid construction delays
- C. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact
- D. Storage and Protection: Material shall be stored in areas that are enclosed and weather tight with the permanent HVAC system set at a temperature of 65-85 degrees Fahrenheit (18° to 29° Celsius) for a minimum of 48 hours prior to commencement of installation

1.5 PROJECT CONDITIONS

- A. Environmental Requirements/Conditions: In accordance with manufacturer's recommendations, areas to receive floor covering shall be clean, fully enclosed and weather tight with permanent HVAC system set to 65-85 degrees Fahrenheit (18° to 29° Celsius) for 48 hours before installation, during installation and for 48 hours after installation
- B. The temperature of the space shall be kept at a minimum of 50° Fahrenheit (10° Celsius) continually after installation. The floor covering material and adhesive shall be conditioned in the same manner. Existing Conditions: (specify existing conditions affecting product use and installation)

1.6 WARRANTY

- A. Manufacturer's Materials Warranty: Submit, for owner's acceptance, manufacturer's standard warranty document
- B. Manufacturer's warranty is in addition to, and not a limitation of, other rights owner may have under Contract Documents.
 - 1. Total Warranty Period: 15-year commercial warranty commencing on the date of substantial completion.
 - 2. For materials: 1 year from date of substantial completion including 100% labor costs

1.7 MAINTENANCE

- A. Extra materials: Deliver to the owner extra materials as the products to be installed. Package products with protective covering or in original cartons and identify with descriptive labels. Comply with Division 1 Closeout Submittals (maintenance materials) Section
 - 1. Quantity: Furnish quantity of floor covering material equal to 5% of the amount to be installed
 - 2. Delivery, Storage and Protection: Comply with the owner's requirements for delivery, storage and protection of extra materials
- B. Maintenance of finished floor covering shall be according to manufacturer's maintenance instructions

PART 2 - PRODUCTS

2.1 COMMERCIAL RESILIENT/VINYL TILE FLOORING

- A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide Shaw Floors product line Breaker's Point 5.0 (5M318)
- B. Other Manufacturers: Subject to compliance with all the requirements of this specification, provide products by one of the following:
 - 1. Armstrong Flooring
 - 2. Mannington Commercial
- C. Product Description: Solid Vinyl Tile flooring
 - 1. Overall Thickness: Not less than 5mm
 - 2. Wear Layer Thickness: Not less than 20 mil
 - 3. Maximum static load must exceed 1,500 PSI (modified)
 - 4. Unit Type: Plank 5-15/16" x 48"
 - Color and Pattern: As selected from manufacturer's standard colors and patterns for Shaw Flooring product line Breaker's Point 5.0 (5M318) or Approved Equivalent
 - 6. Backing: Commercial Grade

D. Performance Criteria:

- 1. Description: Solid Vinyl Tile
- 2. Classification: ASTM F 1700, Class III
- 3. Dimensional Stability per ASTM F 2199

SOUTH FIRE DISTRICT PHASE II MIDDLETOWN, CT

- 4. Recovery from Long Term Indentation per ASTM F 970 modified 1,500psi
- 5. Slip Resistance ASTM D2047: ADA Compliant
- 6. Chemical resistance per ASTM F 925 Pass
- 7. Flexibility per ASTM F 137 Pass
- 8. Fire Performance: ASTM E648; Class 1
- 9. Residual Indentation F1914: Pass, 8%
- 10. Resistance to Heat ASTM F1514: Pass
- 11. Resistance to Light ASTM F1515: Pass
- 12. Smoke Density ASTM E662: Pass <450

2.2 RELATED MATERIALS

- A. Substrate preparation and testing: Comply with ASTM F710 Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
- B. Adhesives Shaw products as following or an Approved Equivalent:

1.	Shaw 4100 spreadable	95% RH	8 lbs pH 10
2.	S150 spray	95% RH	NA pH 11
3.	Shaw 4151 for high moisture	99% RH	10 lbs. pH 12
4.	Shaw 200 for low demand areas	85% RH	5 lbs pH 5-9

- C. Moisture Control (if needed): MoistureShield and MoistureTek are our two applied moisture control products. KOVARA is our rolled moisture barrier.
- D. Weld Rod
 - 1. Heat
 - 2. Chemical
- E. Primer: Shaw 9050 or Approved Equivalent
- F. Leveling and Patching Compounds: Use cementitious patching and leveling compounds that meet or exceed Shaw's maximum moisture level and pH requirements. Use of gypsum-based patching and/or leveling compounds which contain Portland or high alumina cement and meet or exceed the compressive strength of 3,000 psi are acceptable. If you have high moisture issue, be sure to use a moisture-tolerant patch such as USG EXG (exterior grade).
- G. Tack Abatement Coating: Shaw 6200 or Approved Equivalent
- H. Barrier Coat Floor Encapsulation: Shaw 9000 or Approved Equivalent

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content, pH, smoothness and level.
- B. Proceed with installation after any unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Concrete substrates should be tested for Internal Relative Humidity according to ASTM F 2170 and must not exceed 90% RH.
- B. The PH of the concrete sub-floor must be between 7 and 10.
- C. Substrates shall be smooth, structurally sound, permanently dry, clean and free of all foreign material such as dust, wax, solvents, paint, grease, oils, old adhesive residue, curing and hardening/ curing compounds, sealers and other foreign material that might prevent adhesive bond.
- D. Concrete floors shall be flat and smooth within 1/8" in 6 feet or 3/16" in 10 feet.

3.3 INSTALLATION

- A. Install using conventional tile and plank installation techniques. Plank products should have a minimum of 6 to 8" seam stagger.
- B. Center rooms and hallways so borders are not less than half of a tile or plank.
- C. Work out of multiple boxes at the same time.
- D. In hallways and small spaces, work lengthwise from one end.
- E. Ensure cut edges are always against the wall.
- F. To cut products, score the top side of the material with a utility knife. Bend the product and finish the cut through the back side. It may be necessary to use a heat gun to cut around vertical obstructions. Allow the heated product to return to room temperature before installation.
- G. If you cut the product into a fine point, it may delaminate. Use an ethyl cyanoacrylate-based super glue to fuse the points together. Clean all glue from the top surface immediately. Alcohol-based super glues may cause the vinyl to swell.
- H. Roll the plank or tile with a 3-section 100 lb. roller. Re-roll the floor within the working time of the adhesive. Continue to roll the floor throughout the working day to ensure a proper bond.
- I. Use floor protection after installation. DO NOT use a plastic adhesive-based protection system.

3.4 MAINTENANCE

A. Initial Maintenance

- 1. Sweep, vacuum or dust mop to remove dirt and grit.
- 2. If needed, add neutral cleaner to cool water following the manufacturer's instructions.
- 3. Scrub with a low-rpm machine or auto scrubber. Use a red pad or brush.
- 4. Never use brown or black pads (too aggressive and can damage the product)
- 5. Remove the cleaning solution with a wet-dry vacuum or auto scrubber until the floor is dry.
- 6. Rinse the floor with clean water. Repeat the rinse process if necessary to remove all haze.

B. Routine Maintenance

- 1. Sweep, vacuum or dust mop to remove dirt and grit.
- 2. Add neutral pH cleaner to cool water following the manufacturer's instructions.
- 3. As needed, scrub with a low-rpm machine or auto scrubber to retain appearance. Use a red (light scrubbing) pad and neutral cleaner following the manufacturer's instructions.

C. Preventative Floor Care

- 1. Use walk-off mats that are as wide as the doorway and long enough for soil load and weather conditions.
- 2. Use mats with a non-staining backing.
- 3. Floor protectors should be used on all furniture legs.
- 4. The surface area of the floor protectors should be no less than 1" in diameter.
- D. Full maintenance instructions will be provided by the manufacturer.

3.5 PROTECTION

- A. Protection: Protect installed product and finish surfaces from damage during construction. Remove and legally dispose of protective covering at time of substantial completion
- B. Keep foot traffic off new floor covering for first 24 hours
- C. Keep furniture, fixtures and rolling traffic off for first 48 hours

END OF SECTION 096519

SECTION 096566 - RESILIENT ATHLETIC FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Rubber sheet flooring.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each type, color, and pattern of flooring indicated, 6-inch- (150-mm-) square Samples of same thickness and material indicated for the Work.
- C. Qualification Data: For qualified sheet vinyl flooring Installer.
- D. Maintenance Data: For flooring to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Sheet Vinyl Flooring Installer Qualifications: An experienced Installer who has completed sheet vinyl flooring installations using seaming methods indicated for this Project and similar in material, design, and extent to that indicated for this Project; who is acceptable to manufacturer; and whose work has resulted in installations with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storing.
- B. Store materials to prevent deterioration. Store rolls upright.

1.6 FIELD CONDITIONS

- A. Adhesively Applied Products:
 - 1. Maintain temperatures during installation within range recommended in writing by manufacturer, but not less than 70 deg F (21 deg C) or more than 95 deg F (35 deg C), in spaces to receive flooring 48 hours before installation, during installation, and 48 hours after installation unless longer period is recommended in writing by manufacturer.

- 2. After postinstallation period, maintain temperatures within range recommended in writing by manufacturer, but not less than 55 deg F (13 deg C) or more than 95 deg F (35 deg C).
- 3. Close spaces to traffic during flooring installation.
- 4. Close spaces to traffic for 48 hours after flooring installation unless manufacturer recommends longer period in writing.
- B. Install flooring after other finishing operations, including painting, have been completed.

1.7 COORDINATION

A. Coordinate layout and installation of flooring with floor inserts for gymnasium equipment.

1.8 EXTRA MATERIALS

- A. Furnish extra materials, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sheet Flooring: Furnish full-width rolls of not less than 10 linear feet (3 linear m) for each 500 linear feet (150 linear m) or fraction thereof, of each type, color, and pattern of flooring installed.

PART 2 - PRODUCTS

2.1 RUBBER SHEET FLOORING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Amarco Products.
 - 2. ECORE International.
 - 3. Johnsonite; a Tarkett company.
 - 4. Roppe Corporation.
- B. Description: Rubber athletic flooring provided as rolled goods for adhered installation.
- C. Material: Recycled-rubber compound.
- D. Traffic-Surface Texture: Smooth.
- E. Roll Size: Not less than 48 inches (1219 mm) wide by longest length that is practical to minimize splicing during installation.
- F. Thickness: 3/8 inch (9.5 mm).
- G. Color and Pattern: As selected by Architect from manufacturer's full range.

2.2 ACCESSORIES

- A. Trowelable Leveling and Patching Compound: Latex-modified, hydraulic-cement-based formulation approved by flooring manufacturer.
- B. Adhesives: Water-resistant type recommended in writing by manufacturer for substrate and conditions indicated.
 - 1. Use adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Game-Line and Marker Paint: Complete system including primer, if any, compatible with flooring and recommended in writing by flooring and paint manufacturers for use indicated.
 - 1. VOC content: Provide products with VOC content not more than 150 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances, moisture content, and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written recommendations to ensure adhesion of flooring.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Alkalinity Testing: Perform pH testing according to ASTM F 710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
 - 3. Moisture Testing:
 - a. Perform relative humidity test using in-situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

- C. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by manufacturer. Do not use solvents.
- D. Use trowelable leveling and patching compound to fill cracks, holes, and depressions in substrates.
- E. Move flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation unless manufacturer recommends a longer period in writing.
 - 1. Do not install flooring until they are same temperature as space where they are to be installed.
- F. Sweep and vacuum clean substrates to be covered by flooring immediately before installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, and dust.
- G. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 FLOORING INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions.
- B. Scribe, cut, and fit flooring to butt neatly and tightly to vertical surfaces, equipment anchors, floor outlets, and other interruptions of floor surface.
- C. Extend flooring into toe spaces, door reveals, closets, and similar openings unless otherwise indicated.
- D. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating subfloor markings on flooring. Use nonpermanent, nonstaining marking device.

3.4 SHEET FLOORING INSTALLATION

- A. Unroll sheet flooring and allow it to stabilize before cutting and fitting.
- B. Lay out sheet flooring as follows:
 - 1. Maintain uniformity of flooring direction.
 - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (150 mm) away from parallel joints in flooring substrates.
 - 3. Match edges of flooring for color shading at seams.
 - 4. Locate seams per approved Shop Drawings.
- C. Adhered Flooring: Adhere products to substrates using a full spread of adhesive applied to substrate to comply with adhesive and flooring manufacturers' 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.

- D. Vinyl Sheet Flooring Seams: Prepare and finish seams to produce surfaces flush with adjoining flooring surfaces.
 - 1. Heat-Welded Seams: Comply with ASTM F 1516. Rout joints and use welding bead to permanently fuse sections into a seamless flooring.
 - 2. Chemically Bonded Seams: Comply with ASTM F 693. Seal seams to prevent openings from forming between cut edges and to prevent penetration of dirt, liquids, and other substances into seams.

3.5 CLEANING AND PROTECTING

- A. Perform the following operations immediately after completing flooring installation:
 - 1. Remove adhesive and other blemishes from flooring surfaces.
 - 2. Sweep and vacuum flooring thoroughly.
 - 3. Damp-mop flooring to remove marks and soil after time period recommended in writing by manufacturer.
- B. Protect flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods recommended in writing by manufacturer.
 - 1. Do not move heavy and sharp objects directly over flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096566

SECTION 096816 - SHEET CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Tufted carpet.
 - 2. Carpet cushion.

B. Related Requirements:

- 1. Division 02 Section "Selective Structure Demolition" for removing existing floor coverings.
- 2. Division 09 Section "Resilient Tile Flooring," for resilient wall base and accessories installed with carpet.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review methods and procedures related to carpet installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following, including installation recommendations for each type of substrate:
 - 1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Carpet Cushion: For each type indicated. Include manufacturer's written data on physical characteristics and durability.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

- 1. Carpet: 12-inch- (300-mm-) square Sample.
- 2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.
- 3. Carpet Cushion: 6-inch- (150-mm-) square Sample.
- 4. Carpet Seam: 6-inch (150-mm) Sample.
- 5. Mitered Carpet Border Seam: 12-inch- (300-mm-) square Sample. Show carpet pattern alignment.
- C. Product Schedule: For carpet. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Test Reports: For carpet and for tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet and carpet cushion.

1.7 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. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced Installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.
- B. Fire-Test-Response Ratings: Where indicated, provide carpet identical to those of assemblies tested for fire response per NFPA 253 by a qualified testing agency.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups at locations and in sizes shown on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104.

1.10 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet and carpet cushion over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.11 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, and delamination.
 - 3. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET

- A. Products: Subject to compliance with requirements, provide the following:
 - 1. Shaw contract "Turnkey", Prime & Essential Styles.
 - 2. Or approved equal
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings Shaw contract "Turnkey" Prime & Essential styles or comparable product by one of the following:
 - 1. Shaw Contract: or equal value.
- C. Color: or approved equal as selected by Architect from manufacturer's full range.
- D. Pattern: Match Architect's samples Prime and Essentials.
- E. Fiber Content: 100 percent nylon 6, 6.

- F. Fiber Type: Eco solution "Q".
- G. Pile Characteristic: Level-loop Multilevel-loop.
- H. Face Weight: 20 oz./sq. yd. (g/sq. m).
- I. Total Weight: 20 oz./sq. yd. (g/sq. m) for finished carpet.
- J. Primary Backing: Manufacturer's standard material.
- K. Secondary Backing: Manufacturer's standard material.
- L. Backcoating: Manufacturer's standard material.
- M. Width: 12 feet (3.7 m).
- N. Applied Soil-Resistance Treatment: Manufacturer's standard material.
- O. Antimicrobial Treatment: Manufacturer's standard material.
- P. Performance Characteristics: As follows match basis of design.:

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet cushion manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
 - 1. Use adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 2. Use adhesives that comply with the 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."
- C. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
- D. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.
- B. 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 dryness characteristics by performing bond and moisture tests recommended by carpet cushion manufacturer.
- 2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet.
- 3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.

C. For wood subfloors, verify the following:

- 1. Underlayment over subfloor complies with requirements specified in Division 06 Section "Rough Carpentry."
- 2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet[cushion] manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.3 INSTALLATION

- A. Comply with CRI 104 and carpet manufacturer's written installation instructions for the following:
 - 1. Direct-Glue-Down Installation: Comply with CRI 104, Section 9, "Direct Glue-Down Installation."
 - 2. Double-Glue-Down Installation: Comply with CRI 104, Section 10, "Double-Glue-Down Installation."
 - 3. Hook-and-Loop Installation: Comply with CRI 104, Section 11.5, "Hook and Loop Technology."
 - 4. Stretch-in Installation: Comply with CRI 104, Section 12, "Stretch-in Installations."

- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.
- C. Do not bridge building expansion joints with carpet.
- D. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
- E. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, 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 nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, "Patterned Carpet Installations" and with carpet manufacturer's written recommendations.
- H. Comply with carpet cushion manufacturer's written recommendations.

3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI 104, Section 16, "Protecting Indoor Installations."
- C. Protect carpet against 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 carpet manufacturer.

END OF SECTION 096816

SECTION 099000 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 **SUMMARY**

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Gypsum board
- B. Related Sections:
 - 1. Section 09260 Gypsum Wall Board Systems.

1.3 **DEFINITIONS**

A. Conform to ASTM D16 for interpretation of terms used in this Section.

1.4 SUBMITTALS

- A. Product Data: Provide data on all finishing products.
- B. Samples: Submit two samples, in size illustrating range of colors and textures available for each surface finishing product scheduled.

1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Applicator: Company specializing in performing the work of this section with minimum three years' experience.

1.6 QUALITY ASSURANCE

- A. MPI Standards:
 - 1. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."
 - 2. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

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1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for finishes.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Section 01600.
- B. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- C. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- D. Store paint materials at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.9 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

1.10 EXTRA MATERIALS

- A. Extra materials may not be allowed for publicly funded projects.
- B. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers Interior Paint
 - 1. Sherwin Williams Emerald Interior Acrylic Latex Paint
 - 2. Benjamin Moore & Co. Aura Interior Paint
 - 3. Glidden Paint Premium Interior

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2.2 PAINT, GENERAL

A. Material Compatibility:

- 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
- 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. VOC Content of Field-Applied Interior Paints and Coatings: Provide products that comply with the following limits for VOC content, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24); these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - 1. Flat Paints, Coatings, and Primers: VOC content of not more than 50 g/L.
 - 2. Nonflat Paints, Coatings, and Primers: VOC content of not more than 150 g/L.
 - 3. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - 4. Floor Coatings: VOC not more than 100 g/L.
 - 5. Shellacs, Clear: VOC not more than 730 g/L.
 - 6. Shellacs, Pigmented: VOC not more than 550 g/L.
 - 7. Flat Topcoat Paints: VOC content of not more than 50 g/L.
 - 8. Nonflat Topcoat Paints: VOC content of not more than 150 g/L.
 - 9. Anti-Corrosive and Anti-Rust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
 - 10. Floor Coatings: VOC not more than 100 g/L.
 - 11. Shellacs, Clear: VOC not more than 730 g/L.
 - 12. Shellacs, Pigmented: VOC not more than 550 g/L.
 - 13. Primers, Sealers, and Undercoaters: VOC content of not more than 200 g/L.
 - 14. Dry-Fog Coatings: VOC content of not more than 400 g/L.
 - 15. Zinc-Rich Industrial Maintenance Primers: VOC content of not more than 340 g/L.
 - 16. Pre-Treatment Wash Primers: VOC content of not more than 420 g/L.
- C. Chemical Components of Field-Applied Interior Paints and Coatings: Provide topcoat paints and anti-corrosive and anti-rust paints applied to ferrous metals that comply with the following chemical restrictions; these requirements do not apply to paints and coatings that are applied in a fabrication or finishing shop:
 - 1. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

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- 2. Restricted Components: Paints and coatings shall not contain any of the following:
 - a. Acrolein.
 - b. Acrylonitrile.
 - c. Antimony.
 - d. Benzene.
 - e. Butyl benzyl phthalate.
 - f. Cadmium.
 - g. Di (2-ethylhexyl) phthalate.
 - h. Di-n-butyl phthalate.
 - i. Di-n-octyl phthalate.
 - j. 1,2-dichlorobenzene.
 - k. Diethyl phthalate.
 - 1. Dimethyl phthalate.
 - m. Ethylbenzene.
 - n. Formaldehyde.
 - o. Hexavalent chromium.
 - p. Isophorone.
 - q. Lead.
 - r. Mercury.
 - s. Methyl ethyl ketone.
 - t. Methyl isobutyl ketone.
 - u. Methylene chloride.
 - v. Naphthalene.
 - w. Toluene (methylbenzene).
 - x. 1,1,1-trichloroethane.
 - y. Vinyl chloride.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: MPI #4.
 - 1. Sherwin Williams ConFlex, Block Filler
 - 2. Benjamin Moore & Co. Ultra Spec, Hi-Build Masonry Block Filler
 - 3. PPG Paints Glidden, PRO Interior/Exterior Latex Blockfiller

2.4 PRIMERS/SEALERS

- A. Primer, Bonding, Water Based: MPI #17.
 - 1. Rust-Oleum XIM UMA Bonding Primer Sealer
 - 2. Sherwin Williams Extreme Bond Primer
 - 3. Benjamin Moore & Co. STIX Waterborne Bonding Primer SXA-110

- 4. PPG Paints Gripper Universal Acrylic Primer/Sealer
- B. Primer, Bonding, Solvent Based: MPI #69.
 - 1. Rust-Oleum- XIM Xseal
 - 2. Benjamin Moore & Co. Prime Lock Plus
 - 3. PPG Paints Seal Grip Interior/Exterior Alkyd Universal Primer/Sealer
- C. Primer Sealer, Latex, Interior: MPI #50.
 - 1. Sherwin Williams Drywall Latex Primer
 - 2. Benjamin Moore & Co. Fresh Start, Multi-Purpose Latex Primer
 - 3. PPG Paints Glidden Professional, PVA Drywall Interior Primer and Sealer
- D. Primer, Latex, for Interior Wood: MPI #39.
 - 1. Sherwin Williams Multi-Purpose Latex Primer/Sealer
 - 2. Benjamin Moore & Co. Fresh Start, Multi-Purpose Latex Primer
 - 3. PPG Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer
- E. Primer, Latex for Exterior Wood: MPI #6.
 - 1. Sherwin Williams Multi-Purpose Latex Primer/Sealer
 - 2. Benjamin Moore & Co. Fresh Start, Multi-Purpose Latex Primer
 - 3. PPG Paints Seal Grip Interior/Exterior Acrylic Universal Primer/Sealer

2.5 WATER-BASED PAINTS

- A. Latex, Interior, (Gloss Level 2): MPI #44.
 - Sherwin Williams PROMAR 200 Zero VOC, Interior Latex Low Gloss Egg-Shell
 - 2. Benjamin Moore & Co. Premium Interior Latex Eggshell
 - 3. PPG Paints Glidden Ultra, Interior Latex Eggshell
- B. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54.
 - 1. Sherwin Williams Pro Tech, Interior Latex Semi-Gloss Enamel
 - 2. Benjamin Moore & Co. Premium Interior Semi-Gloss Finish
 - 3. PPG Paints Glidden, Essentials Interior Latex Paint Semi-Gloss
- C. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.
 - 1. Sherwin Williams Interior/Exterior 100% Acrylic Semi-Gloss
 - 2. Benjamin Moore & Co. Premium Plus Ultra, Exterior Semi-Gloss Enamel
 - 3. PPG Paints SUN PROOF Exterior Semi-Gloss 100% Acrylic Latex Paint

PART 3 - EXECUTION

3.1 **EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.
 - 2. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

D. Wood Substrates:

- 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
- 2. Sand surfaces that will be exposed to view, and dust off.
- 3. Prime edges, ends, faces, undersides, and backsides of wood.

- 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- E. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- F. Glazed Concrete Block:
 - 1. Scrub the glazed brick with a scrub brush and soapy water to remove any dirt or grease from the surface.
 - 2. Mix scouring powder and water together to form a paste and rub this paste onto your glazed brick with a scrub brush.
 - 3. Rinse the glazed brick thoroughly with clean water and dry it with a towel.
 - 4. Wipe the surface dry.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for painting and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
- B. If tinting is not required, delete first paragraph below. Different tints will show through as topcoat erodes.
- C. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- D. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- E. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- F. Painting Mechanical and Electrical Work: As noted on engineering drawings.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 PAINTING SCHEDULE

- A. Gypsum Wall Board, Exposed Surface:
 - 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.
- B. Gypsum Wall Board, Concealed Surfaces:
 - 1. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, (Gloss Level 2), MPI #44
- C. Concrete Masonry Units:
 - 1. Latex System:
 - a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.

- D. Interior Wood Substrates: Including wood trim and architectural woodwork:
 - 1. Latex System:
 - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54
- E. Exterior Wood Substrates: Including architectural woodwork:
- F. Latex System:
 - 1. Prime Coat: Primer, latex for exterior wood, MPI #6.

END OF SECTION 09900

SECTION 101400 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Plaques.
 - 2. Panel signs.

1.3 **DEFINITIONS**

A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication and installation details for signs.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - 2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
- C. Maintenance Data: For signs to include in maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.5 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.
- B. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- C. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.7 COORDINATION

A. Coordinate placement of anchorage devices with templates for installing signs.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).
- B. Bronze Plate: ASTM B 36/B 36M.
- C. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

2.2 PLAQUES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide A.R.K. Ramos or a comparable product by one of the following:
 - 1. A. R. K. Ramos.
 - 2. Advance Corporation; Braille-Tac Division.

- 3. Gemini Incorporated.
- 4. Matthews International Corporation; Bronze Division.
- D. Cast Plaques: Provide castings free of pits, scale, sand holes, and other defects, as follows:
 - 1. Plaque Material: Bronze.
 - 2. Background Texture: Manufacturer's standard matte texture.
 - 3. Type Style: Palatino & Calibri
 - 4. Mounting: Concealed mounting for studs, noncorroding for substrates encountered.

E. Plaque Schedule:

- 1. Plaque Type:
 - a. Plaque Size: 30"x22 ½"x3/4"
 - b. Finish: BR-400 Satin Bronze Raised Area / Dark Oxidized Background
 - c. Text/Message: As provided by owner to match existing plaque in east wing.
 - d. Location: Lobby
 - e. Includes 2 etched logos per owner.

2.3 PANEL SIGNS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: Subject to compliance with requirements, provide a product by one of the following:
 - 1. Advance Corporation; Braille-Tac Division.
 - 2. ADA Sign Factory
 - 3. Allen Industries Architectural Signage
 - 4. Allenite Signs; Allen Marking Products, Inc.
 - 5. APCO Graphics, Inc.
- D. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:
 - 1. Acrylic Sheet: 0.060 inch (1.52 mm) thick.
 - 2. Edge Condition: Beveled or Bullnose.
 - 3. Corner Condition: Rounded.
 - 4. Mounting: Unframed.

- a. Manufacturer's standard anchors for substrates encountered.
- 5. Color: As selected by Architect from manufacturer's full range.
- 6. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch (0.8 mm) above surface with contrasting colors.
- 7. Sized: As indicated on Drawings.
- E. Exterior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch (1.5 mm) measured diagonally from corner to corner, complying with the following requirements:
 - 1. Acrylic Sheet: 0.080 inch (2.03 mm) thick.
 - 2. Edge Condition: Beveled or Bullnose.
 - 3. Corner Condition: Rounded to radius indicated.
 - 4. Mounting:
 - a. Manufacturer's standard noncorroding anchors for substrates encountered.
 - 5. Color: As selected by Architect from manufacturer's full range.
- F. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color matching background color of panel sign.
- G. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
 - 1. Panel Material: Opaque acrylic sheet.
 - 2. Raised-Copy Thickness: Not less than 1/32 inch (0.8 mm).
- H. Engraved Copy: Machine engrave letters, numbers, symbols, and other graphic devices into panel sign on face indicated to produce precisely formed copy, incised to uniform depth.
 - 1. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.
 - 2. Engraved Metal: Fill engraved copy with enamel.
 - 3. Engraved Opaque Acrylic Sheet: Fill engraved copy with enamel.
 - 4. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with enamel. Apply opaque background color coating to back face of acrylic sheet.
- I. Subsurface Copy: Apply minimum 4-mil- (0.10-mm-) thick vinyl copy to back face of clear acrylic sheet forming panel face to produce precisely formed opaque image. Image shall be free of rough edges.

- J. Subsurface Engraved Acrylic Sheet: Reverse-engrave back face of clear acrylic sheet. Fill resulting copy with enamel. Apply opaque background color coating over enamel-filled copy.
- K. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and are UV and water resistant for five years for application intended.
 - 1. Color: As selected by Architect from manufacturer's full range.

L. Panel Sign Schedule:

- 1. Interior Sign Type: No Access Sign
 - a. Sign Size: As indicated on drawing A-0.1
 - b. Message Panel Material: As indicated.
 - c. Message Panel Finish/Color: Selected from manufacturer's standard colors.
 - d. Background Finish/Color: Selected from manufacturer's standard colors.
 - e. Character Size: As indicated on drawing A-0.1
 - f. Character Finish/Color: Selected from manufacturer's standard colors.
 - g. Panel Sign Frame Finish/Color: Selected from manufacturer's standard colors.
 - h. Text/Message: As indicated on drawing A-0.1
 - i. Locations: Doors 5 & 7.

2. Interior Sign Type: Accessible Rest Rooms

- a. Sign Size: As indicated on drawing A-0.1
- b. Message Panel Material: As indicated.
- c. Message Panel Finish/Color: Selected from manufacturer's standard colors.
- d. Background Finish/Color: Selected from manufacturer's standard colors.
- e. Character Size: As indicated on drawing A-0.1
- f. Character Finish/Color: Selected from manufacturer's standard colors.
- g. Panel Sign Frame Finish/Color: Selected from manufacturer's standard colors.
- h. Text/Message: As indicated on drawing A-0.1
- i. Locations: At doors #6, 27 & 28.

3. Interior Sign Type: Room Designation

- a. Sign Size: 3 1/2" tall by required length for text.
- b. Message Panel Material: As indicated.
- c. Message Panel Finish/Color: Selected from manufacturer's standard colors.
- d. Background Finish/Color: Selected from manufacturer's standard colors.
- e. Character Size: 5/8" tall
- f. Character Finish/Color: Selected from manufacturer's standard colors.

- g. Panel Sign Frame Finish/Color: Selected from manufacturer's standard colors.
- h. Text/Message: "Meeting Room A" "Meeting Room B" & "Tax Office" Include room designation in Grade 2 Braille.
- i. Locations: At doors #8, 14, 16 & 17

4. Exterior Sign Type: Accessible Entrance

- a. Sign Size: As indicated on drawing A-0.1
- b. Message Panel Material: As indicated.
- c. Message Panel Finish/Color: Selected from manufacturer's standard colors.
- d. Background Finish/Color: Selected from manufacturer's standard colors.
- e. Character Size: As indicated on drawing A-0.1
- f. Character Finish/Color: Selected from manufacturer's standard colors.
- g. Panel Sign Frame Finish/Color: Selected from manufacturer's standard colors.
- h. Text/Message: As indicated on drawing A-0.1
- i. Locations: On exterior at doors #2 & 3.

5. Exterior Sign Type: Tax Office & Meeting Rooms

- a. Sign Size: 12" tall by required length for text.
- b. Message Panel Material: As indicated.
- c. Message Panel Finish/Color: Selected from manufacturer's standard colors.
- d. Background Finish/Color: Selected from manufacturer's standard colors.
- e. Character Size: 3" Tall
- f. Character Finish/Color: Selected from manufacturer's standard colors.
- g. Panel Sign Frame Finish/Color: Selected from manufacturer's standard colors.
- h. Text/Message: "Tax Office & Meeting Rooms" Message as two lines of text
- i. Locations: At door #2 on exterior of building, height as shown on A-0.1

6. Exterior Sign Type: Dropbox Pass-Through

- a. Sign Size: 3 1/2" tall by required length for text.
- b. Message Panel Material: As indicated.
- c. Message Panel Finish/Color: Selected from manufacturer's standard colors.
- d. Background Finish/Color: Selected from manufacturer's standard colors.
- e. Character Size: 2" tall
- f. Character Finish/Color: Selected from manufacturer's standard colors.
- g. Panel Sign Frame Finish/Color: Selected from manufacturer's standard colors.
- h. Text/Message: "Tax Drop"
- i. Locations: On the exterior above the dropbox pass-through location.

2.4 ACCESSORIES

A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.5 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
 - 1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.
 - 2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
 - 3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
 - 4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ACRYLIC SHEET FINISHES

A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
 - 1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 - 2. Hook-and-Loop Tapes: Mount signs to smooth, nonporous surfaces.
 - 3. Magnetic Tape: Mount signs to smooth, nonporous surfaces.
 - 4. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
 - 5. Shim Plate Mounting: Provide 1/8-inch- (3-mm-) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
 - 6. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 - 7. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.
- C. Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach

brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.

3.3 **CLEANING AND PROTECTION**

A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 101400

SECTION 102226 OPERABLE PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 **SUMMARY**

- A. This Section includes the following:
 - 1. Manually operated, paired panel operable partitions.
- B. Related Sections include the following:
 - 1. Division 03 Sections for concrete tolerances required.
 - 2. Division 06 Sections for wood framing & supports, and all blocking at head and jambs as required.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified in writing by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.
- B. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure and classified in accordance with ASTM E413 to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.
- C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.
- D. The operable wall must be manufactured by a certified ISO-9001-2015 company or an equivalent quality control system.

1.4 REFERENCE STANDARDS

A. ASTM International

- 1. ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.
- 2. ASTM E90 Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
- 3. ASTM C1036 Standard Specification for Flat Glass.

- 4. ASTM C1048 Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.
- 5. ASTM E84 Surface Burning Characteristics of Building Materials.
- 6. ASTM E413 Classification for Rating Sound Insulation

B. Health Product Declaration Collaborative

1. Health Product Declaration Open Standard v2.1

C. International Standards Organization

- 1. ISO 14021 Environmental Labels and Declarations Self-Declared Environmental Claims (Type II Environmental Labeling).
- 2. ISO 14025:2011-10, Environmental Labels and Declarations Type III Environmental Declarations Principles and Procedures.
- 3. ISO 14040:2009-11, Environmental Management Life Cycle Assessment Principles and Framework.
- 4. ISO 14044:2006-10, Environmental Management Life Cycle Assessment Requirements and Guidelines.
- 5. ISO 21930 Sustainability in Buildings and Civil Engineering Works Core Rules for Environmental Product Declarations of Construction Products and Services.

D. Other Standards

- 1. ADA Americans with Disabilities Act.
- 2. ANSI Z97.1 Safety Glazing Materials Used in Buildings.
- 3. CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials.
- 4. NEMA LD3 High Pressure Decorative Laminates.

1.5 SUBMITTALS

- A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.
- B. Shop Drawings: Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.
- C. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.

- D. Samples: Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.
- E. Reports: Provide a complete and unedited written sound test report indicating test specimen matches product as submitted.
- F. Create spaces that are healthy for occupants.
 - 1. Furnish products and materials with Health Product Declaration (HPD),
 Manufacturer Inventory, or other material health disclosure documentation.
 Products without an HPD or other disclosure documentation are not acceptable.
- G. Furnish materials that generate the least amount of pollution.
 - 1. Furnish products and materials that have third party verified environmental product declarations (EPD's). Consider products and materials that have optimized environmental performance (reduced life cycle impacts). Products without an EPD or other disclosure documentation are not acceptable.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.
- B. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.7 WARRANTY

- A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.
- B. Warranty period: Two (2) years.
- C. Suspension System Warranty:
 - 1. OP-02: Five (5) years.
 - 2. OP-02-A1: Five (5) years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, PRODUCTS, AND OPERATION

- A. Manufacturers: Subject to compliance with requirements, provide product by the following:
 - 1. Modernfold, Inc. or Approved Equivalent
- B. Doors to be manufactured in the U.S.A.

- C. Products: Subject to compliance with the requirements, provide the following product or approved equivalent:
 - 1. OP-02: Acousti-Seal Premier Paired Panel: Manually operated paired panel operable partition.
 - 2. OP-02-A1: Acousti-Seal Premier Paired Panel: Manually operated paired panel operable partition.

2.2 OPERATION

- A. OP-02: Acousti-Seal Premier Paired Panel: Series of paired flat panels hinged together in pairs, manually operated, top supported with operable floor seals.
- B. OP-02-A1: Acousti-Seal Premier Paired Panel: Series of paired flat panels hinged together in pairs, manually operated, top supported with operable floor seals.
- C. Final Closure:
 - 1. OP-02: Horizontally expanding panel edge with removable crank
 - 2. OP-02-A1: Horizontally expanding panel edge with removable crank

2.3 PANEL CONSTRUCTION

- A. OP-02: Nominal 3-inch (76mm) thick panels in manufacturer's standard 48-inch (1220mm) widths. All panel horizontal and vertical framing members fabricated from minimum 18-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.
- B. Panel skin shall be:
 - 1. OP-02-A1: Nominal 3-inch (76mm) thick panels in manufacturer's standard 48-inch (1220mm) widths. All panel horizontal and vertical framing members fabricated from minimum 18-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.

C. Panel skin shall be:

- 1. OP-02: 0.50-inch (13mm) tackable 100% recycled gypsum board, class "A" rated single material or composite layers continuously bonded to panel frame. Acoustical ratings of panels with this construction minimum:
 - a. 50 STC

- 2. OP-02-A1: 0.50-inch (13mm) tackable 100% recycled gypsum board, class "A" rated single material or composite layers continuously bonded to panel frame. Acoustical ratings of panels with this construction minimum:
 - a. 50 STC
- D. Hinges for Panels, Closure Panels, Pass Doors, and Pocket Doors shall be:
 - 1. OP-02: Full leaf butt hinges, attached directly to the panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.
 - 2. OP-02-A1: Full leaf butt hinges, attached directly to the panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.
- E. Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at panel joints.
- F. Panel Weights:
 - 1. OP-02: 50 STC 8 lbs./square foot
 - 2. OP-02-A1: 50 STC 8 lbs./square foot

2.4 PANEL FINISH

- A. Panel finish shall be:
 - 1. OP-02: Reinforced vinyl with woven backing weighing not less than 20 ounces (567 grams) per lineal yard.
 - 2. OP-02-A1: Reinforced vinyl with woven backing weighing not less than 20 ounces (567 grams) per lineal yard.
- B. Panel Trim: Exposed panel trim of one consistent color:
 - 1. OP-02: To Be Advised
 - 2. OP-02-A1: To Be Advised

2.5 SOUND SEALS

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic or aluminum astragals or astragals in only one panel edge are not acceptable.

- B. Horizontal Top Seals: Continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion without the need for mechanically operated parts.
- C. Horizontal bottom floor seals shall be:
 - 1. OP-02: Modernfold IA2 Bottom seal. Automatic operable seals providing nominal 2-inch (51mm) operating clearance with an operating range of +0.50-inch (13mm) to -1.50-inch (38mm) which automatically drop as panels are positioned, without the need for tools or cranks.
 - 2. OP-02-A1: Modernfold IA2 Bottom seal. Automatic operable seals providing nominal 2-inch (51mm) operating clearance with an operating range of +0.50-inch (13mm) to -1.50-inch (38mm) which automatically drop as panels are positioned, without the need for tools or cranks.

2.6 SUSPENSION SYSTEM

- A. OP-02: #17 Suspension System
 - 1. Suspension Tracks: Minimum 11-gauge, 0.12-inch (3.04mm) roll-formed steel track, suitable for either direct mounting to a wood header or supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 0.38-inch (10mm) diameter threaded rods. Aluminum track is not acceptable.
 - a. Exposed track soffit: Steel, integral to track, and pre-painted off-white.
 - 2. Carriers: One all-steel trolley with steel tired ball bearing wheels per panel (except hinged panels). Non-steel tires are not acceptable.
- B. OP-02-A1: #17 Suspension System
 - 1. Suspension Tracks: Minimum 11-gauge, 0.12-inch (3.04mm) roll-formed steel track, suitable for either direct mounting to a wood header or supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 0.38-inch (10mm) diameter threaded rods. Aluminum track is not acceptable.
 - a. Exposed track soffit: Steel, integral to track, and pre-painted off-white.
 - 2. Carriers: One all-steel trolley with steel tired ball bearing wheels per panel (except hinged panels). Non-steel tires are not acceptable.

2.7 OPTIONS

A. Available accessories/options:

1. OP-02-A1: Pocket Doors: Acousti-Seal Pocket Doors by Modernfold, Inc. Equipped with electric interlock system. (see supplement specification)

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.
- B. Install operable partitions and accessories after other finishing operations, including painting have been completed.
- C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed or unmatched panels are not acceptable.

3.2 CLEANING AND PROTECTION

- A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.
- B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and Installer that ensure operable partitions are without damage or deterioration at time of Substantial Completion.

3.3 ADJUSTING

A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 **DEMONSTRATION**

- A. Demonstrate proper operation and maintenance procedures to Owner's representative.
- B. Provide Operation and Maintenance Manual to Owner's representative.

END OF SECTION 102800

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Underlayatory guards.
- B. Owner-Furnished Material:
- C. Related Sections:
 - 1. Division 09 Section "Tiling" for ceramic toilet and bath accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
 - 5. Manufacturer's warranty.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
 - 2. Identify products using designations indicated.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.
- D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and 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 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- B. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

- 1. A & J Washroom Accessories, Inc.
- 2. American Specialties, Inc.
- 3. Bobrick Washroom Equipment, Inc.
- 4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.

C. Toilet Tissue (Roll) Dispenser #4 & 5:

- 1. Basis-of-Design Product: Bobrick B-2888.
- 2. Description: Double-roll dispenser.
- 3. Mounting: Surface mounted.
- 4. Operation: Spindleless with tension-spring controlled delivery and self-locking device extending through core that prevents core removal until roll is empty.
- 5. Capacity: Designed for 5-inch- (127-mm-) diameter tissue rolls.
- 6. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Paper Towel (Roll) Dispenser #7:

- 1. Basis-of-Design Product: Bobrick B-72974.
- 2. Description: Automatic mechanism permits controlled delivery of paper rolls in preset lengths per stroke.
- 3. Mounting: Surface mounted.
- 4. Minimum Capacity: 8-inch- (203-mm-) wide, 800-foot- (244-m-) long roll.
- 5. Material and Finish: ABS plastic, gray.
- 6. Lockset: Tumbler type.

E. Liquid-Soap Dispenser #6:

- 1. Basis-of-Design Product: Bobrick B-2111.
- 2. Description: Designed for dispensing soap in liquid or lotion form.
- 3. Mounting: Vertically oriented, surface mounted.
- 4. Capacity: 40 fl oz.
- 5. Materials: Stainless steel, No. 4 finish (satin).
- 6. Lockset: Tumbler type.
- 7. Refill Indicator: Window type.

F. Grab Bar #1-3:

- 1. Basis-of-Design Product: Bobrick B-6800 Series.
- 2. Mounting: Flanges with exposed fasteners.
- 3. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin)
- 4. Outside Diameter: 1-1/2 inches (38 mm).
- 5. Configuration and Length: As indicated on Drawings.

- G. Seat-Cover Dispenser #10:
 - 1. Basis-of-Design Product: Bobrick B-221
 - 2. Mounting: Surface mounted.
 - 3. Minimum Capacity: 250 seat covers.
 - 4. Exposed Material and Finish: Stainless steel, No. 4 finish (satin).
- H. Mirror Unit #11:
 - 1. Basis-of-Design Product: Bobrick B-1658 2436.
 - 2. Frame: Stainless-steel angle, 0.05 inch (1.3 mm) thick or Stainless-steel channel.
 - a. Corners: Mitered and mechanically interlocked.
 - 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
 - 4. Size: As indicated on Drawings.
- I. Utility Hook #8-9:
 - 1. Basis-of-Design Product: Bobrick B-6707.
 - 2. Description: Single prong unit.
 - 3. Material and Finish: Stainless steel, No. 4 finish (satin).
- J. Waste Receptacle #13:
 - 1. Basis-of-Design Product: Bobrick B-2280.
 - 2. Mounting: Freestanding.
 - 3. Minimum Capacity: 21 gal. (L).
 - 4. Material and Finish: Stainless steel, No. 4 finish (satin).

2.3 UNDERLAVATORY GUARDS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Plumberex Specialty Products, Inc.
 - 2. Truebro by IPS Corporation.
 - 3. OR Equal
- B. Underlayatory Guard:
 - 1. Basis-of-Design Product: .

- 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
- 3. Material and Finish: Antimicrobial, molded plastic, white.

2.4 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of five keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Fire protection cabinets for the following:
 - a. Portable fire extinguishers.

B. Related Sections:

- 1. Division 09 painting Sections for field painting fire protection cabinets.
- 2. Division 10 Section "Fire Extinguishers."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.
 - 1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples for Initial Selection: For each type of fire protection cabinet indicated.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Size: 6 by 6 inches' square.
- E. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

1.5 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.

1.6 SEQUENCING

A. Apply decals on field-painted, fire protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B.
- B. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished).

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 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. J. L. Industries, Inc., a division of Activar Construction Products Group
 - b. Larsen's Manufacturing Company
 - c. Modern Metal Products, Division of Technico Inc.
 - d. Watrous Division, American Specialties, Inc.
- B. Cabinet Construction: Nonrated.
- C. Cabinet Material: Steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.
- D. Flush Mounted Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
 - 1. Return-Edge Trim: 1/4- inch Interior.
- E. Cabinet Trim Material: Steel sheet
- F. Door Material: Steel sheet.
- G. Door Style: Fully glazed panel with frame.
- H. Door Glazing: Acrylic sheet.
 - 1. Acrylic Sheet Color: Clear transparent acrylic sheet.

- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 - 1. Provide projecting lever handle with cam-action latch.
 - 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:

- 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
- 2. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
- 3. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
- 4. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location.
 - a. Identify fire extinguisher in fire protection cabinet with the words "FIRE EXTINGUISHER"
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Decals.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.

K. Finishes:

- 1. Manufacturer's standard baked-enamel paint for the following:
 - a. Exterior of cabinet door and trim except for those surfaces indicated to receive another finish.
 - b. Interior of cabinet and door.
- 2. Steel: Baked enamel or powder coat.

2.3 FABRICATION

- A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Provide factory-drilled mounting holes.
 - 3. Prepare doors and frames to receive locks.
 - 4. Install door locks at factory.

- B. Cabinet Doors: Fabricate doors per manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 - 2. Fabricate door frames of one-piece construction with edges flanged.
 - 3. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling". After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- B. Factory Prime Finish: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- C. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pre-treating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semi-recessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Provide inside latch and lock for break-glass panels.
 - 2. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.
- C. Identification: Apply decals at locations indicated.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturers written installation instructions.
- B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.
- E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Sections:
 - 1. Division 10 Section "Fire Extinguisher Cabinets."

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire extinguisher schedule with fire protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.
- D. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers" and NFPA 75 "Portable Extinguishers".
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 - 1. Provide fire extinguishers approved, listed, and labeled by FMG.

1.5 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.6 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test per NFPA 10.
 - b. Faulty operation of valves or release levers.
 - 2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each mounting bracket indicated.
 - 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. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International Ltd.
 - c. Badger Fire Protection; a Kidde company.
 - d. Buckeye Fire Equipment Company.
 - e. Fire End & Croker Corporation.
 - f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - g. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - h. Larsen's Manufacturing Company.
 - i. Moon-American.
 - j. Pem All Fire Extinguisher Corp.; a division of PEM Systems, Inc.
 - k. Potter Roemer LLC.
 - 1. Pyro-Chem; Tyco Safety Products.
 - 2. Valves: Manufacturer's standard.
 - 3. Handles and Levers: Manufacturer's standard.
 - 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B and bar coding for documenting fire extinguisher location, inspections, maintenance, and recharging.
- B. Clean-Agent Type in Steel Container: UL-rated 2-A:10-B:C, 10-lb (4.5-kg) nominal capacity, with HFC blend agent and inert material in enameled-steel container; with pressure-indicating gage.
- C. Fire extinguisher classifications: As indicated on Drawings.

2.2 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.
 - 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. Amerex Corporation.
 - b. Ansul Incorporated; Tyco International Ltd.
 - c. Badger Fire Protection; a Kidde company.
 - d. Buckeye Fire Equipment Company.
 - e. Fire End & Croker Corporation.
 - f. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - g. Larsen's Manufacturing Company.
 - h. Potter Roemer LLC.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

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3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 10 55 91 – DROP BOX PASS-THROUGH CHUTE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Drop Box Pass-Through Chute

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Including product data and technical information.
 - 2. Including standard instructions and maintenance information. Including any deviations from the manufacturer's instructions.
- B. Shop drawings: Provide shop drawings showing installation and layout for review of conformance.
- C. Warranty: Provide documentation of the manufacturer's standard warranty.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage.

1.5 WARRANTY

- A. Special Warranty: Standard form in which manufacturer agrees to repair or replace asphalt shingles that fail in materials or workmanship within specified warranty period.
 - 1. Workmanship Warranty Period: 1 years from date of Substantial Completion.
 - 2. Material Warranty Period: 5 years from date of Substantial Completion.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: All primary products specified in this section will be supplied by a single manufacturer with a minimum of ten years experience.

PART 2 - PRODUCTS

2.1 DROP BOX PASS-THROUGH CHUTE

- A. Basis-of-Design Manufacturer: Locking Security Mailbox LLC or an Approved Equivalent
- B. Basis-of-Design Model: Adjustable Through-the-Wall Chute with Lift-up Cover and Mail Slot
 - 1. Minimum Drop Slot Opening Size: 12"x3.5"
 - 2. Finish: Powder Coated White
 - 3. Material: 12 Gauge Steel
 - 4. Door Hinge: Top
 - 5. Anti-Phishing Teeth
 - 6. Air & Weather Tight (Gasket can be added by contractor)
 - 7. Rainguard
 - 8. Adjustable Chute for installation in a 14" deep wall.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas of installation and confirm that the environmental conditions are acceptable per the manufacturer's instructions.

3.2 INSTALLATION

- A. Remove any packaging and excess material from the project site and dispose of per local regulations.
- B. Follow all manufacturer's instructions. Any deviation must be documented and approved as part of the submittal process.
- C. Top of Drop Slot to be less than 48" above grade for ADA compliance.
- D. Follow the detailing as shown on the architectural drawings.

3.3 PROTECTION

- A. Protect adjacent any other construction activities that could cause potential damage to the installed product.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

END OF SECTION 105591

SECTION 123640 - STONE COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes stone countertops.

1.3 ACTION SUBMITTALS

- A. Product Data: For each stone accessory and manufactured product.
- B. Shop Drawings:
 - 1. Include plans, sections, details, and attachments to other work.
 - 2. Show locations and details of joints.
 - 3. Show direction of veining, grain, or other directional pattern.
- C. Samples for Verification: For each stone type indicated, in sets of Samples not less than 9 inches square.
 - 1. Include two or more Samples in each set and show the full range of variations in appearance characteristics expected in the completed Work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Material Test Reports:
 - 1. Stone Test Reports: Forstone variety proposed for use on Project, by a qualified testing agency, indicating compliance with required physical properties, in accordance with referenced ASTM standards. Base reports on testing done within previous three years.
 - 2. Sealant Compatibility and Adhesion Test Report: From sealant manufacturer indicating that sealants will not stain or damage stone.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For stone countertops to include in maintenance manuals. Include product data for stone-care products used or recommended by Installer, and names, addresses, and telephone numbers of local sources for products.

1.6 **QUALITY ASSURANCE**

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate stone countertops similar to that required for this Project, and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of stone countertops.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store and handle stone and related materials to prevent deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breaking, chipping, and other causes.
 - 1. Lift stone with wide-belt slings; do not use wire rope or ropes that might cause staining. Move stone, if required, using dollies with cushioned wood supports.
 - 2. Store stone on wood A-frames or pallets with nonstaining, waterproof covers. Arrange to distribute weight evenly and to prevent damage to stone. Ventilate under covers to prevent condensation.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication and indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Empire Granite Marble Quartz; Granite or a comparable product by one of the following:
 - 1. Pacific Marble & Granite.
 - 2. Galleria Stone & Tile
 - 3. OR Equal
- B. Source Limitations for Stone: Obtain stone, from a single quarry with resources to provide materials of consistent quality in appearance and physical properties.

2.2 GRANITE

- A. Material Standard: Comply with ASTM C615/C615M.
- B. Regional Materials: Stone shall be fabricated within 500 miles (800 km) of Project site.
- C. Description: Uniform, fine-grained, gray or black stone.
- D. Cut: Cross Cut.
- E. Cut stone from contiguous, matched slabs in which natural markings occur.
- F. Finish: Polished.

2.3 ADHESIVES, GROUT, SEALANTS, AND STONE ACCESSORIES

- A. General: Use only adhesives formulated for stone and ceramic tile and that are recommended by their manufacturer for the application indicated.
 - 1. Adhesives shall have a VOC content of 65g/L or less.
 - 2. Adhesive shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Water-Cleanable Epoxy Adhesive: ANSI A118.3.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Atlas Minerals & Chemicals, Inc.
 - b. Bostik, Inc.
 - c. C-Cure.
 - d. MAPEI Corporation.
- C. Sealant for Countertops: Manufacturer's standard sealant that complies with applicable requirements in Section 079200 "Joint Sealants" and that will not stain the stone it is applied to.
 - 1. Mildew-Resistant Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, silicone.
 - 2. Joint Sealant: Latex.
 - 3. Color: Match stone color.
- D. Stone Joint Splines: Stainless-steel or brass washers approximately 1 inch (25 mm) in diameter and of thickness to fit snugly in saw-cut kerf in edge of stone units.
- E. Plywood Subtops: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.
- F. Stone Cleaner: Specifically formulated for stone types, finishes, and applications indicated, as recommended by stone producer. Do not use cleaning compounds containing acids, caustics, harsh fillers, or abrasives.
- G. Stone Sealer: Colorless, stain-resistant sealer that does not affect color or physical properties of stone surfaces, as recommended by stone producer for application indicated.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bostik, Inc.
 - b. Custom Building Products.
 - c. Hillyard, Inc.

2.4 STONE FABRICATION, GENERAL

- A. Select stone for intended use to prevent fabricated units from containing cracks, seams, and starts that may impair structural integrity, function, or appearance.
 - 1. Repairs that are characteristic of the varieties specified are acceptable provided they do not impair structural integrity or function and are not aesthetically unpleasing, as judged by Architect.
- B. Grade and mark stone for final locations to produce assembled countertop units with an overall uniform appearance.
- C. Fabricate stone countertops in sizes and shapes required to comply with requirements indicated.
 - 1. Clean sawed backs of stones to remove rust stains and iron particles.
 - 2. Dress joints straight and at right angle to face unless otherwise indicated.
 - 3. Cut and drill sinkages and holes in stone for anchors, supports, and attachments.
 - 4. Provide openings, reveals, and similar features as needed to accommodate adjacent work
 - 5. Fabricate molded edges with machines having abrasive shaping wheels made to reverse contour of edge profile to produce uniform shape throughout entire length of edge and with precisely formed arris slightly eased to prevent snipping, and matched at joints between units. Form corners of molded edges as indicated with outside corners slightly eased unless otherwise indicated.
 - 6. Finish exposed faces of stone to comply with requirements indicated for finish of each stone type required and to match approved Samples and mockups. Provide matching finish on exposed edges of countertops, splashes, and cutouts.
- D. Carefully inspect finished stone units at fabrication plant for compliance with requirements for appearance, material, and fabrication. Replace defective units.

2.5 STONE COUNTERTOPS

- A. General: Comply with recommendations in MIA's "Dimension Stone Design Manual VII."
- B. Nominal Thickness: Provide thickness indicated, but not less than 1-1/4 inches (32 mm). Gage backs to provide units of identical thickness.
- C. Edge Detail: 3/4-inch (20-mm) radius full bullnose.
- D. Joints: Fabricate countertops in sections for joining in field
 - 1. Joint Locations: Not within 18 inches (450 mm) of a sink or cooktop and not where a countertop section less than 36 inches (900 mm) long may result, unless unavoidable.
 - 2. Joint Type: Bonded, 1/32 inch (0.8 mm) or less in width.
 - 3. Joint Type: Sealant-Filled, 1/16 inch (1.5 mm) in width.

4. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.

E. Cutouts and Holes:

- 1. Counter-Mounted Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
- 2. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to receive stone countertops and conditions under which stone countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of stone countertops.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of stone countertops.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Advise installers of other work about specific requirements for placement of inserts and similar items to be used by stone countertop Installer for anchoring stone countertops. Furnish installers of other work with Drawings or templates showing locations of these items.
- B. Before installing stone countertops, clean dirty or stained stone surfaces by removing soil, stains, and foreign materials. Use only mild cleaning compounds that contain no caustic or harsh materials or abrasives and rinse with clear water. Allow stone to dry before installing.

3.3 CONSTRUCTION TOLERANCES

- A. Variation from Level: Do not exceed 1/8 inch in 96 inches (3 mm in 2400 mm), 1/4 inch (6 mm) maximum.
- B. Variation in Joint Width: Do not vary joint thickness more than one-fourth of nominal joint width.
- C. Variation in Plane at Joints (Lipping): Do not exceed 1/64-inch (0.4-mm) difference between planes of adjacent units.
- D. Variation in Line of Edge at Joints (Lipping): Do not exceed 1/64-inch (0.4-mm) difference between edges of adjacent units, where edge line continues across joint.

3.4 INSTALLATION OF COUNTERTOPS

- A. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- B. Install countertops over subtops with full spread of water-cleanable epoxy adhesive.
- C. Do not cut stone in field unless otherwise indicated. If stone countertops or splashes require additional fabrication not specified to be performed at Project site, return to fabrication shop for adjustment.
- D. Do necessary field cutting as stone is set. Use power saws with diamond blades to cut stone. Cut lines straight, true, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- E. Set stone to comply with requirements indicated. Shim and adjust stone to locations indicated, with uniform joints of widths indicated and with edges and faces aligned in accordance with established relationships and indicated tolerances. Install anchors and other attachments indicated or necessary to secure stone countertops in place.
- F. Bond joints with stone adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in stone edges at joints. Fill kerfs with stone adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- G. Space joints with 1/16-inch (1.5-mm) gap for filling with sealant. Use temporary shims to ensure uniform spacing.
 - 1. Install metal splines in kerfs in stone edges at joints. Fill kerfs with setting adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Use power saws with diamond blades to cut stone. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
- I. Install backsplashes and end splashes by adhering to countertops with stone adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Leave 1/16-inch (1.5-mm) gap between splashes and wall for filling with sealant. Use temporary shims to ensure uniform spacing.
- J. Grout joints to comply with ANSI A108.10. Remove temporary shims before grouting. Tool grout uniformly and smoothly with plastic tool.
- K. Apply sealant to joints and gaps specified for filling with sealant; comply with Section 079200 "Joint Sealants." Remove temporary shims before applying sealant.

3.5 ADJUSTING AND CLEANING

- A. In-Progress Cleaning: Clean countertops as work progresses. Remove adhesive, grout, mortar, and sealant smears immediately.
- B. Clean stone countertops no fewer than six days after completion of installation, using clean water and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that may damage stone.
- C. Sealer Application: Apply stone sealer to comply with stone producer's and sealer manufacturer's written instructions.

END OF SECTION 123640



July 20, 2018

Paul Pizzo Landmark Architects, P.C. 100 Riverview Center, Suite 204 Middletown, Connecticut 06457

RE: Renovation Materials Survey
South Fire District Building
445 Randolph Road, Middletown, Connecticut

Dear Mr. Pizzo:

EnSafe Inc. was retained by Landmark Architects to provide professional environmental consulting services as part of the Pre-Renovation Building Hazard Inspection of the South Fire District Building Located at 445 Randolph Road in Middletown, Connecticut. As part of renovations scheduled for Fall 2018, several areas of carpeting will be removed, walls and windows removed, bathroom/locker room areas renovated, new doorways installed, and a portion of the roof structure modified. On May 31, 2018, EnSafe collected limited building material samples to determine the presence of asbestos, polychlorinated biphenyls (PCBs), and lead to identify the need for regulated mitigation, abatement, and/or handling for material disposal, during the proposed renovation activities.

Work Performed

On May 31, 2018 building material samples were collected from pre-renovation building areas located in the Fire House Dormitory, Recreation Room, office areas (see Figure 1), and the Exterior Roof above the dormitories (see Figure 2). Samples were collected using hand tools to remove a representative sample for the appropriate laboratory analysis. Samples were described based on the material encountered. Building materials bonded together that may be incidentally removed together during renovation activities were noted during the investigation. Sampled building materials were submitted to EMSL Analytical, Inc. of Wallingford, Connecticut for asbestos analysis using polarizing light microscopy. A composite renovation building material sample was submitted to Accutest of Dayton, New Jersey for Toxic Characteristic Leachate Procedure (TCLP) lead analysis by EPA Method 1311 and a composite caulk sample from around windows to be removed for PCB analysis by EPA Method 8082A.

Results of Investigation

Asbestos concentrations greater than one percent were identified within several building materials. The composite window caulking sample collected from the Dormitory was found to contain PCBs at 20.4 milligrams per kilogram (mg/kg). The composite demolition debris sample for TCLP lead was reported at a concentration of 0.069 mg/l. Below is a summary of the samples and laboratory results.

Dormitory

Three material samples were determined to contain asbestos. Black mastic (04ABC) flooring adhesive, 2'x2' white ceiling tile (05ABC), and insulation surrounding a 2" elbow (10ABC) were determined to be

positive for greater than one percent chrysotile asbestos. Additionally, window caulking collected as part of the survey was found to contain total PCBs at a concentration of 20.4 mg/kg.

Recreation Room

One material sample composed of black mastic (15ABC) flooring adhesive was found to contain asbestos.

North East Office

Three material samples were reported as containing asbestos above one percent. Black mastic (18ABC), 2'x2' pinhole and worm pattern ceiling tile (20ABC), and 2'x2' pinhole and chisel) pattern ceiling tiles (19ABC) were found to contain asbestos greater than one percent.

<u>Center — Main Hallway</u>

No asbestos containing materials (ACM) identified within proposed renovation areas and materials.

Men's Bathroom

No ACMs identified within proposed renovation areas and materials.

Tax Office Lobby and Northwest Office

Black mastic (35ABC and 50ABC) reported asbestos above one percent.

Exterior Roof

The exterior black roof tar patch (55ABC) and the black tar and paper (56ABC) were positive for asbestos. The tar and tar paper was located below the current surficial roofing material but above plywood.

TCLP Lead Demolition Material Composite Sample

Lead was detected in a building material composite sample at a concentration of 0.069 mg/l.

Conclusions and Recommendations

Sampling conducted as part of this building materials survey has revealed the presence of ACMs in materials described to EnSafe as being potentially removed and/or disturbed during renovations. If disturbed, these materials should be managed and disposed of in accordance with state and federal regulations. PCBs were identified in window caulking from windows planned for removal at a concentration of 20.4 mg/kg, below the US Environmental Protection Agency Toxic Substance Control Act action limit of 50 mg/kg. This material, if disturbed, should be disposed of as a Connecticut Regulated Waste. TCLP lead composite waste characterization was reported at 0.069 mg/l, below the hazardous TCLP action limit of 5 mg/l.

Based on our understanding of the proposed renovation activities, and the site inspection conducted on May 31, 2018, the above mentioned ACMs will require regulated mitigation, abatement, and/or handling for disposal if disturbed.

The demolition debris did not test hazardous for lead and can be handled as a construction and demolition waste stream. Additionally, the removal of the caulk does not require notification to the EPA.

A copy of the laboratory reports, sample summary, and figures are attached. .



If a material is encountered during renovations that was not adequately characterized, additional samples and characterization may be warranted. The May 31 2018 inspection was conducted based on materials identified by Landmark to be potentially disturbed during the renovation and results of this inspection are not representative of a complete building materials inspection.

EnSafe sincerely appreciates the opportunity to be your Consultant for this project. If you have any further questions regarding this survey please me at 860-665-1140.

EnSafe Inc.

By: Timothy O. Myjak, LEP

Senior Project Manager/NE Business Development Lead

Attachments:

Figure 1 – Interior Abatement Area Plan Figure 2 – Exterior Roof Abatement Area Plan Laboratory Reports

Building Materials Sample Summary



Attachment A Figures

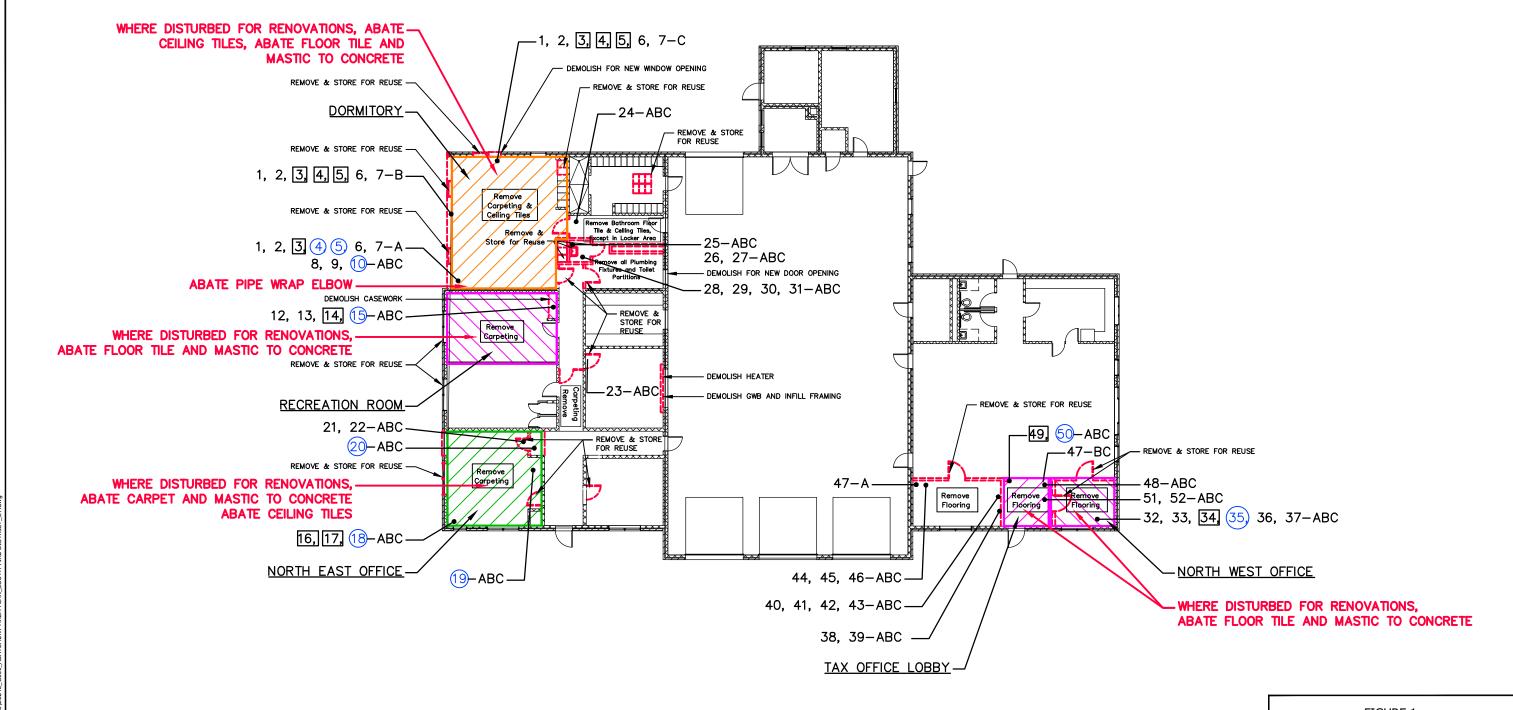


FIGURE 1
INTERIOR ABATEMENT AREA PLAN
SOUTH FIRE DISTRICT
445 RANDOLPH ROAD
MIDDLETOWN, CONNECTICUT 06457

<u>LEGEND</u>

IDENTIFIED ACBM (ASBESTOS CONTAINING BUILDING MATERIAL)

COLLECTED SAMPLE NOT ANALYZED

1, 2, 3-ABC SAMPLE LOCATION AND NUMBER DESTINATION

NOTE
ABATE AREAS AS NOTED, IF DISTURBED DURING RENOVATIONS.

10 20 REQUESTED BY: TM
DRAWN BY: CC
DATE: 7/20/2018
PROJECT: 0888823246



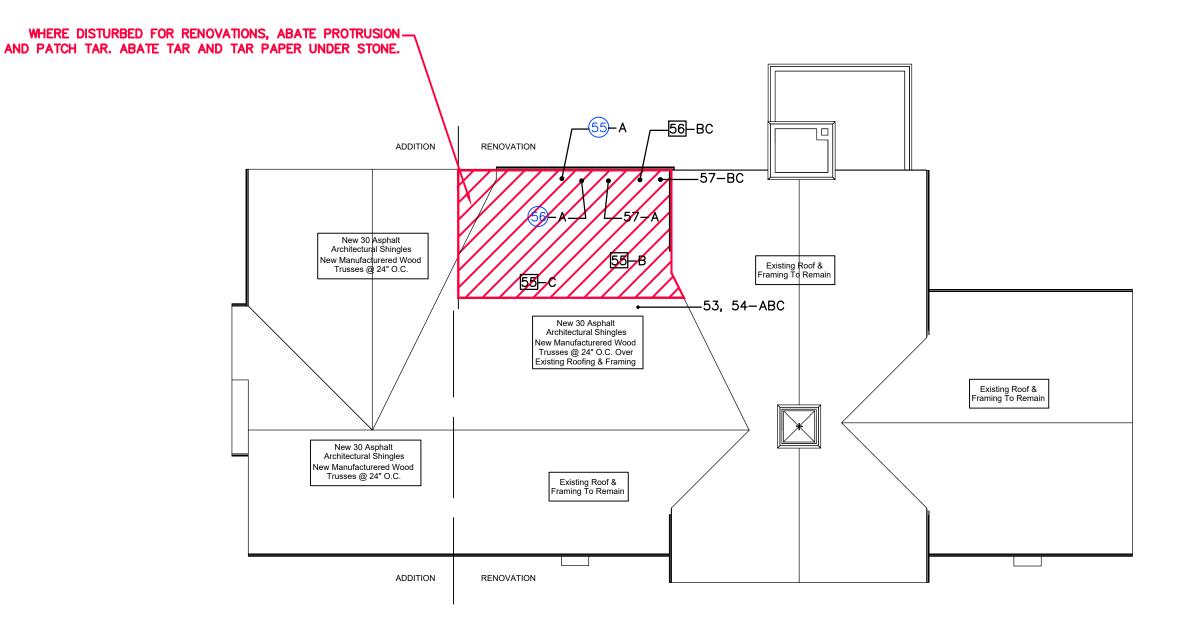


FIGURE 2
EXTERIOR ROOF ABATEMENT AREA PLAN
SOUTH FIRE DISTRICT
445 RANDOLPH ROAD
MIDDLETOWN, CONNECTICUT 06457

LEGEND

(XX)

 ${\tt IDENTIFIED\ ACBM\ (ASBESTOS\ CONTAINING\ BUILDING\ MATERIAL)}$

1, 2, 3-ABC SAMPLE LOCATION AND NUMBER DESTINATION

ABATE AREAS AS NOTED, IF DISTURBED DURING RENOVATIONS.

O 10 20

SCALE IN FEET

COORDINATE SYSTEM: NAD 1983
STATE PLANE TENNESSEE FEET

 REQUESTED BY:
 TM

 DRAWN BY:
 CC

 DATE:
 7/20/2018

 PROJECT:
 0888823246



Attachment B Laboratory Reports



EMSL Analytical, Inc.

29 North Plains Highway, Unit # 4 Wallingford, CT 06492

Tel/Fax: (203) 284-5948 / (203) 284-5978 http://www.EMSL.com / wallingfordlab@emsl.com EMSL Order: 241802730 Customer ID: ESCT42

Customer PO: Project ID:

Attention: Tim Myjak **Phone:** (860) 665-1140

Ensafe Fax:

 1233 Silas Deane Highway
 Received Date:
 06/04/2018 8:20 AM

 Weathersfield, CT 06109
 Analysis Date:
 06/08/2018 - 06/09/2018

Collected Date: 05/31/2018

Project: SFD MIDDLETOWN

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	stos	<u>Asbestos</u>	
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type	
01A 241802730-0001	Dormatory over sample 02a - brown carpet	Various Fibrous Homogeneous	85% Synthetic	15% Non-fibrous (Other)	None Detected	
01B	Dormatory over sample 02B - brown	Various Fibrous	85% Synthetic	15% Non-fibrous (Other)	None Detected	
241802730-0002	carpet	Homogeneous				
01C 241802730-0003	Dormatory over sample 02C - brown	Brown Fibrous	80% Synthetic	20% Non-fibrous (Other)	None Detected	
	carpet Dormatory under	Homogeneous Yellow	2% Cellulose	98% Non-fibrous (Other)	None Detected	
D2A 241802730-0004	sample 1A - yellow flooring mastic	Non-Fibrous Homogeneous	2% Cellulose	96% Non-librous (Otner)	None Detected	
)2B	Dormatory under sample 1B - yellow	Yellow Non-Fibrous	2% Synthetic	98% Non-fibrous (Other)	None Detected	
241802730-0005	flooring mastic	Homogeneous				
02C 241802730-0006	Dormatory under sample 1C - yellow flooring mastic	Yellow Non-Fibrous Homogeneous	3% Synthetic	97% Non-fibrous (Other)	None Detected	
03A	Dormatory under	Homogeneous			Positive Stop (Not Analyzed)	
241802730-0007	sample 2A - beige floor tile				, , ,	
)3B	Dormatory under				Positive Stop (Not Analyzed)	
241802730-0008	sample 2B - beige floor tile					
03C	Dormatory under sample 2C - beige				Positive Stop (Not Analyzed)	
241802730-0009	floor tile					
04A 241802730-0010	Dormatory under sample 3A - black mastic	Black Non-Fibrous		94% Non-fibrous (Other)	6% Chrysotile	
		Homogeneous			Desitive Step (Not Applyand)	
04B 241802730-0011	Dormatory under sample 3B - black mastic				Positive Stop (Not Analyzed)	
04C	Dormatory under sample 3C - black				Positive Stop (Not Analyzed)	
241802730-0012	mastic					
05A	Dormatory - white 2'x2' ceiling tile	Gray/White Fibrous	85% Min. Wool	13% Non-fibrous (Other)	2% Chrysotile	
241802730-0013		Homogeneous				
05B	Dormatory - white 2'x2' ceiling tile				Positive Stop (Not Analyzed)	
241802730-0014 The sample group is not	homogeneous.					
05C	Dormatory - white 2'x2' ceiling tile				Positive Stop (Not Analyzed)	
241802730-0015						
06A	Dormatory ceiling - pink loose fiberglass	Pink Fibrous	98% Min. Wool	2% Non-fibrous (Other)	None Detected	
241802730-0016	type insulation	Homogeneous				

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

		Non-Asbestos			<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
06B 241802730-0017	Dormatory ceiling - pink loose fiberglass type insulation	Pink Fibrous Homogeneous	98% Min. Wool	2% Non-fibrous (Other)	None Detected
06C	Dormatory ceiling - pink loose fiberglass	Gray/Pink Fibrous	85% Min. Wool	15% Non-fibrous (Other)	None Detected
241802730-0018	type insulation	Homogeneous			
07A 241802730-0019	Dormatory replacement - bright white 2'x2' ceiling tile	Gray/White Fibrous Homogeneous	40% Cellulose 40% Min. Wool	10% Perlite 10% Non-fibrous (Other)	None Detected
07B			40% Cellulose	10% Perlite	None Detected
241802730-0020	Dormatory replacement - bright white 2'x2' ceiling tile	Gray/White Fibrous Homogeneous	40% Cellulose 40% Min. Wool	10% Perinte 10% Non-fibrous (Other)	None Detected
07C	Dormatory	Brown/Tan	40% Cellulose	20% Non-fibrous (Other)	None Detected
241802730-0021	replacement - bright white 2'x2' ceiling tile	Fibrous Homogeneous	40% Min. Wool	20 /0 (10): 112.000 (00)	
08A	Dormatory - white cloth pipe wrap	Tan Fibrous	95% Cellulose 2% Synthetic	3% Non-fibrous (Other)	None Detected
241802730-0022		Homogeneous			
08B	Dormatory - white cloth pipe wrap	Tan Fibrous	95% Cellulose	5% Non-fibrous (Other)	None Detected
241802730-0023	Damastan,hita	Homogeneous	000/ Callulana	400/ Non Sharry (Other)	Nama Datastad
08C 241802730-0024	Dormatory - white cloth pipe wrap	Tan Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
09A	Dormatory ceiling -	Yellow	98% Min. Wool	2% Non-fibrous (Other)	None Detected
241802730-0025	yellow fiberglass type insulation	Fibrous Homogeneous	90 /6 WIIII. VVOOI	2 /8 Non-librous (Other)	None Detected
09B	Dormatory ceiling - yellow fiberglass type	Yellow Fibrous	98% Min. Wool	2% Non-fibrous (Other)	None Detected
241802730-0026	insulation	Homogeneous			
09C	Dormatory ceiling - yellow fiberglass type	Yellow Fibrous	10% Cellulose 80% Min. Wool	10% Non-fibrous (Other)	None Detected
241802730-0027	insulation	Homogeneous	050/ Min 1M/n 1	400/ Non Sharana (Others)	00/ 01
10A 241802730-0028	Dormatory - white cement 2" elbow insulation	Gray Fibrous Homogeneous	85% Min. Wool	12% Non-fibrous (Other)	3% Chrysotile
10B	Dormatory - white				Positive Stop (Not Analyzed)
241802730-0029	cement 2" elbow insulation				r course ctop (verrular)256)
10C	Dormatory - white cement 2" elbow				Positive Stop (Not Analyzed)
241802730-0030	insulation				
11A	Dormatory - white flexible caulk	White Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0031		Homogeneous			
11B	Dormatory - white flexible caulk	White Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0032		Homogeneous			
11C 241802730-0033	Dormatory - white flexible caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
	Rec room over	-		1000/ Non fibrous (Other)	None Detected
12A 241802730-0034	sample 13a - dark grey rubber	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
	baseboard				



Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			·	n-Asbestos	<u>Asbestos</u>
ample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
2B 1802730-0035	Rec room over sample 13b - dark grey rubber baseboard	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2C	Rec room over sample 13c - dark	Black Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0036	grey rubber baseboard	Homogeneous			
3A 41802730-0037	Rec room under sample 12a - yellow mastic	Tan/Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3B	Rec room under sample 12b - yellow	Tan/Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0038	mastic	Homogeneous			
3C	Rec room under sample 12c - yellow	Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0039	mastic	Homogeneous			
4A 41802730-0040	Rec room underneath brown carpet and yellow mastic - off				Positive Stop (Not Analyzed
	white floor tile				
4B	Rec room underneath brown carpet and				Positive Stop (Not Analyzed
41802730-0041	yellow mastic - off white floor tile				
4C	Rec room underneath brown carpet and				Positive Stop (Not Analyzed
41802730-0042	yellow mastic - off white floor tile				
15A	Rec room under 14A - black mastic	Black Non-Fibrous		96% Non-fibrous (Other)	4% Chrysotile
41802730-0043		Homogeneous			5 0. 41.44
5B 41802730-0044	Rec room under 14b - black mastic				Positive Stop (Not Analyzed
5C	Rec room under 14c -				Positive Stop (Not Analyzed
41802730-0045	black mastic				Positive Stop (Not Arialyzed)
6A	Southwest office over				Positive Stop (Not Analyzed
41802730-0046	sample 17a - blue carpet with yellow acsent				
16B	Southwest office over sample 17b - blue				Positive Stop (Not Analyzed
241802730-0047	carpet with yellow acsent				
16C	Southwest office over sample 17bc - blue				Positive Stop (Not Analyzed
41802730-0048	carpet with yellow acsent				
7A	Southwest office under 16a - yellow				Positive Stop (Not Analyzed
41802730-0049	mastic				
7B	Southwest office under 16b - yellow				Positive Stop (Not Analyzed
41802730-0050	mastic				
17C	Southwest office under 16c - yellow				Positive Stop (Not Analyzed
241802730-0051	mastic				

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

		Non-Asbestos		<u>tos</u>	<u>Asbestos</u>	
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type	
18A 241802730-0052	Southwest office under 17a - black mastic	Brown/Gray Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile	
8B 41802730-0053	Southwest office under 17b - black mastic	<u> </u>			Positive Stop (Not Analyzed)	
8C	Southwest office under 17c - black				Positive Stop (Not Analyzed)	
11802730-0054	mastic					
9A 41802730-0055	Southwest office - white 2'x2' pinhole and chistle pattern	Gray Fibrous Homogeneous	65% Min. Wool	33% Non-fibrous (Other)	2% Amosite	
77002730-0033	ceiling tile	riomogeneous				
9B	Southwest office - white 2'x2' pinhole				Positive Stop (Not Analyzed)	
41802730-0056	and chistle pattern ceiling tile					
9C	Southwest office - white 2'x2' pinhole				Positive Stop (Not Analyzed)	
41802730-0057	and chistle pattern ceiling tile					
0A	Southwest office - white 2'x2' pinhole	Gray/Pink Fibrous	55% Min. Wool	41% Non-fibrous (Other)	4% Amosite	
11802730-0058	and worm pattern- maroon backing	Homogeneous				
0B	Southwest office - white 2'x2' pinhole				Positive Stop (Not Analyzed)	
41802730-0059	and worm pattern- maroon backing					
0C	Southwest office - white 2'x2' pinhole				Positive Stop (Not Analyzed)	
41802730-0060	and worm pattern- maroon backing					
1A	Southwest office over sample 22a - blue	Blue Non-Fibrous		100% Non-fibrous (Other)	None Detected	
41802730-0061	rubberized cove base	Homogeneous				
1B	Southwest office over sample 22b - blue	Blue Non-Fibrous		100% Non-fibrous (Other)	None Detected	
41802730-0062 1C	rubberized cove base Southwest office over	Homogeneous Blue		100% Non-fibrous (Other)	None Detected	
	sample 22c - blue	Non-Fibrous		100 % Noti-fibrous (Other)	None Detected	
41802730-0063 2A	rubberized cove base Southwest office	Homogeneous Tan		100% Non-fibrous (Other)	None Detected	
ZA.	under sample 21a -	Non-Fibrous		100% Non-librous (Other)	None Detected	
41802730-0064	yellow mastic	Homogeneous				
2B	Southwest office under sample 21b -	Tan Non-Fibrous	<1% Cellulose	100% Non-fibrous (Other)	None Detected	
41802730-0065	yellow mastic	Homogeneous		1000/ Non Shares (Others)	None Detected	
2C 41802730-0066	Southwest office under sample 21c - yellow mastic	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
3A	Center- main hallway	White		2% Quartz	None Detected	
41802730-0067	- white flexible caulk	Non-Fibrous Homogeneous		98% Non-fibrous (Other)		
23B	Center- main hallway - white flexible caulk	White Non-Fibrous		100% Non-fibrous (Other)	None Detected	
241802730-0068		Homogeneous				

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	<u>stos</u>	<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
23C 241802730-0069	Center- main hallway - white flexible caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
24A	Mens bathroom - beige sandy texture	White Non-Fibrous	5% Cellulose 5% Glass	90% Non-fibrous (Other)	None Detected
241802730-0070	gypsum type ceiling tile	Homogeneous			
24B	Mens bathroom - beige sandy texture	White Non-Fibrous	8% Cellulose 2% Glass	90% Non-fibrous (Other)	None Detected
241802730-0071	gypsum type ceiling tile	Homogeneous			
24C	Mens bathroom - beige sandy texture	White Non-Fibrous	7% Cellulose	93% Non-fibrous (Other)	None Detected
241802730-0072	gypsum type ceiling tile	Homogeneous			
25A	Mens bathroom - concrete block with	Gray/White Non-Fibrous		20% Quartz 80% Non-fibrous (Other)	None Detected
241802730-0073 25B	beige tile type surface Mens bathroom -	Homogeneous Gray/White		15% Quartz	None Detected
241802730-0074	concrete block with beige tile type surface	Non-Fibrous Homogeneous		85% Non-fibrous (Other)	20.00.00
25C	Mens bathroom -	Gray		10% Quartz	None Detected
241802730-0075	concrete block with beige tile type surface	Non-Fibrous Homogeneous		90% Non-fibrous (Other)	
26A	Mens bathroom - beige rubberized cove	Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0076	base	Homogeneous		4000/ New Shares (Other)	New Detected
26B 241802730-0077	Mens bathroom - beige rubberized cove base	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
26C	Mens bathroom - beige rubberized cove	Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0078	base	Homogeneous			
27A 241802730-0079	Mens bathroom under sample 26a - yellow mastic	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
27B	Mens bathroom under	Homogeneous Yellow	2% Cellulose	98% Non-fibrous (Other)	None Detected
41802730-0080	sample 26b - yellow mastic	Non-Fibrous Homogeneous			
27C	Mens bathroom under sample 26c - yellow	Tan/Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0081	mastic	Homogeneous			
28A	Mens bathroom - off white 1 inch ceramic	White Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0082	type flooring tile	Homogeneous			
28B 41802730-0083	Mens bathroom - off white 1 inch ceramic type flooring tile	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28C	Mens bathroom - off	White		100% Non-fibrous (Other)	None Detected
241802730-0084	white 1 inch ceramic type flooring tile	Non-Fibrous Homogeneous		100 /5 (1011 librous (Other)	None Delected
29A	Mens bathroom - brown 1 inch ceramic	Brown		100% Non-fibrous (Other)	None Detected
241802730-0085	type flooring tile	Non-Fibrous Homogeneous			
29B	Mens bathroom - brown 1 inch ceramic	Brown Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0086	type flooring tile	Homogeneous			

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe		<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
29C 241802730-0087	Mens bathroom - brown 1 inch ceramic type flooring tile	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
30A 241802730-0088	Mens bathroom - grey grout	Gray Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (Other)	None Detected
30B	Mens bathroom - grey grout	Brown Non-Fibrous		10% Quartz 90% Non-fibrous (Other)	None Detected
41802730-0089 GOC	Mens bathroom - grey grout	Homogeneous Gray Non-Fibrous		2% Quartz 98% Non-fibrous (Other)	None Detected
41802730-0090		Homogeneous			
31A	Mens bathroom occurs under 28a -	Tan Fibrous	95% Cellulose	5% Non-fibrous (Other)	None Detected
41802730-0091	white paper tile backing	Homogeneous			
31B 241802730-0092	Mens bathroom occurs under 28b - white paper tile	Tan Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
+1002130-0092	backing	Tiomogeneous			
31C	Mens bathroom occurs under 28c -	Tan/White Fibrous	98% Cellulose	2% Non-fibrous (Other)	None Detected
41802730-0093	white paper tile backing	Homogeneous			
2A	Tax office occurs over 33a - red carpet	Red Fibrous	95% Synthetic	5% Non-fibrous (Other)	None Detected
11802730-0094		Homogeneous			
2B 41802730-0095	Tax office occurs over 33b - red carpet	Red Non-Fibrous	95% Synthetic	5% Non-fibrous (Other)	None Detected
	Tax office occurs over	Homogeneous Red	00% Cunthatia	100/ Non fibrous (Other)	None Detected
2C 41802730-0096	33c - red carpet	Fibrous Homogeneous	90% Synthetic	10% Non-fibrous (Other)	None Detected
3A	Tax office occurs under 32a - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0097	mastic	Homogeneous			
3B	Tax office occurs under 32b - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0098 3C	mastic Tax office occurs under 32c - yellow	Homogeneous Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0099	mastic	Homogeneous			
4A	Tax office occurred under sample 33a -				Positive Stop (Not Analyzed)
41802730-0100	beige flooring tile				
4B 11802730-0101	Tax office occurred under sample 33b - beige flooring tile				Positive Stop (Not Analyzed)
4C	Tax office occurred				Positive Stop (Not Analyzed)
4C 41802730-0102	under sample 33c - beige flooring tile				r ositive Stop (Not Arialyzed)
5A	Tax office occurs under 34a - black	Black Non-Fibrous		98% Non-fibrous (Other)	2% Chrysotile
11802730-0103	mastic	Homogeneous			
35B	Tax office occurs under 34b - black	-			Positive Stop (Not Analyzed)
241802730-0104	mastic				

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbes	<u>stos</u>	<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
85C	Tax office occurs under 34c - black				Positive Stop (Not Analyzed)
241802730-0105	mastic			4000(N) - 51 - (O.11 -)	N 5 ()
66A 41802730-0106	Tax office - brown rubberized cove base	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
6B	Tax office - brown rubberized cove base	Brown Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0107	1455011204 0010 5400	Homogeneous			
6C	Tax office - brown rubberized cove base	Brown Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0108		Homogeneous			
7A	Tax office occurs under 36a - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0109	mastic	Homogeneous			
7B	Tax office occurs under 36b - yellow mastic	Yellow Non-Fibrous	<1% Cellulose	100% Non-fibrous (Other)	None Detected
41802730-0110	Tax office occurs	Homogeneous Yellow		100% Non-fibrous (Other)	None Detected
7C 41802730-0111	under 36c - yellow mastic	Non-Fibrous Homogeneous		100 % INOH-HIDIOUS (OTHER)	None Detected
8A	Tax office - beige rubberized cove base	Brown/Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0112		Homogeneous			
3B	Tax office - beige rubberized cove base	Brown/Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0113		Homogeneous			
8C 11802730-0114	Tax office - beige rubberized cove base	Brown Non-Fibrous		100% Non-fibrous (Other)	None Detected
	Tax office occurs	Homogeneous Yellow		100% Non-fibrous (Other)	None Detected
9A 11802730-0115	under 39a - yellow mastic	Non-Fibrous Homogeneous		100% Noti-librous (Other)	None Detected
9B	Tax office occurs under 39b - yellow	Yellow Non-Fibrous	2% Cellulose	98% Non-fibrous (Other)	None Detected
11802730-0116	mastic	Homogeneous			
9C	Tax office occurs under 39c - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0117	mastic	Homogeneous		000/ N 51 / 511	
DA 11802730-0118	Tax office - red and brown carpet	Brown/Black Fibrous Homogeneous	80% Synthetic	20% Non-fibrous (Other)	None Detected
)B	Tax office - red and	Brown/Red	80% Synthetic	20% Non-fibrous (Other)	None Detected
	brown carpet	Fibrous	,		
11802730-0119	Toy office and and	Homogeneous Proug/Dod	0E0/ C	E0/ Non Share (Other)	None Detected
OC 1802730-0120	Tax office - red and brown carpet	Brown/Red Fibrous Homogeneous	95% Synthetic	5% Non-fibrous (Other)	None Detected
	Tax office occurred	Tan	10% Synthetic	90% Non-fibrous (Other)	<1% Chrysotile
1A 11802730-0121	below sample 40a - beige mastic	nan Non-Fibrous Heterogeneous	10% Synthetic	90% INOTI-TIDIOUS (OTHER)	<1% Unrysotile
1B	Tax office occurred	Tan/Black	15% Synthetic	85% Non-fibrous (Other)	<1% Chrysotile
41802730-0122	below sample 40b - beige mastic	Fibrous Heterogeneous			
-1C	Tax office occurred below sample 40c -	Black/Yellow Non-Fibrous		100% Non-fibrous (Other)	<1% Chrysotile
41802730-0123	beige mastic	Heterogeneous			

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	<u>stos</u>	<u>Asbestos</u>	
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type	
42A 241802730-0124	Tax office potential black mastic below foam-difficult to sample- occurred below sample 41a - black foam type carpet backing	Black Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected	
42B 241802730-0125	Tax office potential black mastic below foam-difficult to sample- occurred below sample 41b - black foam type carpet backing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
42C 241802730-0126	Tax office potential black mastic below foam-difficult to sample- occurred below sample 41c - black foam type carpet backing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
43A 241802730-0127	Tax office occurred below sample 40a - yellow mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
43B 241802730-0128	Tax office occurred below sample 40b - yellow mastic	Yellow Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (Other)	None Detected	
43C 241802730-0129	Tax office occurred below sample 40bc - yellow mastic	Yellow Non-Fibrous Homogeneous	2% Synthetic	98% Non-fibrous (Other)	None Detected	
44A 241802730-0130	Tax office - white sheetrock	White Non-Fibrous Homogeneous	6% Cellulose 2% Glass	92% Non-fibrous (Other)	None Detected	
44B 241802730-0131	Tax office - white sheetrock	White Non-Fibrous Homogeneous	8% Cellulose 2% Glass	90% Non-fibrous (Other)	None Detected	
44C 241802730-0132	Tax office - white sheetrock	Gray/White Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected	
45A 241802730-0133	Tax office - white joint compound	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
45B 241802730-0134	Tax office - white joint compound	White Non-Fibrous		100% Non-fibrous (Other)	None Detected	
45C 241802730-0135	Tax office - white joint compound	Tan/White Non-Fibrous		100% Non-fibrous (Other)	None Detected	
241802730-0135 46A 241802730-0136	Tax office - compound tape	Homogeneous Brown Fibrous Homogeneous	99% Cellulose	1% Non-fibrous (Other)	None Detected	
46B 241802730-0137	Tax office - compound tape	Brown Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected	
46C	Tax office - compound tape	Brown Fibrous	98% Cellulose	2% Non-fibrous (Other)	None Detected	



Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	stos	Asbestos
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
41802730-0139	Tax office - white 2x2 foot ceiling tile with pinholes and chistle marks	Tan/White Fibrous Homogeneous	30% Cellulose 35% Min. Wool	35% Non-fibrous (Other)	None Detected
17B	Tax office - white 2x2 foot ceiling tile with	Tan/White Fibrous	40% Cellulose 30% Min. Wool	30% Non-fibrous (Other)	None Detected
241802730-0140	pinholes and chistle marks	Homogeneous			
41802730-0141	Tax office - white 2x2 foot ceiling tile with pinholes and chistle	Gray/White Fibrous Homogeneous	40% Cellulose 40% Min. Wool	10% Perlite 10% Non-fibrous (Other)	None Detected
-8A	marks Tax office - black adhesive and craft	Brown/Black/Pink Fibrous	60% Cellulose 30% Glass	10% Non-fibrous (Other)	None Detected
41802730-0142	paper	Homogeneous			
41802730-0143	Tax office - black adhesive and craft	Brown/Black/Pink Fibrous Homogeneous	65% Cellulose 25% Glass	10% Non-fibrous (Other)	None Detected
41802730-0144	paper Tax office - black adhesive and craft paper	Brown/Black Fibrous Homogeneous	55% Cellulose 35% Min. Wool	10% Non-fibrous (Other)	None Detected
19A	Tax office occurred over sample 50a -				Positive Stop (Not Analyzed)
41802730-0145 .9B	beige flooring tile Tax office occurred over sample 50b -				Positive Stop (Not Analyzed)
41802730-0146	beige flooring tile				
.9C 41802730-0147	Tax office occurred over sample 50c - beige flooring tile				Positive Stop (Not Analyzed)
60A 41802730-0148	Tax office occurred under sample 49 - black mastic	Black Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
60B	Tax office occurred under sample 49 -	Homogeneous			Positive Stop (Not Analyzed)
41802730-0149 50C	black mastic Tax office occurred under sample 49 -				Positive Stop (Not Analyzed)
41802730-0150 61A	black mastic Tax office - olive green rubberized	Green Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0151 1B 41802730-0152	cove base Tax office - olive green rubberized cove base	Homogeneous Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
1C	Tax office - olive green rubberized	Green Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0153	cove base	Homogeneous			
2A	Tax office occurred under 51a - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
2B	mastic Tax office occurred under 51b - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0155	mastic Tax office occurred	Homogeneous Yellow		100% Non fibrous (Other)	None Detected
52C 241802730-0156	under 51c - yellow mastic	Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	<u>estos</u>	<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
53A 241802730-0157	Exterior roof - blue asphalt type roof shingles with surface	Gray/Black Fibrous Homogeneous	15% Glass	85% Non-fibrous (Other)	None Detected
	agrigate				
53B 241802730-0158	Exterior roof - blue asphalt type roof shingles with surface agrigate	Gray/Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
53C	Exterior roof - blue asphalt type roof	Gray/Black Non-Fibrous		10% Quartz 90% Non-fibrous (Other)	None Detected
241802730-0159	shingles with surface agrigate	Homogeneous		,	
54A	Exterior roof occurs under sample 53 -	Black Fibrous	20% Glass	80% Non-fibrous (Other)	None Detected
241802730-0160	black rolled sub roofing with agrigate	Homogeneous			
54B	Exterior roof occurs under sample 53 -	Black Fibrous	20% Glass	80% Non-fibrous (Other)	None Detected
241802730-0161	black rolled sub roofing with agrigate	Homogeneous			
54C	Exterior roof occurs under sample 53 -	Gray/Black Fibrous	10% Glass	90% Non-fibrous (Other)	None Detected
241802730-0162	black rolled sub roofing with agrigate	Homogeneous			
55A 241802730-0163	Exterior roof - black roof tar	Black Non-Fibrous		90% Non-fibrous (Other)	10% Chrysotile
	Exterior roof blook	Homogeneous			Desitive Step (Net Applying)
55B	Exterior roof - black roof tar				Positive Stop (Not Analyzed)
241802730-0164					
55C	Exterior roof - black roof tar				Positive Stop (Not Analyzed)
241802730-0165					
56A	Exterior roof - black tar and paper	Black Non-Fibrous		94% Non-fibrous (Other)	6% Chrysotile
241802730-0166 56B	Exterior roof - black	Homogeneous			Positive Stop (Not Analyzed)
241802730-0167	tar and paper				
56C	Exterior roof - black tar and paper				Positive Stop (Not Analyzed)
241802730-0168	and paper				
57A	Exterior roof - black tar paper	Brown/Black Fibrous	20% Cellulose	80% Non-fibrous (Other)	None Detected
241802730-0169		Homogeneous			
57B	Exterior roof - black tar paper	Black Fibrous	20% Cellulose	80% Non-fibrous (Other)	None Detected
241802730-0170		Homogeneous			
57C	Exterior roof - black tar paper	Black Fibrous	8% Cellulose	92% Non-fibrous (Other)	None Detected
241802730-0171		Homogeneous			



EMSL Order: 241802730 Customer ID: ESCT42 Customer PO:

Project ID:

Analyst(s)

Almedina Hodzic (46) Lauren Buffone (19) Quetcy Castro Romero (66) hu kn

Lauren Brennan, Asbestos Lab Manager or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Wallingford, CT NVLAP Lab Code 200700-0,

OrderID: 241802730

24/802730



1233 Silas Deane Hwy. Wethersfield, CT 06109 Tel. 860 665 1140 Fax 860 665 9445

		Chain of Custody	
Project:	SFD Middletown		
Project ID:			
Sampled By:	Tim Myjak	Sampled On:	5/31/2018
Sample ID's:	1 A,B,C through 57 A,B,C	Number of Materials Sampl	ed: 171
Sample Summary	Attached: Yes		
Type: Bulk Samp	oles	Analysis: PLM Asbestos E	PA 600 / Point Counting 198.1 as needed
Special Notes: Turnaround: 5 Da	mastic on tile / cove base / carpet san set.		oted on attached sample summary. Run ositive for tile / cove base / carpet sample
Lab: EMSL Wa	ıllingford CT		
Send reports to: Relinquished by:	tmyjak@ensafe.com	Date: 6-1-7018	Time:
Received by:		Date:	Time:
Relinquished by:		Date:	Time:
Received by:		Date:	Time:
		FOR LAB USE:	
			JUN 0 4 2018 BE 8 Seam W

OrderID: 241802730

24/80 2730



Project #: -

Location: SFD Middletown

Date: 05/31/2018

				Sampled By: Tim Myjak	
Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location	
01A		Brown Carpet	N	Dermatory	
01B		Brown Carpet	N	Dormatory	
01C		Brown Carpet	N	Dormatory	
02A		Yellow Flooring Mastic	N	Dormatory	
02B		Yellow Flooring Mastic	N	Dormatory	
02C		Yellow Flooring Mastic	N	Dormatory	
03A		Beige Floor Tile	N	Dormatory	
03B		Beige Floor Tile	N	Dormatory	
03C		Beige Floor Tile	N	Dormatory	
04A		Black Mastic	N	Dormatory	
04B		Black Mastic	N	Dormatory	
04C		Black Mastic	N	Domatory	
05A		White 2' x 2' Ceiling Tile	Y	Dormatory	
05B		White 2' x 2' Ceiling Tile	Y	Domnatory	
05C		White 2' x 2' Ceiling Tile	Y	Dormatory	
06A		Pink Loose Fiberglass Type Insulation	N	Dormatory	
06B		Pink Loose Fiberglass Type Insulation	N	Domiatory	
06C		Pink Loose Fiberglass Type Insulation	N	Domnatory	
07A		Bright White 2'x,2' Ceiling Tile	Y	Dormatory	
07B		Bright White 2'x,2' Ceiling Tile	Y	Dormatory	
07C		Bright White 2'x2' Ceiling Tile	Y	Domnatory	
08A		White Cloth Pipe Wrap	N	Dormatory	
08B		White Cloth Pipe Wrap	N	Dormatory	
08C		White Cloth Pipe Wrap	N	Dormatory	
09A		Yellow Fiberglass Type Insulation	N	Dormatory	
09B		Yellow Fiberglass Type Insulation	N	Dormatory	
09C		Yellow Fiberglass Type Insulation	N	Dormatory	
10A		White Cement 2" Elbow Insulation	Y	Dormatory	
		1			







Project #: 7148

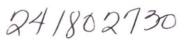
Location: SFD Middletown

Date: 05/31/2018

		энцич ру: 1 па мунк					
Sumple #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location			
10B		White Cement 2" Elbow Insulation	Y	Dormatory			
10C		White Cement 2" Elbow Insulation	Y	Dormatory			
11A		White Flexible Caulk	N	Dormatory			
11B		White Flexible Caulk	N	Dormatory			
11C		White Flexible Caulk	N	Dormatory			
12A		Durk grey rubber baseboard	N	Rec Room			
12B		Dark grey rubber baseboard	N	Rec Room			
12C		Durk grey rubber baseboard	N	Rec Room			
13A		Yellow mastic	N	Rec Room			
13B		Yellow mastic	N	Rec Room			
13C		Yellow mastic	N	Rec Room			
14A		Offwhite Floor Tile	N	Rec Room			
14B		Offwhite Floor Tile	N	Rec Room			
14C		Offwhite Floor Tile	N	Rec Room			
15A		Black mastic	N	Rec Room			
15B		Black mastic	N	Rec Room			
15C		Black mastic	N	Rec Room			
16A		Blue Curpet with Yellow Acsent	N	Southwest Office			
16B		Blue Carpet with Yellow Acsent	N	Southwest Office			
16C		Blue Carpet with Yellow Assent	N	Southwest Office			
17A		Yellow mastic	N	Southwest Office			
17B		Yellow mastic	N	Southwest Office			
17C		Yellow mastic	N	Southwest Office			
18A		Black mastic	N	Southwest Office			
18B		Black mastic	N	Southwest Office			
18C		Black mastic	N	Southwest Office			
19A		White 2'x2' Pinhole and Chistle Pattern Ceiling Tile	Y	Southwest Office	÷.		
19B		White ZxZ Pinhole and Chistle Pattern CeilingTile	Y	Southwest Office			



OrderID: 241802730





Project #:

Location: SFD Middletown

Date: 05/31/2018

Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location	Under/O
19C	Laboratory ID	White 2's:2' Pinhole and Chistle Pattern	N	Southwest Office	
20A		White 2%2 Pinhole and Worm Pattern - Maroon Backing	Y	Southwest Office	
20B		White 2%2° Pinhole and Worm Pattern - Maroon Backing	Y	Southwest Office	
20C		White 2%2" Pinhole and Worm Pattern - Maroon Backing	Y	Southwest Office	
21A		Blue Ruberized Cove Base	N	Southwest Office	Over Samp
21B		Blue Ruberized Cove Base	N	Southwest Office	Over Samj
21C	 	Blue Ruberized Cove Base	N	Southwest Office	Over Sam
22A		Yellow mastic	N	Southwest Office	Under sam
22B		Yellow mastic	N	Southwest Office	Under sam
22C		Yellow mastic	N	Southwest Office	Under sam
23A		White Flexible Caulk	N	Center - Main Hallway	
23B		White Flexible Caulk	N	Center - Main Hallway	
23C		White Flexible Caulk	N	Center - Main Hallway	
24A		Beige sandy texture gypsum type ceiling tile	Y	Mens Bathroom	
24B		Beige sandy texture gypourn type celling tile	Y	Mens Bathroom	
24C		Beige sandy texture gypsum type ceiling tile	Y	Mens Bathroom	
25 A		Concrete Block with Beige Tile Type Surface	Y	Mens Bathroom	
25B		Concrete Block with Beige Tile Type Surface	Y	Mens Bathroom	
25C		Concrete Block with Beige Tile Type Surface	Y	Mens Bathroom	
26A		Beige Ruberized Cove Base	N	Mens Bathroom	
26B		Beige Ruberized Cove Base	N	Mens Bathroom	
26C		Beige Ruberized Cove Base	N	Mens Bathroom	
27A		Yellow mastic	N	Mens Bathroom	Under Sar
27B		Yellow mastic	N	Mens Bathroom	Under Sar
27C		Yellow mastic	N	Mens Bathroom	Under Sat
28A		Offwhite 1 inch ceramic type flooring tile	N	Mens Bathroom	
28B		Offwhite 1 inch ceramic type flooring tile	, N	Mens Bathroom	
28C		Offwhite 1 inch ceramic type flooring tile	N	Mens Bathroom	
29A		Brown I inch ceramic type flooring tile	N	Mens Bathroom	
29B		Brown 1 inch ceramic type flooring tile	N	Mens Bathroom	
29C		Brown I inch ceramic type flooring tile	N	Mens Bathroom	
30A		Grey grout	N	Mens Bathroom	



OrderID: 241802730

24180 2730



Project #: -

Location: SFD Middletown

Date: 05/31/2018

Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location		
30B		Grey grout	N	Mens Bathroom		
30C		Grey groat	N	Mens Bathroom		
31A		White Paper Tile Backing	N	Mens Bathroom		
31B		White Paper Tile Backing	N	Mens Bathroom		
31C		White Paper Tile Backing	N	Meus Bathroom		
32A		Red carpet	N	Tax Office		
32B		Red carpet	N	Tax Office		
32C		Red carpet	N	Tax Office		
33A		Yellow mastic	N	Tax Office		
33B		Yellow mastic	N	Tax Office		
33C		Yellow mastic	N	Tax Office		
34A		Beige flooring tile	N	Tax Office		
34B		Beige flooring tile	N	Tax Office		
34C		Beige flooring tile	N	Tax Office		
35A		Black mastic	N	Tax Office		
35B		Black mastic	N	Tax Office		
35C		Black mastic	N	Tax Office		
36A		Brown ruberized cove base	N	Tax Office		
36B		Brown ruberized cove base	N	Tax Office		
36C		Brown ruberized cove base	N	Tax Office		
37A		Yellow mastic	N	Tax Office		
37B		Yellow mastic	N	Tax Office		
37C		Yellow mastic	N	Tax Office		
38A		Beige Ruberized Cove Base	N	Tax Office		
38B		Beige Ruberized Cove Base	N	Tax Office		
38C		Beige Ruberized Cove Base	N	Tax Office		
39A		Yellow mastic	N	Tax Office		
39B		Yellow mastic	N	Tax Office		



241802730



Project #: -

Location: SFD Middletown

Date: 05/31/2018

		Sampled By: Tim Myjak				
Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location		
39C		Yellow mastic	N	Tax Office		
40A		Red and brown carpet	N	Tax Office		
40B		Red and brown carpet	N	Tax Office		
40C		Red and brown carpet	N	Tax Office		
41A		Beige mastic	N	Tax Office		
41B		Beige mastic	N	Tax Office		
41C		Beige mastic	N	Tax Office		
42A		Black foam type carpet backing	N	Tax Office	potential black n	
42B		Black foam type carpet backing	N	Tax Office	potential black n	
42C		Black fourn type carpet backing	N	Tax Office	potential black n	
43A		Yellow mastic	N	Tax Office		
43B		Yellow mastic	N	Tax Office		
43C		Yellow mastic	N	Tax Office		
44A		White sheet rock	Y	Tax Office		
44B		White shoet rock	Y	Tax Office		
44C		White sheet rock	Y	Tax Office		
45A		White Joint Compound	Y	Tax Office		
45B		White Joint Compound	Y	Tax Office		
45C		White Joint Compound	Y	Tax Office		
46A		Compound Tape	N	Tax Office		
46B		Compound Tape	N	Tax Office		
46C		Compound Tape	N	Tax Office		
47A		White 2 \times 2 foot ceiling tile with pin holes and chistle marks	Y	Tax Office		
47B		White 2×2 foot ceiling tile with pin holes and chistle marks	Y	Tax Office		
47C		White 2 \times 2 foot ceiling tile with pin holes and chistle marks	Y	Tax Office		
48A		Black adhesive and craft paper	N	Tax Office		
48B		Black adhesive and craft paper	N	Tax Office		
48C		Black adhesive and craft paper	N	Tax Office		



Sample #

241802750



Project #: -

Location: SED Middletown

Date: 05/31/201

Laboratory ID	Description (color and texture)	Friable (Y/N)	Location
	Beige flooring tile	N	Tax Office

Saupien	Laboratory ID	Description (color and texture)	Princie (Y/N)	Location	
49A		Beige flooring tile	N	Tax Office	
49B		Beige flooring tile	N	Tax Office	
49C		Beige flooring tile	N	Tax Office	
50A		Black mastic	N	Tax Office	
50B		Black mastic	N	Tax Office	
50C		Black mastic	N	Tax Office	
51A		Olive Green Rubberized Cove Base	N	Tax Office	
51B		Olive Green Rubberized Cove Base	N	Tax Office	
51C		Offive Green Rubberized Cove Base	N	Tax Office	
52A		Yellow mastic	N	Tax Office	
52B		Yellow mastic	N	Tax Office	
52C		Yellow mastic	N	Tax Office	
53A		Blue asphalt type roof shingles with surface agrigate	N	Exterior Roof	
53B		Blue asphalt type roof shingles with surface agrigate	N	Exterior Roof	
53C		Blue asphalt type roof shingles with surface agrigate	N	Exterior Roof	
54A		Black rolled sub roofing with agrigate	N	Exterior Roof	
54B		Black rolled sub roofing with agrigate	N	Exterior Roof	
54C		Black rolled sub roofing with agrigate	N	Exterior Roof	
55A		Black roof tar	N	Exterior Roof	
55B		Black roof tar	N	Exterior Roof	
55C		Black roof tar	N	Exterior Roof	
56A		Black tar and paper	N	Exterior Roof	
56B		Black tar and paper	N	Exterior Roof	
56c		Black tar and paper	N	Exterior Roof	
57A		Black tar paper	N	Exterior Roof	
57B		Black tar paper	N	Exterior Roof	
57C		Black tar paper	N	Exterior Roof	





Dayton, NJ 06/13/18

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

Ensafe, Inc

South Fire, CT

SGS Job Number: JC67399

Sampling Date: 06/05/18

Report to:

Ensafe, Inc 1233 Silas Deane Highway Wethersfield, CT 06109

TMcCarthy@ensafe.com; Tclemmey@ensafe.com

ATTN: Thomas McCarthy

Total number of pages in report: 27

TNI FABORATORY

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Maney - Cole
Nancy Cole
Laboratory Director

Client Service contact: Tammy McCloskey 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, FL, IL, IN, KS, KY, LA, MA, MD, ME, MN, NC, OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TX, UT, VA, WV, DoD ELAP (ANAB L2248)

This report shall not be reproduced, except in its entirety, without the written approval of SGS. Test results relate only to samples analyzed.

SGS North America Inc. • 2235 Route 130 • Dayton, NJ 08810 • tel: 732-329-0200 • fax: 732-329-3499

2-329-3499 **SGS**

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Ensafe, Inc

Job No: JC67399

South Fire, CT

Sample	Collected			Matrix		Client
Number	Date	Time By	Received	Code	Type	Sample ID
JC67399-1	06/05/18	08:00 TM	06/05/18	SO	Solid	WHITE WINDOW CAULK
JC67399-2	06/05/18	09:00 TM	06/05/18	SO	Solid	MATERIAL COMP #1

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client: Ensafe, Inc Job No JC67399

 Site:
 South Fire, CT
 Report Date
 6/13/2018 5:35:57 PM

On 06/05/2018, 2 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were received at SGS North America Inc. at a maximum corrected temperature of 2.1 C. Samples were intact and chemically preserved, unless noted below. A SGS North America Inc. Job Number of JC67399 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Compounds qualified as out of range in the continuing calibration summary report are acceptable as per method requirements when there is a high bias but the sample result is non-detect.

GC/LC Semi-volatiles By Method SW846 8082A

Matrix: SO Batch ID: OP12686

- All samples were extracted within the recommended method holding time.
- Sample(s) JC67399-1MS, JC67399-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike Recovery(s) for Aroclor 1260 are outside control limits. Outside control limits due to presence of other Aroclor pattern.
- RPD(s) for MSD for Aroclor 1254, Aroclor 1260 are outside control limits for sample OP12686-MSD. Outside control limits due to matrix interference.
- OP12686-BS1 for Aroclor 1016: Reported from 2nd signal, 1st signal used for confirmation.
- OP12686-BS1/BSD for Aroclor 1260: Reported from the 1st signal. The %D of the CCV on the 2nd signal exceeds the method criteria of 20%, so it being used for confirmation only.

Metals Analysis By Method SW846 6010C

Matrix: LEACHATE Batch ID: MP7561

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC67308-1ASDL were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Lead are outside control limits for sample MP7561-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

SGS North America Inc. certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting the Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

SGS North America Inc. is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by SGS North America Inc indicated via signature on the report cover

Wednesday, June 13, 2018

Page 1 of 1

Summary of Hits Job Number: JC67399 Account: Ensafe, Inc **Project:** South Fire, CT **Collected:** 06/05/18

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC67399-1	WHITE WINDOV	W CAULK				
Aroclor 1254		20400	930		ug/kg	SW846 8082A
JC67399-2	MATERIAL COM	/IP #1				
Lead		0.069	0.015		mg/l	SW846 6010C





Dayton, NJ

Section 4

Page 1 of 1

Report of Analysis

Client Sample ID: WHITE WINDOW CAULK

 Lab Sample ID:
 JC67399-1
 Date Sampled:
 06/05/18

 Matrix:
 SO - Solid
 Date Received:
 06/05/18

 Method:
 SW846 8082A
 SW846 3540C
 Percent Solids:
 n/a a

Project: South Fire, CT

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5G79386.D	1	06/12/18 18:36	TR	06/12/18 06:00	OP12686	G5G1886
Run #2	5G79407.D	5	06/13/18 12:34	TR	06/12/18 06:00	OP12686	G5G1887

	Initial Weight	Final Volume
Run #1	2.7 g	10.0 ml
Run #2	2.7 g	10.0 ml

PCB List

CAS No.	Compound	Result	RL	Units Q
12674-11-2 11104-28-2 11141-16-5 53469-21-9 12672-29-6 11097-69-1 11096-82-5 11100-14-4	Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 Aroclor 1268	ND ND ND ND ND 20400 ^b ND ND	190 190 190 190 190 190 930 190	ug/kg ug/kg ug/kg ug/kg ug/kg ug/kg ug/kg ug/kg
37324-23-5	Aroclor 1262	ND	190	ug/kg
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8 877-09-8 2051-24-3 2051-24-3	Tetrachloro-m-xylene Tetrachloro-m-xylene Decachlorobiphenyl Decachlorobiphenyl	93% 89% 119% 102%	115% 100% 129% 130%	24-152% 24-152% 10-166% 10-166%

- (a) All results reported on a wet weight basis.
- (b) Result is from Run# 2

ND = Not detected RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

 $B = \ Indicates \ analyte \ found \ in \ associated \ method \ blank$

N = Indicates presumptive evidence of a compound

4

Report of Analysis

Client Sample ID: MATERIAL COMP #1

 Lab Sample ID:
 JC67399-2
 Date Sampled:
 06/05/18

 Matrix:
 SO - Solid
 Date Received:
 06/05/18

 Percent Solids:
 n/a

Project: South Fire, CT

Metals Analysis, TCLP Leachate SW846 1311

Analyte	Result	HW#	MCL	RL	Units	DF	Prep	Analyzed By	Method	Prep Method
Lead	0.069	D008	5.0	0.015	mg/l	5	06/08/18	06/08/18 ND	SW846 6010C ¹	SW846 3010A ²

(1) Instrument QC Batch: MA44616

(2) Prep QC Batch: MP7561

RL = Reporting Limit

MCL = Maximum Contamination Level (40 CFR 261 7/1/11)





Misc. Forms

Dayton, NJ

Custody Documents and Other Forms

Includes the following where applicable:

- · Chain of Custody
- RCP Form
- Sample Tracking Chronicle
- QC Evaluation: CT RCP Limits

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En9	Safe Inc.	Site Location:	middle	etown,	4					Sam	ple A	nalys	is Re	ques	ted (Enter	numbe	er of co	ntaine	rs for	each t	est)
800-5	88-7962			arthy@ E		. Con	ч			(3)→											ß	
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Lab Name	e: 565				rnaround Time(specify):	5	day	,	Contain	Lead	507									e for I	
Lab ID	Sample ID			Location ID		Time (Military)	Matrix Code	Sample Type	Field Filtered	Total No. of Containers	0	3									Extra Volume for MS/MSD	
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(1) Matri SQ=Soil/S	ix Code: AA=Air, Solid QC Matrix, S1	AQ=Air QC Matrix, CK=	Caulk, GS=S oil (Sas, LF=Free Product, LH= al Tissue, TP=Plant Tissue,	Liquid Waste, MS=M	lastic, Oil=Oil,	PT=Paint,	SC=Cement	t/Concrete,	SE=Sediment	ent, SF= /Q=Wate	Filter Sar er QC Ma	ndpack, : trix, WS	SL=Sluc i=Surfac	lge, SN : e Water	Miscella SU≃St	neous So	olid/Buildi er, WW =	ng Mater Waste W	rials, SO Vater	≃Soil,	

SQ=Source WHILE STATES, \$1=Source Water, \$M=SwadyWile; IA=Animal Issue, IV=Halt Issue, WG=Ground water, WHILEGENERGE, WGHC, WG

JC67399: Chain of Custody Page 1 of 2

SGS Sample Receipt Summary

Job Number: JC67399	Client:		Project:		
Date / Time Received: 6/5/2018	6:30:00 PM Delivery I	Method:	Airbill #'s:		
Cooler Temps (Raw Measured) °C Cooler Temps (Corrected) °C	· //				
	N	 ✓ □ 1. Samp 2. Conta 3. Samp Sample	Integrity - Documentation le labels present on bottles: liner labeling complete: le container label / COC agree: le Integrity - Condition	Y or N V Y Y or N V	
3. Cooler media: 4. No. Coolers:	Ice (Bag)	2. All con	le recvd within HT: ntainers accounted for: tion of sample:	✓ ⊔ ✓ Intact	_
1. Trip Blank present / cooler: 2. Trip Blank listed on COC: 3. Samples preserved properly: []	Y or N N/A	1. Analy 2. Bottle 3. Suffic 4. Com	e Integrity - Instructions ysis requested is clear: es received for unspecified tests cient volume recvd for analysis: positing instructions clear: ing instructions clear:	Y or N	N/A V
Test Strip Lot #s: pH 1-12	2:216017	pH 12+:208717	Other: (Specify)		
Comments					

SM089-03 Rev. Date 12/7/17

JC67399: Chain of Custody

Page 2 of 2

Reasonable Confidence Protocol Laboratory Analysis QA/QC Certification Form

Laboratory Name:	SGS North America Inc.	Client:	Ensafe, Inc
------------------	------------------------	---------	-------------

Project Location: South Fire, CT Project Number:

Sampling Date(s): 6/5/2018

Laboratory Sample ID(s): JC67399-1, JC67399-2

SW846 6010C. SW846 8082A

Methods:	SW846 6010C, SW846 8082A				
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the CTDEP method-specific Reasonable Confidence Protocol documents)?	Yes	V	No	□
1A	Where all the method specified preservation and holding time requirements met?	Yes	<u> </u>	No	
1B	VPH and EPH mehods only: Was the VPH or EPH method conducted without significant modifications (See section 11.3 of respective methods)	Yes	□ NA	No I	
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes	>	No	
3	Were samples received at an appropriate temperature (<6° C)?	Yes	~	No	
4	Were all QA/QC performance criteria specified in the CTDEP Reasonable Confidence Protocol documents achieved?	Yes		No	<u>~</u>
5	a) Were reporting limits specified or referenced on the chain-of-custody?	Yes		No	7
	b) Were these reporting limits met?	Yes		No	7
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the Reasonable Confidence Protocol documents?	Yes	□	No	~
7	Are project-specific matrix spikes and laboratory duplicates included in this data set?	Yes	7	No	

Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1A or #1B is "No", the data package does not meet the requirements for "Reasonable Confidence".

I, the undersigned, attest under pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete.

Authorized

Maney +. Cole Signature:

Position: Lab Director

Printed Name: Nancy F. Cole Date: 6/13/2018

Mid-Atlantic Laboratory

Internal Sample Tracking Chronicle

Ensafe, Inc

Job No:

JC67399

South Fire, CT

Sample Number	Method	Analyzed	Ву	Prepped	Ву	Test Codes
	Collected: 05-JUN-18 (NDOW CAULK	08:00 By: TM	Receiv	ved: 05-JUN-	18 By:	RL
	SW846 8082A SW846 8082A	12-JUN-18 18:36 13-JUN-18 12:34		12-JUN-18 12-JUN-18		P8082SOXHLETRCP P8082SOXHLETRCP
	Collected: 05-JUN-18 (L COMP #1	09:00 By: TM	Receiv	ved: 05-JUN-	18 By:	RL
JC67399-2	SW846 6010C	08-JUN-18 21:46	ND	08-JUN-18	СН	EPB

QC Evaluation: CT RCP Limits Job Number: JC67399

Job Number: JC67399
Account: Ensafe, Inc
Project: South Fire, CT
Collected: 06/05/18

Type Type	QC Sample ID	CAS#	Analyte	Sample Result Result Type Type	Units Limits
-----------	--------------	------	---------	--------------------------------	---------------------

07/10/	ATT 10 1 1 0 0 0 4						
OP12686	SW846 8082A	A.					
OD12606 DC1	12674 11 2	A == -1= = 1016	DCD	DEC	138 ^a	0/	10 140
OP12686-BS1	12674-11-2	Arcelor 1360	BSP	REC REC	138 ^a	%	40-140
OP12686-BS1	11096-82-5	Aroclor 1260	BSP			%	40-140
OP12686-BS1	877-09-8	Tetrachloro-m-xylene (sig#1)	BSP	SURR	111	%	30-150
OP12686-BS1	877-09-8	Tetrachloro-m-xylene (sig#2)	BSP	SURR	136	%	30-150
OP12686-BS1	2051-24-3	Decachlorobiphenyl (sig#1)	BSP	SURR	132	%	30-150
OP12686-BS1	2051-24-3	Decachlorobiphenyl (sig#2)	BSP	SURR	133	%	30-150
OP12686-BSD	12674-11-2	Aroclor 1016	BSD	REC	127	%	40-140
OP12686-BSD	12674-11-2	Aroclor 1016	BSD	RPD	8	%	30
OP12686-BSD	11104-28-2	Aroclor 1221	BSD	RPD	0	%	30
OP12686-BSD	11141-16-5	Aroclor 1232	BSD	RPD	0	%	30
OP12686-BSD	53469-21-9	Aroclor 1242	BSD	RPD	0	%	30
OP12686-BSD	12672-29-6	Aroclor 1248	BSD	RPD	0	%	30
OP12686-BSD	11097-69-1	Aroclor 1254	BSD	RPD	0	%	30
OP12686-BSD	11096-82-5	Aroclor 1260	BSD	REC	119 b	%	40-140
OP12686-BSD	11096-82-5	Aroclor 1260	BSD	RPD	9 b	%	30
OP12686-BSD	11100-14-4	Aroclor 1268	BSD	RPD	0	%	30
OP12686-BSD	37324-23-5	Aroclor 1262	BSD	RPD	0	%	30
OP12686-BSD	877-09-8	Tetrachloro-m-xylene (sig#1)	BSD	SURR	96	%	30-150
OP12686-BSD	877-09-8	Tetrachloro-m-xylene (sig#2)	BSD	SURR	109	%	30-150
OP12686-BSD	2051-24-3	Decachlorobiphenyl (sig#1)	BSD	SURR	138	%	30-150
OP12686-BSD	2051-24-3	Decachlorobiphenyl (sig#2)	BSD	SURR	119	%	30-150
OP12686-MS	12674-11-2	Aroclor 1016	MS	REC	139	%	40-140
OP12686-MS	11096-82-5	Aroclor 1260	MS	REC	409 c	%	40-140
OP12686-MS	877-09-8	Tetrachloro-m-xylene (sig#1)	MS	SURR	99	%	30-150
OP12686-MS	877-09-8	Tetrachloro-m-xylene (sig#2)	MS	SURR	88	%	30-150
OP12686-MS	2051-24-3	Decachlorobiphenyl (sig#1)	MS	SURR	112	%	30-150
OP12686-MS	2051-24-3	Decachlorobiphenyl (sig#2)	MS	SURR	102	%	30-150
OP12686-MSD	12674-11-2	Aroclor 1016	MSD	REC	111	%	40-140
OP12686-MSD	12674-11-2	Aroclor 1016	MSD	RPD	23	%	50
OP12686-MSD	11104-28-2	Aroclor 1221	MSD	RPD	0	%	50
OP12686-MSD	11141-16-5	Aroclor 1232	MSD	RPD	0	%	50
OP12686-MSD	53469-21-9	Aroclor 1242	MSD	RPD	0	%	50
OP12686-MSD	12672-29-6	Aroclor 1248	MSD	RPD	0	%	50
OP12686-MSD	11097-69-1	Aroclor 1254	MSD	RPD	68 ^d	%	50
OP12686-MSD	11096-82-5	Aroclor 1260	MSD	REC	251 ^c	%	40-140
OP12686-MSD	11096-82-5	Aroclor 1260	MSD	RPD	48 ^d	%	50
OP12686-MSD	11100-14-4	Aroclor 1268	MSD	RPD	0	%	50
OP12686-MSD	37324-23-5	Aroclor 1262	MSD	RPD	0	%	50
OP12686-MSD	877-09-8	Tetrachloro-m-xylene (sig#1)	MSD	SURR	80	%	30-150
OP12686-MSD	877-09-8	Tetrachloro-m-xylene (sig#2)	MSD	SURR	82	%	30-150
OP12686-MSD	2051-24-3	Decachlorobiphenyl (sig#1)	MSD	SURR	138	%	30-150
OP12686-MSD	2051-24-3	Decachlorobiphenyl (sig#2)	MSD	SURR	89	%	30-150
01 12000 MDD	2031 27 3	2 continuo compilony (bigii 2)	1,101	SCILIC	37	, 5	50 150

^{*} Sample used for QC is not from job JC67399

QC Evaluation: CT RCP Limits

Job Number: JC67399
Account: Ensafe, Inc
Project: South Fire, CT
Collected: 06/05/18

QC Sample ID	CAS#	Analyte	Sample Type	Sample Result Type Type		Result Units Li	
OP12686-MB1	877-09-8	Tetrachloro-m-xylene (sig#1)	MB	SURR	108	%	30-150
OP12686-MB1	877-09-8	Tetrachloro-m-xylene (sig#2)	MB	SURR	135	%	30-150
OP12686-MB1	2051-24-3	Decachlorobiphenyl (sig#1)	MB	SURR	122	%	30-150
OP12686-MB1	2051-24-3	Decachlorobiphenyl (sig#2)	MB	SURR	132	%	30-150
JC67399-1	877-09-8	Tetrachloro-m-xylene (sig#1)	SAMP	SURR	93	%	30-150
JC67399-1	877-09-8	Tetrachloro-m-xylene (sig#1)	SAMP	SURR	115	%	30-150
JC67399-1	877-09-8	Tetrachloro-m-xylene (sig#2)	SAMP	SURR	100	%	30-150
JC67399-1	877-09-8	Tetrachloro-m-xylene (sig#2)	SAMP	SURR	89	%	30-150
JC67399-1	2051-24-3	Decachlorobiphenyl (sig#1)	SAMP	SURR	119	%	30-150
JC67399-1	2051-24-3	Decachlorobiphenyl (sig#1)	SAMP	SURR	129	%	30-150
JC67399-1	2051-24-3	Decachlorobiphenyl (sig#2)	SAMP	SURR	102	%	30-150
JC67399-1	2051-24-3	Decachlorobiphenyl (sig#2)	SAMP	SURR	130	%	30-150

⁽a) Reported from 2nd signal, 1st signal used for confirmation.

⁽b) Reported from the 1st signal. The %D of the CCV on the 2nd signal exceeds the method criteria of 20%, so it being used for confirmation only.

⁽c) Outside control limits due to presence of other Aroclor pattern.

⁽d) Outside control limits due to matrix interference.

^{*} Sample used for QC is not from job JC67399



GC/LC Semi-volatiles

Dayton, NJ

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries
- Surrogate Recovery Summaries

Page 1 of 1

Method: SW846 8082A

Method Blank Summary Job Number: JC67399

ENSCTN Ensafe, Inc Account: **Project:** South Fire, CT

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP12686-MB1	5G79383.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886

The QC reported here applies to the following samples:

JC67399-1

CAS No.	Compound	Result	RL	Units Q
12674-11-2	Aroclor 1016	ND	50	ug/kg
11104-28-2	Aroclor 1221	ND	50	ug/kg
11141-16-5	Aroclor 1232	ND	50	ug/kg
53469-21-9	Aroclor 1242	ND	50	ug/kg
12672-29-6	Aroclor 1248	ND	50	ug/kg
11097-69-1	Aroclor 1254	ND	50	ug/kg
11096-82-5	Aroclor 1260	ND	50	ug/kg
11100-14-4	Aroclor 1268	ND	50	ug/kg
37324-23-5	Aroclor 1262	ND	50	ug/kg

CAS No.	Surrogate Recoveries	Limits	
877-09-8	Tetrachloro-m-xylene	108%	24-152%
877-09-8	Tetrachloro-m-xylene	135%	24-152%
2051-24-3	Decachlorobiphenyl	122%	10-166%
2051-24-3	Decachlorobiphenyl	132%	10-166%

6.2.

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Method: SW846 8082A

Blank Spike/Blank Spike Duplicate Summary

Job Number: JC67399

Account: ENSCTN Ensafe, Inc **Project:** South Fire, CT

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch	
OP12686-BS1	5G79384.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886	
OP12686-BSD	5G79385.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886	

The QC reported here applies to the following samples:

JC67399-1

CAS No. Con	npound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
12674-11-2 Aro	olon 1016	200	276	138 a	254	127	8	61-146/30
11104-28-2 Aro		200	ND	136 -	ND	127	nc	70-130/30
11141-16-5 Aro			ND		ND		nc	70-130/30
53469-21-9 Aroo	clor 1242		ND		ND		nc	70-130/30
12672-29-6 Aroc	clor 1248		ND		ND		nc	70-130/30
11097-69-1 Aro	clor 1254		ND		ND		nc	70-130/30
11096-82-5 Aroc	clor 1260	200	259	130 b	237	119 ^b	9 b	62-148/30
11100-14-4 Aroc	clor 1268		ND		ND		nc	-/30
37324-23-5 Aroc	clor 1262		ND		ND		nc	-/30

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
	Tetrachloro-m-xylene	111%	96%	24-152%
	Tetrachloro-m-xylene	136%	109%	24-152%
	Decachlorobiphenyl	132%	138%	10-166%
	Decachlorobiphenyl	133%	119%	10-166%

⁽a) Reported from 2nd signal, 1st signal used for confirmation.

⁽b) Reported from the 1st signal. The %D of the CCV on the 2nd signal exceeds the method criteria of 20%, so it being used for confirmation only.

^{* =} Outside of Control Limits.

6.3.1

Page 1 of 1

Method: SW846 8082A

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: JC67399

Account: ENSCTN Ensafe, Inc Project: South Fire, CT

Sample	File ID	DF	Analyzed	Ву	Prep Date	Prep Batch	Analytical Batch
OP12686-MS	5G79387.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886
OP12686-MSD	5G79388.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886
JC67399-1	5G79386.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886
JC67399-1	5G79407.D	5	06/13/18	TR	06/12/18	OP12686	G5G1887

The QC reported here applies to the following samples:

JC67399-1

CAS No.	Compound	JC67399-1 ug/kg Q	Spike ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
12674-11-2	Aroclor 1016	ND	741	1030	139	741	820	111	23	24-178/46
11104-28-2	Aroclor 1221	ND		ND			ND		nc	70-130/50
11141-16-5	Aroclor 1232	ND		ND			ND		nc	70-130/50
53469-21-9	Aroclor 1242	ND		ND			ND		nc	70-130/50
12672-29-6	Aroclor 1248	ND		ND			ND		nc	70-130/50
11097-69-1	Aroclor 1254	20400 b		88600			43400		68* a	70-130/50
11096-82-5	Aroclor 1260	ND	741	3030	409* c	741	1860	251* c	48* a	15-185/45
11100-14-4	Aroclor 1268	ND		ND			ND		nc	-/50
37324-23-5	Aroclor 1262	ND		ND			ND		nc	-/50

CAS No.	Surrogate Recoveries	MS	MSD	JC67399-1	JC67399-1	Limits
877-09-8	Tetrachloro-m-xylene	99%	80%	93%	115%	24-152%
877-09-8	Tetrachloro-m-xylene	88%	82%	89%	100%	24-152%
2051-24-3	Decachlorobiphenyl	112%	138%	119%	129%	10-166%
2051-24-3	Decachlorobiphenyl	102%	89%	102%	130%	10-166%

⁽a) Outside control limits due to matrix interference.

⁽b) Result is from Run #2.

⁽c) Outside control limits due to presence of other Aroclor pattern.

^{* =} Outside of Control Limits.

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Surrogate Recovery Summary

Job Number: JC67399

Account: ENSCTN Ensafe, Inc **Project:** South Fire, CT

Method: SW846 8082A Matrix: SO

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1 ^a	S1 b	S2 ^a	S2 b
JC67399-1	5G79386.D	93	89	119	102
JC67399-1	5G79407.D	115	100	129	130
OP12686-BS1	5G79384.D	111	136	132	133
OP12686-BSD	5G79385.D	96	109	138	119
OP12686-MB1	5G79383.D	108	135	122	132
OP12686-MS	5G79387.D	99	88	112	102
OP12686-MSD	5G79388.D	80	82	138	89

Surrogate Recovery Compounds Limits

S1 = Tetrachloro-m-xylene 24-152% S2 = Decachlorobiphenyl 10-166%

(a) Recovery from GC signal #1

(b) Recovery from GC signal #2



Metals Analysis

Dayton, NJ

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY Part 2 - Method Blanks

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

QC Batch ID: MP7561 Matrix Type: LEACHATE Methods: SW846 6010C

Units: mg/l

Prep Date:

06/08/18

TIEP Date.					00/00/10
Metal	RL	IDL	MDL	MB raw	final
Aluminum	1.0	.095	.17		
Antimony	0.50	.012	.022		
Arsenic	0.50	.006	.014		
Barium	1.0	.003	.0063		
Beryllium	0.025	.001	.002		
Bismuth	0.10	.016	.025		
Boron	0.50	.0075	.067		
Cadmium	0.025	.002	.0035		
Calcium	10	.028	.14		
Chromium	0.050	.0035	.0043		
Cobalt	0.25	.002	.0036		
Copper	0.050	.0055	.016		
Iron	0.50	.018	.16		
Lead	0.50	.011	.013	0.00030	<0.50
Lithium	0.25	.017	.076		
Magnesium	10	.12	.32		
Manganese	0.075	.0007	.0021		
Molybdenum	0.10	.002	.007		
Nickel	0.050	.0025	.0067		
Potassium	10	.3	1.2		
Selenium	0.50	.019	.033		
Silicon	1.0	.009	.22		
Silver	0.050	.0035	.016		
Strontium	0.050	.001	.0015		
Sulfur	0.25	.016	.075		
Thallium	0.50	.009	.0082		
Tin	0.050	.0045	.012		
Titanium	0.050	.0035	.0092		
Tungsten	0.25	.011	.071		
Vanadium	0.25	.004	.0064		
Zinc	0.10	.001	.002		
Zirconium	0.050	.0015	.01		

Associated samples MP7561: JC67399-2

BLANK RESULTS SUMMARY Part 2 - Method Blanks

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

06/08/18

QC Batch ID: MP7561 Methods: SW846 6010C

Matrix Type: LEACHATE Units: mg/l

MB IDL MDL Metal RL raw final

Results < IDL are shown as zero for calculation purposes (*) Outside of QC limits (anr) Analyte not requested

Prep Date:

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

QC Batch ID: MP7561 Methods: SW846 6010C Matrix Type: LEACHATE Units: $\mbox{mg/l}$

Prep Date: 06/08/18

Trep bace.	Dar		00700710	
Metal	BSP Result	Spikelot MPSPK2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Bismuth				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper				
Iron				
	2.0	2.0	100.0	80-120
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium	anr			
Silicon				
Silver	anr			
Strontium				
Sulfur				
Thallium				
Tin				
Titanium				
Tungsten				
Vanadium				
Zinc				
Zirconium				
ZIICOIIIUM				

Associated samples MP7561: JC67399-2

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

QC Batch ID: MP7561 Methods: SW846 6010C

Matrix Type: LEACHATE Units: mg/l

Prep Date: 06/08/18

	BSP Spikelot QC
Metal	Result MPSPK2 % Rec Limi

Results < IDL are shown as zero for calculation purposes (*) Outside of QC limits

(*) Outside of QC limits (anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

QC Batch ID: MP7561 Matrix Type: LEACHATE Methods: SW846 6010C

Units: ug/l

06/08/18 Prep Date:

Metal	JC67308 Origina	-1A 1 SDL 5:25	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Bismuth				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper				
Iron				
Lead	14.0	0.00	100.0(a)	0-10
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium	anr			
Silicon				
Silver	anr			
Sodium				
Strontium				
Sulfur				
Thallium				
Tin				
Titanium				
Tungsten				
Vanadium				
Zinc				
Zirconium				

SERIAL DILUTION RESULTS SUMMARY

Login Number: JC67399
Account: ENSCTN - Ensafe, Inc
Project: South Fire, CT

QC Batch ID: MP7561 Methods: SW846 6010C

Matrix Type: LEACHATE Units: ug/l

Prep Date: 06/08/18

JC67308-1A QC Metal Original SDL 5:25 %DIF Limits

Associated samples MP7561: JC67399-2

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

(a) Percent difference acceptable due to low initial sample $\,$ concentration (< 50 times IDL).

Attachment C
Building Materials Sample Summary



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
01A	Brown Carpet	N	Dormitory	Over Sample 02A	
01B	Brown Carpet	N	Dormitory	Over Sample 02B	
01C	Brown Carpet	N	Dormitory	Over Sample 02C	
02A	Yellow Flooring Mastic	N	Dormitory	Under sample 1 A	
02B	Yellow Flooring Mastic	N	Dormitory	Under Sample 1B	
02C	Yellow Flooring Mastic	N	Dormitory	Under Sample 1C	
03A	Beige Floor Tile	N	Dormitory	Under Sample 2A	
03B	Beige Floor Tile	N	Dormitory	Under Sample 2B	
03C	Beige Floor Tile	N	Dormitory	Under Sample 2C	
04A	Black Mastic	N	Dormitory	Under Sample 3A	
04B	Black Mastic	N	Dormitory	Under Sample 3B	
04C	Black Mastic	N	Dormitory	Under Sample 3C	
05A	White 2' x 2' Ceiling Tile	Y	Dormitory		
05B	White 2' x 2' Ceiling Tile	Y	Dormitory		
05C	White 2' x 2' Ceiling Tile	Y	Dormitory		
06A	Pink Loose Fiberglass Type Insulation	N	Dormitory	Ceiling	
06B	Pink Loose Fiberglass Type Insulation	N	Dormitory	Ceiling	
06C	Pink Loose Fiberglass Type Insulation	N	Dormitory	Ceiling	
07A	Bright White 2'x2' Ceiling Tile	Y	Dormitory	Replacement	
07B	Bright White 2'x2' Ceiling Tile	Y	Dormitory	Replacement	
07C	Bright White 2'x2' Ceiling Tile	Y	Dormitory	Replacement	
08A	White Cloth Pipe Wrap	N	Dormitory		
08B	White Cloth Pipe Wrap	N	Dormitory		
08C	White Cloth Pipe Wrap	N	Dormitory		
09A	Yellow Fiberglass Type Insulation	N	Dormitory	Ceiling	
09B	Yellow Fiberglass Type Insulation	N	Dormitory	Ceiling	
09C	Yellow Fiberglass Type Insulation	N	Dormitory	Ceiling	
10A	White Cement 2" Elbow Insulation	Y	Dormitory		



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
10B	White Cement 2* Elbow Insulation	Y	Dormitory		
10C	White Cement 2* Elbow Insulation	Y	Dormitory		
11A	White Flexible Caulk	N	Dormitory		Window A
11B	White Flexible Caulk	N	Dormitory		Window B
11C	White Flexible Caulk	N	Dormitory		Window C
12A	Dark grey rubber baseboard	N	Rec Room	Over Sample 13a	
12B	Dark grey rubber baseboard	N	Rec Room	Over Sample 13b	
12C	Dark grey rubber baseboard	N	Rec Room	Over Sample 13c	
13A	Yellow mastic	N	Rec Room	Under Sample 12a	
13B	Yellow mastic	N	Rec Room	Under Sample 12b	
13C	Yellow mastic	N	Rec Room	Under Sample 12c	
14A	Off-white Floor Tile	N	Rec Room	Underneath brown carpet and yellow mastic	
14B	Off-white Floor Tile	N	Rec Room	Underneath brown carpet and yellow mastic	
14C	Off-white Floor Tile	N	Rec Room	Underneath brown carpet and yellow mastic	
15A	Black mastic	N	Rec Room	Under 14A	
15B	Black mastic	N	Rec Room	Under 14B	
15C	Black mastic	N	Rec Room	Under 14C	
16A	Blue Carpet with Yellow Accent	N	North East Office	Over Sample 17A	
16B	Blue Carpet with Yellow Accent	N	North East Office	Over Sample 17B	
16C	Blue Carpet with Yellow Accent	N	North East Office	Over Sample 17C	
17A	Yellow mastic	N	North East Office	Under 16A	
17B	Yellow mastic	N	North East Office	Under 16B	
17C	Yellow mastic	N	North East Office	Under 16C	
18A	Black mastic	N	North East Office	Under 17A	
18B	Black mastic	N	North East Office	Under 17B	
18C	Black mastic	N	North East Office	Under 17C	
19A	White 2'x2' Pinhole and chisel Pattern Ceiling Tile	Y	North East Office		Ceiling
19B	White 2'x2' Pinhole and chisel Pattern Ceiling Tile	Y	North East Office		Ceiling



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
19C	White 2'x2' Pinhole and chisel Pattern	N	North East Office		Ceiling
20A	White 2'x2' Pinhole and Worm Pattern - Maroon Backing	Y	North East Office		
20B	White 2'x2' Pinhole and Worm Pattern - Maroon Backing	Y	North East Office		
20C	White 2'x2' Pinhole and Worm Pattern - Maroon Backing	Y	North East Office		
21A	Blue Rubberized Cove Base	N	North East Office	Over Sample 22A	
21B	Blue Rubberized Cove Base	N	North East Office	Over Sample 22B	
21C	Blue Rubberized Cove Base	N	North East Office	Over Sample 22c	
22A	Yellow mustic	N	North East Office	Under sample 21A	
22B	Yellow mastic	N	North East Office	Under sample 21B	
22C	Yellow mastic	N	North East Office	Under sample 21C	
23A	White Flexible Caulk	N	Center - Main Hallway		Around Door Jamb
23B	White Flexible Caulk	N	Center - Main Hallway		Around Door Jamb
23C	White Flexible Caulk	N	Center - Main Hallway		Around Door Jamb
24A	Beige sandy texture gypsum type ceiling tile	Y	Men's Bathroom		
24B	Beige sandy texture gypsum type ceiling tile	Y	Men's Bathroom		
24C	Beige sandy texture gypsum type ceiling tile	Y	Men's Bathroom		
25 A	Concrete Block with Beige Tile Type Surface	Y	Men's Bathroom		
25B	Concrete Block with Beige Tile Type Surface	Y	Men's Bathroom		
25C	Concrete Block with Beige Tile Type Surface	Y	Men's Bathroom		
26A	Beige Rubberized Cove Base	N	Men's Bathroom		
26B	Beige Rubberized Cove Base	N	Men's Bathroom		
26C	Beige Rubberized Cove Base	N	Men's Bathroom		
27A	Yellow mastic	N	Men's Bathroom	Under Sample 26A	
27B	Yellow mastic	N	Men's Bathroom	Under Sample 26B	
27C	Yellow mastic	N	Men's Bathroom	Under Sample 26C	
28A	Off-white I inch ceramic type flooring tile	N	Men's Bathroom		
28B	Off-white I inch ceramic type flooring tile	N	Men's Bathroom		
28C	Off-white I inch ceramic type flooring tile	N	Men's Bathroom		
29A	Brown I inch ceramic type flooring tile	N	Men's Bathroom		
29B	Brown I inch ceramic type flooring tile	N	Men's Bathroom		
29C	Brown I inch ceramic type flooring tile	N	Men's Bathroom		
30A	Grey grout	N	Men's Bathroom		Occurs to the side of tile



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
30B	Grey grout	N	Men's Bathroom		Occurs to the side of tile
30C	Grey grout	N	Men's Bathroom		Occurs to the side of tile
31A	White Paper Tile Backing	N	Men's Bathroom	Occurs Under 28A	
31B	White Paper Tile Backing	N	Men's Bathroom	Occurs Under 28B	
31C	White Paper Tile Backing	N	Men's Bathroom	Occurs Under 28C	
32A	Red carpet	N	North West Office	Occurs over 33A	
32B	Red carpet	N	North West Office	Occurs Over 33B	
32C	Red carpet	N	North West Office	Occurs Over 33C	
33A	Yellow mastic	N	North West Office	Occurs Under 32A	
33B	Yellow mastic	N	North West Office	Occurs Under 32B	
33C	Yellow mastic	N	North West Office	Occurs Under 32C	
34A	Beige flooring tile	N	North West Office	Occurred Under Sample 33A	
34B	Beige flooring tile	N	North West Office	Occurred Under Sample 33B	
34C	Beige flooring tile	N	North West Office	Occurred Under Sample 33C	
35A	Black mastic	N	North West Office	Occurs Under 34A	
35B	Black mastic	N	North West Office	Occurs Under 34B	
35C	Black mastic	N	North West Office	Occurs Under 34C	
36A	Brown rubberized cove base	N	North West Office		
36B	Brown rubberized cove base	N	North West Office		
36C	Brown rubberized cove base	N	North West Office		
37A	Yellow mastic	N	North West Office	Occurs under 36A	
37B	Yellow mastic	N	North West Office	Occurs under 36B	
37C	Yellow mastic	N	North West Office	Occurs under 36C	
38A	Beige Rubberized Cove Base	N	Tax Office		
38B	Beige Rubberized Cove Base	N	Tax Office		
38C	Beige Rubberized Cove Base	N	Tax Office		
39A	Yellow mastic	N	Tax Office	Occurs under 39A	
39B	Yellow mastic	N	Tax Office	Occurs Under 39B	
					1



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
39C	Yellow mastic	N	Tax Office	Under sample 39C	
40A	Red and brown carpet	N	Tax Office		
40B	Red and brown carpet	N	Tax Office		
40C	Red and brown carpet	N	Tax Office		
41A	Beige mastic	N	Tax Office	Occurred below sample 40A	
41B	Beige mastic	N	Tax Office	Occurred below sample 40B	
41C	Beige mastic	N	Tax Office	Occurred below sample 40C	
42A	Black foam type carpet backing	N	Tax Office	Occurred below sample 41A	
42B	Black foam type carpet backing	N	Tax Office	Occurred below sample 41B	
42C	Black foam type carpet backing	N	Tax Office	Occurred below sample 41C	
43A	Yellow mastic	N	Tax Office	Occurred below sample 40A	
43B	Yellow mastic	N	Tax Office	Occurred below sample 40B	
43C	Yellow mastic	N	Tax Office	Occurred below sample 40C	
44A	White sheet rock	Y	Tax Office		Ceiling
44B	White sheet rock	Y	Tax Office		Ceiling
44C	White sheet rock	Y	Tax Office		Ceiling
45A	White Joint Compound	Y	Tax Office		Ceiling
45B	White Joint Compound	Y	Tax Office		Ceiling
45C	White Joint Compound	Y	Tax Office		Ceiling
46A	Compound Tape	N	Tax Office		Ceiling
46B	Compound Tape	N	Tax Office		Ceiling
46C	Compound Tape	N	Tax Office		Ceiling
47A	White 2 x 2 foot ceiling tile with pin holes and chisel marks	Y	Tax Office Lobby		
47B	White 2 x 2 foot ceiling tile with pin holes and chisel marks	Y	Tax Office Lobby		
47C	White 2 x 2 foot ceiling tile with pin holes and chisel marks	Y	Tax Office Lobby		
48A	Black adhesive and craft paper	N	Tax Office Lobby		Black adhesive and craft paper over pink fiberglass insulation
48B	Black adhesive and craft paper	N	Tax Office Lobby		Black adhesive and craft paper over pink fiberglass insulation
48C	Black adhesive and craft paper	N	Tax Office Lobby		Black adhesive and craft paper over pink fiberglass insulation



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
49A	Beige flooring tile	N	Tax Office Lobby	Occurred over sample 50A	
49B	Beige flooring tile	N	Tax Office Lobby	Occurred over sample 50B	
49C	Beige flooring tile	N	Tax Office Lobby	Occurred over sample 50C	
50A	Black mastic	N	Tax Office Lobby	Occurred Under sample 49	
50B	Black mastic	N	Tax Office Lobby	Occurred Under sample 49	
50C	Black mastic	N	Tax Office Lobby	Occurred Under sample 49	
51A	Olive Green Rubberized Cove Base	N	Tax Office Lobby		
51B	Olive Green Rubberized Cove Base	N	Tax Office Lobby		
51C	Olive Green Rubberized Cove Base	N	Tax Office Lobby		
52A	Yellow mastic	N	Tax Office Lobby	Occurred under 51A	
52B	Yellow mastic	N	Tax Office Lobby	Occurred under 51B	
52C	Yellow mastic	N	Tax Office Lobby	Occurred under 51C	
53A	Blue asphalt type roof shingles with surface aggregate	N	Exterior Roof		
53B	Blue asphalt type roof shingles with surface aggregate	N	Exterior Roof		
53C	Blue asphalt type roof shingles with surface aggregate	N	Exterior Roof		
54A	Black rolled sub roofing with aggregate	N	Exterior Roof	Occurs Under sample 53	
54B	Black rolled sub roofing with aggregate	N	Exterior Roof	Occurs Under sample 53	
54C	Black rolled sub roofing with aggregate	N	Exterior Roof	Occurs Under sample 53	
55A	Black roof tar	N	Exterior Roof		Misc. protrusions and patches
55B	Black roof tar	N	Exterior Roof		Misc. protrusions and patches - Plastic PVC vent pipe
55C	Black roof tar	N	Exterior Roof		Misc. protrusions and patches - Vent duct
56A	Black tar and paper	N	Exterior Roof		White fibers - Under stone
56B	Black tar and paper	N	Exterior Roof		White fibers - Under stone
56c	Black tar and paper	N	Exterior Roof		White fibers - Under stone
57A	Black tar paper	N	Exterior Roof		Under an inch and a half of sand, over wood.
57B	Black tar paper	N	Exterior Roof		
57C	Black tar paper	N	Exterior Roof		



July 20, 2018

Paul Pizzo Landmark Architects, P.C. 100 Riverview Center, Suite 204 Middletown, Connecticut 06457

RE: Renovation Materials Survey
South Fire District Building
445 Randolph Road, Middletown, Connecticut

Dear Mr. Pizzo:

EnSafe Inc. was retained by Landmark Architects to provide professional environmental consulting services as part of the Pre-Renovation Building Hazard Inspection of the South Fire District Building Located at 445 Randolph Road in Middletown, Connecticut. As part of renovations scheduled for Fall 2018, several areas of carpeting will be removed, walls and windows removed, bathroom/locker room areas renovated, new doorways installed, and a portion of the roof structure modified. On May 31, 2018, EnSafe collected limited building material samples to determine the presence of asbestos, polychlorinated biphenyls (PCBs), and lead to identify the need for regulated mitigation, abatement, and/or handling for material disposal, during the proposed renovation activities.

Work Performed

On May 31, 2018 building material samples were collected from pre-renovation building areas located in the Fire House Dormitory, Recreation Room, office areas (see Figure 1), and the Exterior Roof above the dormitories (see Figure 2). Samples were collected using hand tools to remove a representative sample for the appropriate laboratory analysis. Samples were described based on the material encountered. Building materials bonded together that may be incidentally removed together during renovation activities were noted during the investigation. Sampled building materials were submitted to EMSL Analytical, Inc. of Wallingford, Connecticut for asbestos analysis using polarizing light microscopy. A composite renovation building material sample was submitted to Accutest of Dayton, New Jersey for Toxic Characteristic Leachate Procedure (TCLP) lead analysis by EPA Method 1311 and a composite caulk sample from around windows to be removed for PCB analysis by EPA Method 8082A.

Results of Investigation

Asbestos concentrations greater than one percent were identified within several building materials. The composite window caulking sample collected from the Dormitory was found to contain PCBs at 20.4 milligrams per kilogram (mg/kg). The composite demolition debris sample for TCLP lead was reported at a concentration of 0.069 mg/l. Below is a summary of the samples and laboratory results.

Dormitory

Three material samples were determined to contain asbestos. Black mastic (04ABC) flooring adhesive, 2'x2' white ceiling tile (05ABC), and insulation surrounding a 2" elbow (10ABC) were determined to be

positive for greater than one percent chrysotile asbestos. Additionally, window caulking collected as part of the survey was found to contain total PCBs at a concentration of 20.4 mg/kg.

Recreation Room

One material sample composed of black mastic (15ABC) flooring adhesive was found to contain asbestos.

North East Office

Three material samples were reported as containing asbestos above one percent. Black mastic (18ABC), 2'x2' pinhole and worm pattern ceiling tile (20ABC), and 2'x2' pinhole and chisel) pattern ceiling tiles (19ABC) were found to contain asbestos greater than one percent.

<u>Center — Main Hallway</u>

No asbestos containing materials (ACM) identified within proposed renovation areas and materials.

Men's Bathroom

No ACMs identified within proposed renovation areas and materials.

Tax Office Lobby and Northwest Office

Black mastic (35ABC and 50ABC) reported asbestos above one percent.

Exterior Roof

The exterior black roof tar patch (55ABC) and the black tar and paper (56ABC) were positive for asbestos. The tar and tar paper was located below the current surficial roofing material but above plywood.

TCLP Lead Demolition Material Composite Sample

Lead was detected in a building material composite sample at a concentration of 0.069 mg/l.

Conclusions and Recommendations

Sampling conducted as part of this building materials survey has revealed the presence of ACMs in materials described to EnSafe as being potentially removed and/or disturbed during renovations. If disturbed, these materials should be managed and disposed of in accordance with state and federal regulations. PCBs were identified in window caulking from windows planned for removal at a concentration of 20.4 mg/kg, below the US Environmental Protection Agency Toxic Substance Control Act action limit of 50 mg/kg. This material, if disturbed, should be disposed of as a Connecticut Regulated Waste. TCLP lead composite waste characterization was reported at 0.069 mg/l, below the hazardous TCLP action limit of 5 mg/l.

Based on our understanding of the proposed renovation activities, and the site inspection conducted on May 31, 2018, the above mentioned ACMs will require regulated mitigation, abatement, and/or handling for disposal if disturbed.

The demolition debris did not test hazardous for lead and can be handled as a construction and demolition waste stream. Additionally, the removal of the caulk does not require notification to the EPA.

A copy of the laboratory reports, sample summary, and figures are attached. .



If a material is encountered during renovations that was not adequately characterized, additional samples and characterization may be warranted. The May 31 2018 inspection was conducted based on materials identified by Landmark to be potentially disturbed during the renovation and results of this inspection are not representative of a complete building materials inspection.

EnSafe sincerely appreciates the opportunity to be your Consultant for this project. If you have any further questions regarding this survey please me at 860-665-1140.

EnSafe Inc.

By: Timothy O. Myjak, LEP

Senior Project Manager/NE Business Development Lead

Attachments:

Figure 1 – Interior Abatement Area Plan Figure 2 – Exterior Roof Abatement Area Plan Laboratory Reports

Building Materials Sample Summary



Attachment A Figures

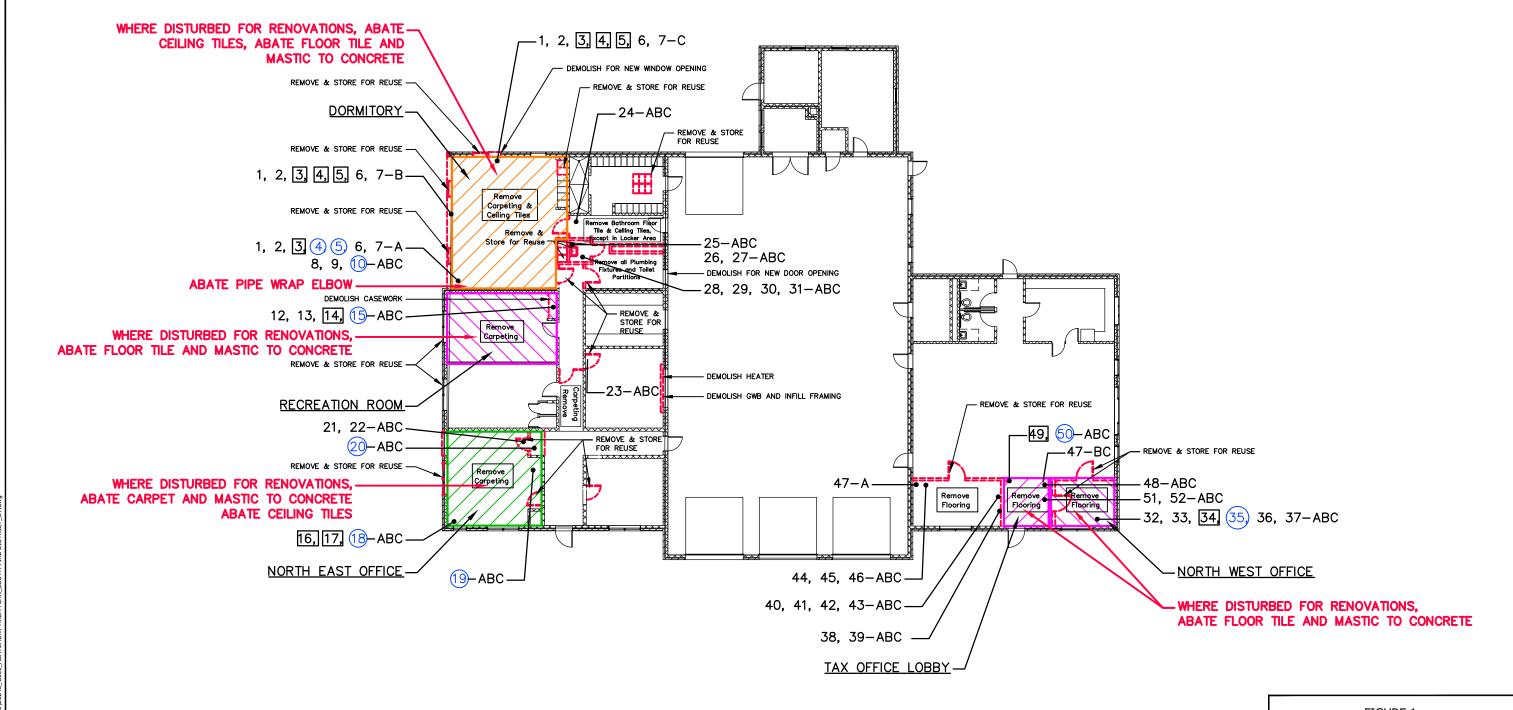


FIGURE 1
INTERIOR ABATEMENT AREA PLAN
SOUTH FIRE DISTRICT
445 RANDOLPH ROAD
MIDDLETOWN, CONNECTICUT 06457

<u>LEGEND</u>

IDENTIFIED ACBM (ASBESTOS CONTAINING BUILDING MATERIAL)

COLLECTED SAMPLE NOT ANALYZED

1, 2, 3-ABC SAMPLE LOCATION AND NUMBER DESTINATION

NOTE
ABATE AREAS AS NOTED, IF DISTURBED DURING RENOVATIONS.

10 20 REQUESTED BY: TM
DRAWN BY: CC
DATE: 7/20/2018
PROJECT: 0888823246



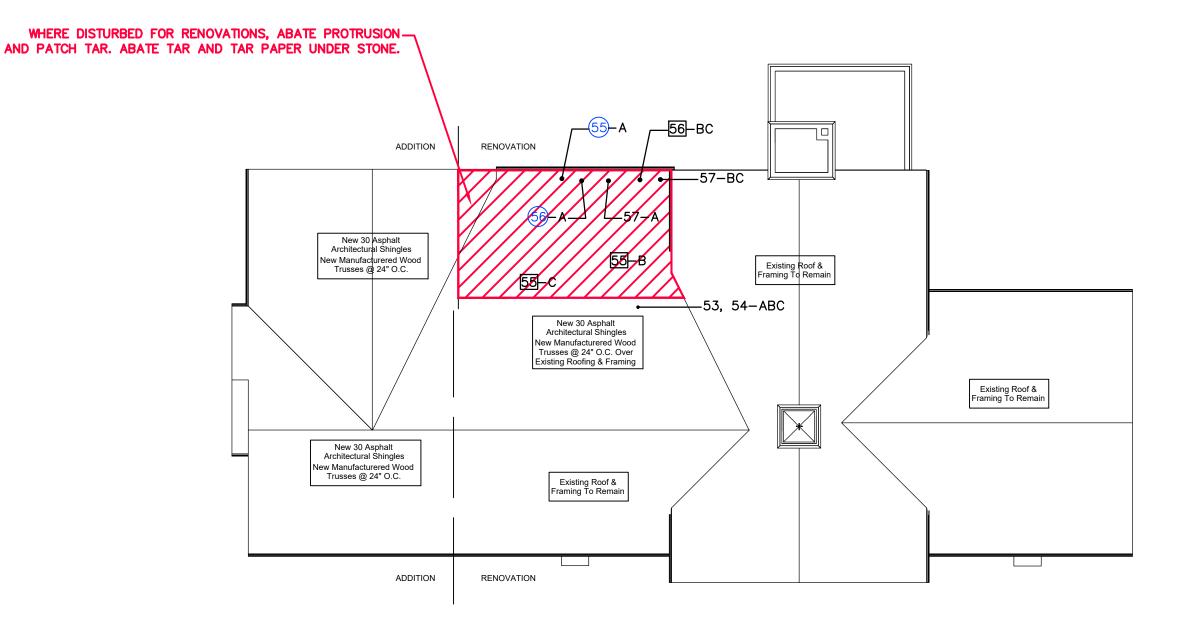


FIGURE 2
EXTERIOR ROOF ABATEMENT AREA PLAN
SOUTH FIRE DISTRICT
445 RANDOLPH ROAD
MIDDLETOWN, CONNECTICUT 06457

LEGEND

(XX)

 ${\tt IDENTIFIED\ ACBM\ (ASBESTOS\ CONTAINING\ BUILDING\ MATERIAL)}$

1, 2, 3-ABC SAMPLE LOCATION AND NUMBER DESTINATION

ABATE AREAS AS NOTED, IF DISTURBED DURING RENOVATIONS.

O 10 20

SCALE IN FEET

COORDINATE SYSTEM: NAD 1983
STATE PLANE TENNESSEE FEET

 REQUESTED BY:
 TM

 DRAWN BY:
 CC

 DATE:
 7/20/2018

 PROJECT:
 0888823246



Attachment B Laboratory Reports



EMSL Analytical, Inc.

29 North Plains Highway, Unit # 4 Wallingford, CT 06492

Tel/Fax: (203) 284-5948 / (203) 284-5978 http://www.EMSL.com / wallingfordlab@emsl.com EMSL Order: 241802730 Customer ID: ESCT42

Customer PO: Project ID:

Attention: Tim Myjak **Phone:** (860) 665-1140

Ensafe Fax:

 1233 Silas Deane Highway
 Received Date:
 06/04/2018 8:20 AM

 Weathersfield, CT 06109
 Analysis Date:
 06/08/2018 - 06/09/2018

Collected Date: 05/31/2018

Project: SFD MIDDLETOWN

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	stos	<u>Asbestos</u>	
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type	
01A 241802730-0001	Dormatory over sample 02a - brown carpet	Various Fibrous Homogeneous	85% Synthetic	15% Non-fibrous (Other)	None Detected	
01B	Dormatory over sample 02B - brown	Various Fibrous	85% Synthetic	15% Non-fibrous (Other)	None Detected	
241802730-0002	carpet	Homogeneous				
01C 241802730-0003	Dormatory over sample 02C - brown	Brown Fibrous	80% Synthetic	20% Non-fibrous (Other)	None Detected	
	carpet Dormatory under	Homogeneous Yellow	2% Cellulose	98% Non-fibrous (Other)	None Detected	
D2A 241802730-0004	sample 1A - yellow flooring mastic	Non-Fibrous Homogeneous	2% Cellulose	96% Non-librous (Otner)	None Detected	
)2B	Dormatory under sample 1B - yellow	Yellow Non-Fibrous	2% Synthetic	98% Non-fibrous (Other)	None Detected	
241802730-0005	flooring mastic	Homogeneous				
02C 241802730-0006	Dormatory under sample 1C - yellow flooring mastic	Yellow Non-Fibrous Homogeneous	3% Synthetic	97% Non-fibrous (Other)	None Detected	
03A	Dormatory under	Homogeneous			Positive Stop (Not Analyzed)	
241802730-0007	sample 2A - beige floor tile				,	
)3B	Dormatory under				Positive Stop (Not Analyzed)	
241802730-0008	sample 2B - beige floor tile					
03C	Dormatory under sample 2C - beige				Positive Stop (Not Analyzed)	
241802730-0009	floor tile					
04A 241802730-0010	Dormatory under sample 3A - black mastic	Black Non-Fibrous		94% Non-fibrous (Other)	6% Chrysotile	
		Homogeneous			Desitive Step (Not Applyand)	
04B 241802730-0011	Dormatory under sample 3B - black mastic				Positive Stop (Not Analyzed)	
04C	Dormatory under sample 3C - black				Positive Stop (Not Analyzed)	
241802730-0012	mastic					
05A	Dormatory - white 2'x2' ceiling tile	Gray/White Fibrous	85% Min. Wool	13% Non-fibrous (Other)	2% Chrysotile	
241802730-0013		Homogeneous				
05B	Dormatory - white 2'x2' ceiling tile				Positive Stop (Not Analyzed)	
241802730-0014 The sample group is not	homogeneous.					
05C	Dormatory - white 2'x2' ceiling tile				Positive Stop (Not Analyzed)	
241802730-0015						
06A	Dormatory ceiling - pink loose fiberglass	Pink Fibrous	98% Min. Wool	2% Non-fibrous (Other)	None Detected	
241802730-0016	type insulation	Homogeneous				

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

		Non-Asbestos			<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
06B 241802730-0017	Dormatory ceiling - pink loose fiberglass type insulation	Pink Fibrous Homogeneous	98% Min. Wool	2% Non-fibrous (Other)	None Detected
06C	Dormatory ceiling - pink loose fiberglass	Gray/Pink Fibrous	85% Min. Wool	15% Non-fibrous (Other)	None Detected
241802730-0018	type insulation	Homogeneous			
07A 241802730-0019	Dormatory replacement - bright white 2'x2' ceiling tile	Gray/White Fibrous Homogeneous	40% Cellulose 40% Min. Wool	10% Perlite 10% Non-fibrous (Other)	None Detected
07B			40% Cellulose	10% Perlite	None Detected
241802730-0020	Dormatory replacement - bright white 2'x2' ceiling tile	Gray/White Fibrous Homogeneous	40% Cellulose 40% Min. Wool	10% Perinte 10% Non-fibrous (Other)	None Detected
07C	Dormatory	Brown/Tan	40% Cellulose	20% Non-fibrous (Other)	None Detected
241802730-0021	replacement - bright white 2'x2' ceiling tile	Fibrous Homogeneous	40% Min. Wool	20 /0 (10): 112.000 (00)	
08A	Dormatory - white cloth pipe wrap	Tan Fibrous	95% Cellulose 2% Synthetic	3% Non-fibrous (Other)	None Detected
241802730-0022		Homogeneous			
08B	Dormatory - white cloth pipe wrap	Tan Fibrous	95% Cellulose	5% Non-fibrous (Other)	None Detected
241802730-0023	Damastan,hita	Homogeneous	000/ Callulana	400/ Non Sharry (Other)	Nama Datastad
08C 241802730-0024	Dormatory - white cloth pipe wrap	Tan Fibrous Homogeneous	90% Cellulose	10% Non-fibrous (Other)	None Detected
09A	Dormatory ceiling -	Yellow	98% Min. Wool	2% Non-fibrous (Other)	None Detected
241802730-0025	yellow fiberglass type insulation	Fibrous Homogeneous	90 /6 WIIII. VVOOI	2 /8 Non-librous (Other)	None Detected
09B	Dormatory ceiling - yellow fiberglass type	Yellow Fibrous	98% Min. Wool	2% Non-fibrous (Other)	None Detected
241802730-0026	insulation	Homogeneous			
09C	Dormatory ceiling - yellow fiberglass type	Yellow Fibrous	10% Cellulose 80% Min. Wool	10% Non-fibrous (Other)	None Detected
241802730-0027	insulation	Homogeneous	050/ Min 1M/n 1	400/ Non Sharana (Others)	00/ 01
10A 241802730-0028	Dormatory - white cement 2" elbow insulation	Gray Fibrous Homogeneous	85% Min. Wool	12% Non-fibrous (Other)	3% Chrysotile
10B	Dormatory - white				Positive Stop (Not Analyzed)
241802730-0029	cement 2" elbow insulation				r course ctop (verrular)256)
10C	Dormatory - white cement 2" elbow				Positive Stop (Not Analyzed)
241802730-0030	insulation				
11A	Dormatory - white flexible caulk	White Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0031		Homogeneous			
11B	Dormatory - white flexible caulk	White Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0032		Homogeneous			
11C 241802730-0033	Dormatory - white flexible caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
	Rec room over	-		1000/ Non fibrous (Other)	None Detected
12A 241802730-0034	sample 13a - dark grey rubber	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
	baseboard				



Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			·	n-Asbestos	<u>Asbestos</u>
ample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
2B 1802730-0035	Rec room over sample 13b - dark grey rubber baseboard	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
2C	Rec room over sample 13c - dark	Black Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0036	grey rubber baseboard	Homogeneous			
3A 41802730-0037	Rec room under sample 12a - yellow mastic	Tan/Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
3B	Rec room under sample 12b - yellow	Tan/Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0038	mastic	Homogeneous			
3C	Rec room under sample 12c - yellow	Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0039	mastic	Homogeneous			
4A 41802730-0040	Rec room underneath brown carpet and yellow mastic - off				Positive Stop (Not Analyzed
	white floor tile				
4B	Rec room underneath brown carpet and				Positive Stop (Not Analyzed
41802730-0041	yellow mastic - off white floor tile				
4C	Rec room underneath brown carpet and				Positive Stop (Not Analyzed
41802730-0042	yellow mastic - off white floor tile				
15A	Rec room under 14A - black mastic	Black Non-Fibrous		96% Non-fibrous (Other)	4% Chrysotile
41802730-0043		Homogeneous			5 0. 41.44
5B 41802730-0044	Rec room under 14b - black mastic				Positive Stop (Not Analyzed
5C	Rec room under 14c -				Positive Stop (Not Analyzed
41802730-0045	black mastic				Positive Stop (Not Arialyzed)
6A	Southwest office over				Positive Stop (Not Analyzed
41802730-0046	sample 17a - blue carpet with yellow acsent				
16B	Southwest office over sample 17b - blue				Positive Stop (Not Analyzed
241802730-0047	carpet with yellow acsent				
16C	Southwest office over sample 17bc - blue				Positive Stop (Not Analyzed
41802730-0048	carpet with yellow acsent				
7A	Southwest office under 16a - yellow				Positive Stop (Not Analyzed
41802730-0049	mastic				
7B	Southwest office under 16b - yellow				Positive Stop (Not Analyzed
41802730-0050	mastic				
17C	Southwest office under 16c - yellow				Positive Stop (Not Analyzed
241802730-0051	mastic				

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

		Non-Asbestos		<u>tos</u>	<u>Asbestos</u>	
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type	
18A 241802730-0052	Southwest office under 17a - black mastic	Brown/Gray Non-Fibrous Homogeneous		98% Non-fibrous (Other)	2% Chrysotile	
8B 41802730-0053	Southwest office under 17b - black mastic	<u> </u>			Positive Stop (Not Analyzed)	
8C	Southwest office under 17c - black				Positive Stop (Not Analyzed)	
11802730-0054	mastic					
9A 41802730-0055	Southwest office - white 2'x2' pinhole and chistle pattern	Gray Fibrous Homogeneous	65% Min. Wool	33% Non-fibrous (Other)	2% Amosite	
77002730-0033	ceiling tile	riomogeneous				
9B	Southwest office - white 2'x2' pinhole				Positive Stop (Not Analyzed)	
41802730-0056	and chistle pattern ceiling tile					
9C	Southwest office - white 2'x2' pinhole				Positive Stop (Not Analyzed)	
41802730-0057	and chistle pattern ceiling tile					
0A	Southwest office - white 2'x2' pinhole	Gray/Pink Fibrous	55% Min. Wool	41% Non-fibrous (Other)	4% Amosite	
11802730-0058	and worm pattern- maroon backing	Homogeneous				
0B	Southwest office - white 2'x2' pinhole				Positive Stop (Not Analyzed)	
41802730-0059	and worm pattern- maroon backing					
0C	Southwest office - white 2'x2' pinhole				Positive Stop (Not Analyzed)	
41802730-0060	and worm pattern- maroon backing					
1A	Southwest office over sample 22a - blue	Blue Non-Fibrous		100% Non-fibrous (Other)	None Detected	
41802730-0061	rubberized cove base	Homogeneous				
1B	Southwest office over sample 22b - blue	Blue Non-Fibrous		100% Non-fibrous (Other)	None Detected	
41802730-0062 1C	rubberized cove base Southwest office over	Homogeneous Blue		100% Non-fibrous (Other)	None Detected	
	sample 22c - blue	Non-Fibrous		100 % Noti-fibrous (Other)	Notic Detected	
41802730-0063 2A	rubberized cove base Southwest office	Homogeneous Tan		100% Non-fibrous (Other)	None Detected	
ZA.	under sample 21a -	Non-Fibrous		100% Non-librous (Other)	None Detected	
41802730-0064	yellow mastic	Homogeneous				
2B	Southwest office under sample 21b -	Tan Non-Fibrous	<1% Cellulose	100% Non-fibrous (Other)	None Detected	
41802730-0065	yellow mastic	Homogeneous		1000/ Non Shares (Others)	None Detected	
2C 41802730-0066	Southwest office under sample 21c - yellow mastic	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
3A	Center- main hallway	White		2% Quartz	None Detected	
41802730-0067	- white flexible caulk	Non-Fibrous Homogeneous		98% Non-fibrous (Other)		
23B	Center- main hallway - white flexible caulk	White Non-Fibrous		100% Non-fibrous (Other)	None Detected	
241802730-0068		Homogeneous				

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	<u>stos</u>	<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
23C 241802730-0069	Center- main hallway - white flexible caulk	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
24A	Mens bathroom - beige sandy texture	White Non-Fibrous	5% Cellulose 5% Glass	90% Non-fibrous (Other)	None Detected
241802730-0070	gypsum type ceiling tile	Homogeneous			
24B	Mens bathroom - beige sandy texture	White Non-Fibrous	8% Cellulose 2% Glass	90% Non-fibrous (Other)	None Detected
241802730-0071	gypsum type ceiling tile	Homogeneous			
24C	Mens bathroom - beige sandy texture	White Non-Fibrous	7% Cellulose	93% Non-fibrous (Other)	None Detected
241802730-0072	gypsum type ceiling tile	Homogeneous			
25A	Mens bathroom - concrete block with	Gray/White Non-Fibrous		20% Quartz 80% Non-fibrous (Other)	None Detected
241802730-0073 25B	beige tile type surface Mens bathroom -	Homogeneous Gray/White		15% Quartz	None Detected
241802730-0074	concrete block with beige tile type surface	Non-Fibrous Homogeneous		85% Non-fibrous (Other)	20.00.00
25C	Mens bathroom -	Gray		10% Quartz	None Detected
241802730-0075	concrete block with beige tile type surface	Non-Fibrous Homogeneous		90% Non-fibrous (Other)	
26A	Mens bathroom - beige rubberized cove	Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0076	base	Homogeneous		4000/ New Shares (Other)	New Detected
26B 241802730-0077	Mens bathroom - beige rubberized cove base	Tan Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
26C	Mens bathroom - beige rubberized cove	Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0078	base	Homogeneous			
27A 241802730-0079	Mens bathroom under sample 26a - yellow mastic	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
27B	Mens bathroom under	Homogeneous Yellow	2% Cellulose	98% Non-fibrous (Other)	None Detected
41802730-0080	sample 26b - yellow mastic	Non-Fibrous Homogeneous			
27C	Mens bathroom under sample 26c - yellow	Tan/Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0081	mastic	Homogeneous			
28A	Mens bathroom - off white 1 inch ceramic	White Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0082	type flooring tile	Homogeneous			
28B 241802730-0083	Mens bathroom - off white 1 inch ceramic type flooring tile	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
28C	Mens bathroom - off	White		100% Non-fibrous (Other)	None Detected
241802730-0084	white 1 inch ceramic type flooring tile	Non-Fibrous Homogeneous		100 /5 (1011 librous (Other)	None Delected
29A	Mens bathroom - brown 1 inch ceramic	Brown		100% Non-fibrous (Other)	None Detected
241802730-0085	type flooring tile	Non-Fibrous Homogeneous			
29B	Mens bathroom - brown 1 inch ceramic	Brown Non-Fibrous		100% Non-fibrous (Other)	None Detected
241802730-0086	type flooring tile	Homogeneous			

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe		<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
29C 241802730-0087	Mens bathroom - brown 1 inch ceramic type flooring tile	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
30A 241802730-0088	Mens bathroom - grey grout	Gray Non-Fibrous Homogeneous		10% Quartz 90% Non-fibrous (Other)	None Detected
30B	Mens bathroom - grey grout	Brown Non-Fibrous		10% Quartz 90% Non-fibrous (Other)	None Detected
41802730-0089 GOC	Mens bathroom - grey grout	Homogeneous Gray Non-Fibrous		2% Quartz 98% Non-fibrous (Other)	None Detected
41802730-0090		Homogeneous			
31A	Mens bathroom occurs under 28a -	Tan Fibrous	95% Cellulose	5% Non-fibrous (Other)	None Detected
41802730-0091	white paper tile backing	Homogeneous			
31B 241802730-0092	Mens bathroom occurs under 28b - white paper tile	Tan Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected
+1002130-0092	backing	Tiomogeneous			
31C	Mens bathroom occurs under 28c -	Tan/White Fibrous	98% Cellulose	2% Non-fibrous (Other)	None Detected
41802730-0093	white paper tile backing	Homogeneous			
2A	Tax office occurs over 33a - red carpet	Red Fibrous	95% Synthetic	5% Non-fibrous (Other)	None Detected
11802730-0094		Homogeneous			
2B 41802730-0095	Tax office occurs over 33b - red carpet	Red Non-Fibrous	95% Synthetic	5% Non-fibrous (Other)	None Detected
	Tax office occurs over	Homogeneous Red	00% Cunthatia	100/ Non fibrous (Other)	None Detected
2C 41802730-0096	33c - red carpet	Fibrous Homogeneous	90% Synthetic	10% Non-fibrous (Other)	None Detected
3A	Tax office occurs under 32a - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0097	mastic	Homogeneous			
3B	Tax office occurs under 32b - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0098 3C	mastic Tax office occurs under 32c - yellow	Homogeneous Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0099	mastic	Homogeneous			
4A	Tax office occurred under sample 33a -				Positive Stop (Not Analyzed)
41802730-0100	beige flooring tile				
4B 11802730-0101	Tax office occurred under sample 33b - beige flooring tile				Positive Stop (Not Analyzed)
4C	Tax office occurred				Positive Stop (Not Analyzed)
4C 41802730-0102	under sample 33c - beige flooring tile				r ositive Stop (Not Arialyzed)
5A	Tax office occurs under 34a - black	Black Non-Fibrous		98% Non-fibrous (Other)	2% Chrysotile
11802730-0103	mastic	Homogeneous			
35B	Tax office occurs under 34b - black	-			Positive Stop (Not Analyzed)
241802730-0104	mastic				

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	stos	<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
35C 41802730-0105	Tax office occurs under 34c - black mastic				Positive Stop (Not Analyzed)
36A 941802730-0106	Tax office - brown rubberized cove base	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66B	Tax office - brown rubberized cove base	Brown Non-Fibrous		100% Non-fibrous (Other)	None Detected
6C	Tax office - brown rubberized cove base	Homogeneous Brown Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0108		Homogeneous			
41802730-0109	Tax office occurs under 36a - yellow mastic	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
		Homogeneous	<10/ Collulado	1000/ Non fibrous (Other)	None Detected
41802730-0110	Tax office occurs under 36b - yellow mastic	Yellow Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (Other)	None Detected
41802730-0111	Tax office occurs under 36c - yellow mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
88A	Tax office - beige rubberized cove base	Brown/Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0112		Homogeneous			
8B	Tax office - beige rubberized cove base	Brown/Tan Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0113		Homogeneous			
8C 41802730-0114	Tax office - beige rubberized cove base	Brown Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
9A	Tax office occurs under 39a - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
11802730-0115	mastic	Homogeneous			
9B	Tax office occurs under 39b - yellow 	Yellow Non-Fibrous	2% Cellulose	98% Non-fibrous (Other)	None Detected
11802730-0116	mastic	Homogeneous			
9C :1802730-0117	Tax office occurs under 39c - yellow mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
0A	Tax office - red and brown carpet	Brown/Black Fibrous	80% Synthetic	20% Non-fibrous (Other)	None Detected
11802730-0118	•	Homogeneous			
OB	Tax office - red and brown carpet	Brown/Red Fibrous	80% Synthetic	20% Non-fibrous (Other)	None Detected
11802730-0119		Homogeneous			
0C	Tax office - red and brown carpet	Brown/Red Fibrous	95% Synthetic	5% Non-fibrous (Other)	None Detected
41802730-0120	-	Homogeneous	1001 5	000/ 11 77 17 17	
1A 11802730-0121	Tax office occurred below sample 40a - beige mastic	Tan Non-Fibrous Heterogeneous	10% Synthetic	90% Non-fibrous (Other)	<1% Chrysotile
1B	Tax office occurred below sample 40b -	Tan/Black Fibrous	15% Synthetic	85% Non-fibrous (Other)	<1% Chrysotile
41802730-0122	beige mastic	Heterogeneous			
1C	Tax office occurred below sample 40c -	Black/Yellow Non-Fibrous		100% Non-fibrous (Other)	<1% Chrysotile
41802730-0123	beige mastic	Heterogeneous			

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	<u>stos</u>	<u>Asbestos</u>	
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type	
42A 241802730-0124	Tax office potential black mastic below foam-difficult to sample- occurred below sample 41a - black foam type carpet backing	Black Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected	
42B 241802730-0125	Tax office potential black mastic below foam-difficult to sample- occurred below sample 41b - black foam type carpet backing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
42C 241802730-0126	Tax office potential black mastic below foam-difficult to sample- occurred below sample 41c - black foam type carpet backing	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
43A 241802730-0127	Tax office occurred below sample 40a - yellow mastic	Yellow Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
43B 241802730-0128	Tax office occurred below sample 40b - yellow mastic	Yellow Non-Fibrous Homogeneous	<1% Cellulose	100% Non-fibrous (Other)	None Detected	
43C 241802730-0129	Tax office occurred below sample 40bc - yellow mastic	Yellow Non-Fibrous Homogeneous	2% Synthetic	98% Non-fibrous (Other)	None Detected	
44A 241802730-0130	Tax office - white sheetrock	White Non-Fibrous Homogeneous	6% Cellulose 2% Glass	92% Non-fibrous (Other)	None Detected	
44B 241802730-0131	Tax office - white sheetrock	White Non-Fibrous Homogeneous	8% Cellulose 2% Glass	90% Non-fibrous (Other)	None Detected	
44C 241802730-0132	Tax office - white sheetrock	Gray/White Non-Fibrous Homogeneous	2% Cellulose	98% Non-fibrous (Other)	None Detected	
45A 241802730-0133	Tax office - white joint compound	White Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected	
45B 241802730-0134	Tax office - white joint compound	White Non-Fibrous		100% Non-fibrous (Other)	None Detected	
45C 241802730-0135	Tax office - white joint compound	Tan/White Non-Fibrous		100% Non-fibrous (Other)	None Detected	
241802730-0135 46A 241802730-0136	Tax office - compound tape	Homogeneous Brown Fibrous Homogeneous	99% Cellulose	1% Non-fibrous (Other)	None Detected	
46B 241802730-0137	Tax office - compound tape	Brown Fibrous Homogeneous	95% Cellulose	5% Non-fibrous (Other)	None Detected	
46C	Tax office - compound tape	Brown Fibrous	98% Cellulose	2% Non-fibrous (Other)	None Detected	



Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	stos	Asbestos
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
41802730-0139	Tax office - white 2x2 foot ceiling tile with pinholes and chistle marks	Tan/White Fibrous Homogeneous	30% Cellulose 35% Min. Wool	35% Non-fibrous (Other)	None Detected
17B	Tax office - white 2x2 foot ceiling tile with	Tan/White Fibrous	40% Cellulose 30% Min. Wool	30% Non-fibrous (Other)	None Detected
241802730-0140	pinholes and chistle marks	Homogeneous			
41802730-0141	Tax office - white 2x2 foot ceiling tile with pinholes and chistle	Gray/White Fibrous Homogeneous	40% Cellulose 40% Min. Wool	10% Perlite 10% Non-fibrous (Other)	None Detected
-8A	marks Tax office - black adhesive and craft	Brown/Black/Pink Fibrous	60% Cellulose 30% Glass	10% Non-fibrous (Other)	None Detected
41802730-0142	paper	Homogeneous			
41802730-0143	Tax office - black adhesive and craft	Brown/Black/Pink Fibrous Homogeneous	65% Cellulose 25% Glass	10% Non-fibrous (Other)	None Detected
41802730-0144	paper Tax office - black adhesive and craft paper	Brown/Black Fibrous Homogeneous	55% Cellulose 35% Min. Wool	10% Non-fibrous (Other)	None Detected
19A	Tax office occurred over sample 50a -				Positive Stop (Not Analyzed)
41802730-0145 .9B	beige flooring tile Tax office occurred over sample 50b -				Positive Stop (Not Analyzed)
41802730-0146	beige flooring tile				
.9C 41802730-0147	Tax office occurred over sample 50c - beige flooring tile				Positive Stop (Not Analyzed)
60A 41802730-0148	Tax office occurred under sample 49 - black mastic	Black Non-Fibrous Homogeneous		95% Non-fibrous (Other)	5% Chrysotile
60B	Tax office occurred under sample 49 -	Homogeneous			Positive Stop (Not Analyzed)
41802730-0149 50C	black mastic Tax office occurred under sample 49 -				Positive Stop (Not Analyzed)
41802730-0150 61A	black mastic Tax office - olive green rubberized	Green Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0151 1B 41802730-0152	cove base Tax office - olive green rubberized cove base	Homogeneous Green Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
1C	Tax office - olive green rubberized	Green Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0153	cove base	Homogeneous			
2A	Tax office occurred under 51a - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
2B	mastic Tax office occurred under 51b - yellow	Yellow Non-Fibrous		100% Non-fibrous (Other)	None Detected
41802730-0155	mastic Tax office occurred	Homogeneous Yellow		100% Non fibrous (Other)	None Detected
52C 241802730-0156	under 51c - yellow mastic	Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Customer PO: Project ID:

Test Report: Asbestos Analysis of Bulk Materials via EPA 600/R-93/116 Method using Polarized Light Microscopy

			Non-Asbe	<u>estos</u>	<u>Asbestos</u>
Sample	Description	Appearance	% Fibrous	% Non-Fibrous	% Type
53A 241802730-0157	Exterior roof - blue asphalt type roof shingles with surface	Gray/Black Fibrous Homogeneous	15% Glass	85% Non-fibrous (Other)	None Detected
	agrigate				
53B 241802730-0158	Exterior roof - blue asphalt type roof shingles with surface agrigate	Gray/Black Fibrous Homogeneous	20% Glass	80% Non-fibrous (Other)	None Detected
53C	Exterior roof - blue asphalt type roof	Gray/Black Non-Fibrous		10% Quartz 90% Non-fibrous (Other)	None Detected
241802730-0159	shingles with surface agrigate	Homogeneous		,	
54A	Exterior roof occurs under sample 53 -	Black Fibrous	20% Glass	80% Non-fibrous (Other)	None Detected
241802730-0160	black rolled sub roofing with agrigate	Homogeneous			
54B	Exterior roof occurs under sample 53 -	Black Fibrous	20% Glass	80% Non-fibrous (Other)	None Detected
241802730-0161	black rolled sub roofing with agrigate	Homogeneous			
54C	Exterior roof occurs under sample 53 -	Gray/Black Fibrous	10% Glass	90% Non-fibrous (Other)	None Detected
241802730-0162	black rolled sub roofing with agrigate	Homogeneous			
55A 241802730-0163	Exterior roof - black roof tar	Black Non-Fibrous		90% Non-fibrous (Other)	10% Chrysotile
	Exterior roof blook	Homogeneous			Desitive Step (Net Applyand)
55B	Exterior roof - black roof tar				Positive Stop (Not Analyzed)
241802730-0164					
55C	Exterior roof - black roof tar				Positive Stop (Not Analyzed)
241802730-0165					
56A	Exterior roof - black tar and paper	Black Non-Fibrous		94% Non-fibrous (Other)	6% Chrysotile
241802730-0166 56B	Exterior roof - black	Homogeneous			Positive Stop (Not Analyzed)
241802730-0167	tar and paper				
56C	Exterior roof - black tar and paper				Positive Stop (Not Analyzed)
241802730-0168	and paper				
57A	Exterior roof - black tar paper	Brown/Black Fibrous	20% Cellulose	80% Non-fibrous (Other)	None Detected
241802730-0169		Homogeneous			
57B	Exterior roof - black tar paper	Black Fibrous	20% Cellulose	80% Non-fibrous (Other)	None Detected
241802730-0170		Homogeneous			
57C	Exterior roof - black tar paper	Black Fibrous	8% Cellulose	92% Non-fibrous (Other)	None Detected
241802730-0171		Homogeneous			



EMSL Order: 241802730 Customer ID: ESCT42 Customer PO:

Project ID:

Analyst(s)

Almedina Hodzic (46) Lauren Buffone (19) Quetcy Castro Romero (66) hu kn

Lauren Brennan, Asbestos Lab Manager or Other Approved Signatory

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Samples analyzed by EMSL Analytical, Inc. Wallingford, CT NVLAP Lab Code 200700-0,

OrderID: 241802730

24/802730



1233 Silas Deane Hwy. Wethersfield, CT 06109 Tel. 860 665 1140 Fax 860 665 9445

		Chain of Custody	
Project:	SFD Middletown		
Project ID:			
Sampled By:	Tim Myjak	Sampled On:	5/31/2018
Sample ID's:	1 A,B,C through 57 A,B,C	Number of Materials Sampl	ed: 171
Sample Summary	Attached: Yes		
Type: Bulk Samp	oles	Analysis: PLM Asbestos E	PA 600 / Point Counting 198.1 as needed
Special Notes: Turnaround: 5 Da	mastic on tile / cove base / carpet san set.		oted on attached sample summary. Run ositive for tile / cove base / carpet sample
Lab: EMSL Wa	ıllingford CT		
Send reports to: Relinquished by:	tmyjak@ensafe.com	Date: 6-1-7018	Time:
Received by:		Date:	Time:
Relinquished by:		Date:	Time:
Received by:		Date:	Time:
		FOR LAB USE:	
			JUN 0 4 2018 BE 8 Seam W

OrderID: 241802730

24/80 2730



Project #: -

Location: SFD Middletown

Date: 05/31/2018

				Sampled By: Tim Myjak	
Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location	
01A		Brown Carpet	N	Dermatory	
01B		Brown Carpet	N	Dormatory	
01C		Brown Carpet	N	Dormatory	
02A		Yellow Flooring Mastic	N	Dormatory	
02B		Yellow Flooring Mastic	N	Dormatory	
02C		Yellow Flooring Mastic	N	Dormatory	
03A		Beige Floor Tile	N	Dormatory	
03B		Beige Floor Tile	N	Dormatory	
03C		Beige Floor Tile	N	Dormatory	
04A		Black Mastic	N	Dormatory	
04B		Black Mastic	N	Dormatory	
04C		Black Mastic	N	Domatory	
05A		White 2' x 2' Ceiling Tile	Y	Dormatory	
05B		White 2' x 2' Ceiling Tile	Y	Domnatory	
05C		White 2' x 2' Ceiling Tile	Y	Dormatory	
06A		Pink Loose Fiberglass Type Insulation	N	Dormatory	
06B		Pink Loose Fiberglass Type Insulation	N	Domiatory	
06C		Pink Loose Fiberglass Type Insulation	N	Domnatory	
07A		Bright White 2'x,2' Ceiling Tile	Y	Dormatory	
07B		Bright White 2'x,2' Ceiling Tile	Y	Dormatory	
07C		Bright White 2'x2' Ceiling Tile	Y	Domnatory	
08A		White Cloth Pipe Wrap	N	Dormatory	
08B		White Cloth Pipe Wrap	N	Dormatory	
08C		White Cloth Pipe Wrap	N	Dormatory	
09A		Yellow Fiberglass Type Insulation	N	Dormatory	
09B		Yellow Fiberglass Type Insulation	N	Dormatory	
09C		Yellow Fiberglass Type Insulation	N	Dormatory	
10A		White Cement 2" Elbow Insulation	Y	Dormatory	
		1			







Project #: 7148

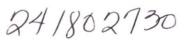
Location: SFD Middletown

Date: 05/31/2018

				90 (00 8 + 400 8 + 800 (00 00 00 00 00 00 00 00 00 00 00 00	
Sumple #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location	
10B		White Cement 2" Ebow Insulation	Y	Dormatory	
10C		White Cement 2" Elbow Insulation	Y	Dormatory	
11A		White Flexible Caulk	N	Dormatory	
11B		White Flexible Caulk	N	Dormatory	
11C		White Flexible Caulk	N	Dormatory	
12A		Durk grey rubber basebound	N	Rec Room	
12B		Dark grey rubber baseboard	N	Rec Room	
12C		Durk grey rubber baseboard	N	Rec Room	
13A		Yellow mastic	N	Rec Room	
13B		Yellow mastic	N	Rec Room	
13C		Yellow mastic	N	Rec Room	
14A		Offwhite Floor Tile	N	Rec Room	
14B		Offwhite Floor Tile	N	Rec Room	
14C		Offwhite Floor Tile	N	Rec Room	
15A		Black mastic	N	Rec Room	
15B		Black mastic	N	Rec Room	
15C		Black mastic	N	Rec Room	
16A		Blue Curpet with Yellow Acsent	N	Southwest Office	
16B		Blue Curpet with Yellow Acsent	N	Southwest Office	
16C		Blue Curpet with Yellow Acsent	N	Southwest Office	
17A		Yellow mastic	N	Southwest Office	
17B		Yellow mastic	N	Southwest Office	
17C		Yellow mastic	N	Southwest Office	
18A		Black mastic	N	Southwest Office	
18B		Black mastic	N	Southwest Office	
18C		Black mastic	N	Southwest Office	
19A		White 2'x2' Pinhole and Chistle Pattern Ceiling Tile	Y	Southwest Office	÷.
19B		White ZxZ Pinhole and Chistle Pattern CeilingTile	Y	Southwest Office	



OrderID: 241802730





Project #:

Location: SFD Middletown

Date: 05/31/2018

Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location	Under/O
19C	Laboratory ID	White 2's:2' Pinhole and Chistle Pattern	N	Southwest Office	
20A		White 2%2 Pinhole and Worm Pattern - Maroon Backing	Y	Southwest Office	
20B		White 2%2° Pinhole and Worm Pattern - Maroon Backing	Y	Southwest Office	
20C		White 2%2" Pinhole and Worm Pattern - Maroon Backing	Y	Southwest Office	
21A		Blue Ruberized Cove Base	N	Southwest Office	Over Samp
21B		Blue Ruberized Cove Base	N	Southwest Office	Over Samj
21C	 	Blue Ruberized Cove Base	N	Southwest Office	Over Sam
22A		Yellow mastic	N	Southwest Office	Under sam
22B		Yellow mastic	N	Southwest Office	Under sam
22C		Yellow mastic	N	Southwest Office	Under sam
23A		White Flexible Caulk	N	Center - Main Hallway	
23B		White Flexible Caulk	N	Center - Main Hallway	
23C		White Flexible Caulk	N	Center - Main Hallway	
24A		Beige sandy texture gypsum type ceiling tile	Y	Mens Bathroom	
24B		Beige sandy texture gypsum type celling tile	Y	Mens Bathroom	
24C		Beige sandy texture gypsum type ceiling tile	Y	Mens Bathroom	
25 A		Concrete Block with Beige Tile Type Surface	Y	Mens Bathroom	
25B		Concrete Block with Beige Tile Type Surface	Y	Mens Bathroom	
25C		Concrete Block with Beige Tile Type Surface	Y	Mens Bathroom	
26A		Beige Ruberized Cove Base	N	Mens Bathroom	
26B		Beige Ruberized Cove Base	N	Mens Bathroom	
26C		Beige Ruberized Cove Base	N	Mens Bathroom	
27A		Yellow mastic	N	Mens Bathroom	Under San
27B		Yellow mastic	N	Mens Bathroom	Under Sar
27C		Yellow mastic	N	Mens Bathroom	Under Sar
28A		Offwhite 1 inch ceramic type flooring tile	N	Mens Bathroom	
28B		Offwhite I inch ceramic type flooring tile	, N	Mens Bathroom	
28C		Offwhite I inch ceramic type flooring tile	N	Mens Bathroom	
29A		Brown I inch ceramic type flooring tile	N	Mens Bathroom	
29B		Brown 1 inch ceramic type flooring tile	N	Mens Bathroom	
29C		Brown I inch ceramic type flooring tile	N	Mens Bathroom	
30A		Grey grout	N	Mens Bathroom	



OrderID: 241802730

24180 2730



Project #: -

Location: SFD Middletown

Date: 05/31/2018

Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location	
30B		Grey grout	N	Mens Bathroom	
30C		Grey groat	N	Mens Bathroom	
31A		White Paper Tile Backing	N	Mens Bathroom	
31B		White Paper Tile Backing	N	Mens Bathroom	
31C		White Paper Tile Backing	N	Meus Bathroom	
32A		Red carpet	N	Tax Office	
32B		Red carpet	N	Tax Office	
32C		Red carpet	N	Tax Office	
33A		Yellow mastic	N	Tax Office	
33B		Yellow mastic	N	Tax Office	
33C		Yellow mastic	N	Tax Office	
34A		Beige flooring tile	N	Tax Office	
34B		Beige flooring tile	N	Tax Office	
34C		Beige flooring tile	N	Tax Office	
35A		Black mastic	N	Tax Office	
35B		Black mastic	N	Tax Office	
35C		Black mastic	N	Tax Office	
36A		Brown ruberized cove base	N	Tax Office	
36B		Brown ruberized cove base	N	Tax Office	
36C		Brown ruberized cove base	N	Tax Office	
37A		Yellow mastic	N	Tax Office	
37B		Yellow mastic	N	Tax Office	
37C		Yellow mastic	N	Tax Office	
38A		Beige Ruberized Cove Base	N	Tax Office	
38B		Beige Ruberized Cove Base	N	Tax Office	
38C		Beige Ruberized Cove Base	N	Tax Office	
39A		Yellow mastic	N	Tax Office	
39B		Yellow mastic	N	Tax Office	



241802730



Project #: -

Location: SFD Middletown

Date: 05/31/2018

Sampled By: Tim Myjak							
Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location			
39C		Yellow mastic	N	Tax Office			
40A		Red and brown carpet		Tax Office			
40B		Red and brown carpet	N	Tax Office			
40C		Red and brown carpet	N	Tax Office			
41A		Beige mastic	N	Tax Office			
41B		Beige mastic	N	Tax Office			
41C		Beige mastic	N	Tax Office			
42A		Black foam type carpet backing	N	Tax Office	potential black n		
42B		Black foam type carpet backing	N	Tax Office	potential black n		
42C		Black foam type carpet backing	N	Tax Office	potential black n		
43A		Yellow mastic	N	Tax Office			
43B		Yellow mastic	N	Tax Office			
43C		Yellow mastic	N	Tax Office			
44A		White sheet rock	Y	Tax Office			
44B		White sheet rock	Y	Tax Office			
44C		White sheet rock	Y	Tax Office			
45A		White Joint Compound	Y	Tax Office			
45B		White Joint Compound	Y	Tax Office			
45C		White Joint Compound	Y	Tax Office			
46A		Compound Tape	N	Tax Office			
46B		Compound Tape	N	Tax Office			
46C		Compound Tape	N	Tax Office			
47A		White 2×2 foot ceiling tile with pin holes and chistle marks	Y	Tax Office			
47B		White 2×2 foot ceiling tile with pin holes and chistle marks	Y	Tax Office			
47C		White 2×2 foot ceiling tile with pin holes and chistle marks	Y	Tax Office			
48A		Black adhesive and craft paper	N	Tax Office			
48B		Black adhesive and craft paper	N	Tax Office			
48C		Black adhesive and craft paper	N	Tax Office			



241802750



Project #: -

Location: SFD Middletown

Date: 05/31/2018

				Sampled By: Tun Myjak	
Sample #	Laboratory ID	Description (color and texture)	Friable (Y/N)	Location	
49A		Beige flooring tile	N	Tax Office	
49B		Beige flooring tile	N	Tax Office	
49C		Beige flooring tile	N	Tax Office	
50A		Black mastic	N	Tax Office	
50B		Black mastic	N	Tax Office	
50C		Black mastic	N	Tax Office	
51A		Olive Green Rubberized Cove Base	N	Tax Office	
51B		Olive Green Rubberized Cove Base	N	Tax Office	
51C		Offive Groen Rubberized Cove Base	N	Tax Office	
52A		Yellow mastic	N	Tax Office	
52B		Yellow mastic	N	Tax Office	
52C		Yellow mastic	N	Tax Office	
53A		Blue asphalt type roof shingles with surface agrigate	N	Exterior Roof	
53B		Blue asphalt type roof shingles with surface agrigate	N	Exterior Roof	
53C		Blue asphalt type roof shingles with surface agrigate	N	Exterior Roof	
54A		Black rolled sub rooting with agrigate	N	Exterior Roof	
54B		Black rolled sub rooting with agrigate	N	Exterior Roof	
54C		Black rolled sub roofing with agrigate	N	Exterior Roof	
55A		Black roof tar	N	Exterior Roof	
55B		Black roof tar	N	Exterior Roof	
55C		Black roof tar	N	Exterior Roof	
56A		Black tar and paper	N	Exterior Roof	
56B		Black tar and paper	N	Exterior Roof	
56c		Black tar and paper	N	Exterior Roof	
57A		Black tar paper	N	Exterior Roof	
57B		Black tar paper	N	Exterior Roof	
57C		Black tar paper	N	Exterior Roof	





Dayton, NJ 06/13/18

The results set forth herein are provided by SGS North America Inc.

e-Hardcopy 2.0
Automated Report

Technical Report for

Ensafe, Inc

South Fire, CT

SGS Job Number: JC67399

Sampling Date: 06/05/18

Report to:

Ensafe, Inc 1233 Silas Deane Highway Wethersfield, CT 06109

TMcCarthy@ensafe.com; Tclemmey@ensafe.com

ATTN: Thomas McCarthy

Total number of pages in report: 27

TNI FBORATORY

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.

Nancy Cole Laboratory Director

Maney +. Cole

Client Service contact: Tammy McCloskey 732-329-0200

Certifications: NJ(12129), NY(10983), CA, CT, FL, IL, IN, KS, KY, LA, MA, MD, ME, MN, NC, OH VAP (CL0056), AK (UST-103), AZ (AZ0786), PA, RI, SC, TX, UT, VA, WV, DoD ELAP (ANAB L2248)

This report shall not be reproduced, except in its entirety, without the written approval of SGS. Test results relate only to samples analyzed.

SGS North America Inc. • 2235 Route 130 • Dayton, NJ 08810 • tel: 732-329-0200 • fax: 732-329-3499

SGS

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Sample Summary

Ensafe, Inc

Job No: JC67399

South Fire, CT

Sample	Collected			Matrix		Client
Number	Date	Time By	Received	Code	Type	Sample ID
JC67399-1	06/05/18	08:00 TM	06/05/18	SO	Solid	WHITE WINDOW CAULK
JC67399-2	06/05/18	09:00 TM	06/05/18	SO	Solid	MATERIAL COMP #1

Soil samples reported on a dry weight basis unless otherwise indicated on result page.

CASE NARRATIVE / CONFORMANCE SUMMARY

Client: Ensafe, Inc Job No JC67399

 Site:
 South Fire, CT
 Report Date
 6/13/2018 5:35:57 PM

On 06/05/2018, 2 Sample(s), 0 Trip Blank(s) and 0 Field Blank(s) were received at SGS North America Inc. at a maximum corrected temperature of 2.1 C. Samples were intact and chemically preserved, unless noted below. A SGS North America Inc. Job Number of JC67399 was assigned to the project. Laboratory sample ID, client sample ID and dates of sample collection are detailed in the report's Results Summary Section.

Specified quality control criteria were achieved for this job except as noted below. For more information, please refer to the analytical results and QC summary pages.

Compounds qualified as out of range in the continuing calibration summary report are acceptable as per method requirements when there is a high bias but the sample result is non-detect.

GC/LC Semi-volatiles By Method SW846 8082A

Matrix: SO Batch ID: OP12686

- All samples were extracted within the recommended method holding time.
- Sample(s) JC67399-1MS, JC67399-1MSD were used as the QC samples indicated.
- All method blanks for this batch meet method specific criteria.
- Matrix Spike Recovery(s) for Aroclor 1260 are outside control limits. Outside control limits due to presence of other Aroclor pattern.
- RPD(s) for MSD for Aroclor 1254, Aroclor 1260 are outside control limits for sample OP12686-MSD. Outside control limits due to matrix interference.
- OP12686-BS1 for Aroclor 1016: Reported from 2nd signal, 1st signal used for confirmation.
- OP12686-BS1/BSD for Aroclor 1260: Reported from the 1st signal. The %D of the CCV on the 2nd signal exceeds the method criteria of 20%, so it being used for confirmation only.

Metals Analysis By Method SW846 6010C

Matrix: LEACHATE Batch ID: MP7561

- All samples were digested within the recommended method holding time.
- All method blanks for this batch meet method specific criteria.
- Sample(s) JC67308-1ASDL were used as the QC samples for metals.
- RPD(s) for Serial Dilution for Lead are outside control limits for sample MP7561-SD1. Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

SGS North America Inc. certifies that data reported for samples received, listed on the associated custody chain or analytical task order, were produced to specifications meeting the Quality System precision, accuracy and completeness objectives except as noted.

Estimated non-standard method measurement uncertainty data is available on request, based on quality control bias and implicit for standard methods. Acceptable uncertainty requires tested parameter quality control data to meet method criteria.

SGS North America Inc. is not responsible for data quality assumptions if partial reports are used and recommends that this report be used in its entirety. Data release is authorized by SGS North America Inc indicated via signature on the report cover

Wednesday, June 13, 2018

Page 1 of 1

Summary of Hits Job Number: JC67399 Account: Ensafe, Inc **Project:** South Fire, CT **Collected:** 06/05/18

Lab Sample ID Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
JC67399-1	WHITE WINDOV	W CAULK				
Aroclor 1254		20400	930		ug/kg	SW846 8082A
JC67399-2	MATERIAL COM	/IP #1				
Lead		0.069	0.015		mg/l	SW846 6010C





Dayton, NJ

Section 4

Page 1 of 1

Report of Analysis

Client Sample ID: WHITE WINDOW CAULK

 Lab Sample ID:
 JC67399-1
 Date Sampled:
 06/05/18

 Matrix:
 SO - Solid
 Date Received:
 06/05/18

 Method:
 SW846 8082A
 SW846 3540C
 Percent Solids:
 n/a a

Project: South Fire, CT

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	5G79386.D	1	06/12/18 18:36	TR	06/12/18 06:00	OP12686	G5G1886
Run #2	5G79407.D	5	06/13/18 12:34	TR	06/12/18 06:00	OP12686	G5G1887

	Initial Weight	Final Volume
Run #1	2.7 g	10.0 ml
Run #2	2.7 g	10.0 ml

PCB List

CAS No.	Compound	Result	RL	Units Q
12674-11-2 11104-28-2 11141-16-5 53469-21-9 12672-29-6 11097-69-1	Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254	ND ND ND ND ND 20400 b	190 190 190 190 190 190 930	ug/kg ug/kg ug/kg ug/kg ug/kg ug/kg
11096-82-5	Aroclor 1260	ND	190	ug/kg
11100-14-4	Aroclor 1268	ND	190	ug/kg
37324-23-5	Aroclor 1262	ND	190	ug/kg
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
877-09-8	Tetrachloro-m-xylene	93%	115%	24-152%
877-09-8	Tetrachloro-m-xylene	89%	100%	24-152%
2051-24-3	Decachlorobiphenyl	119%	129%	10-166%
2051-24-3	Decachlorobiphenyl	102%	130%	10-166%

- (a) All results reported on a wet weight basis.
- (b) Result is from Run# 2

ND = Not detected RL = Reporting Limit

E = Indicates value exceeds calibration range

J = Indicates an estimated value

 $B = \ Indicates \ analyte \ found \ in \ associated \ method \ blank$

N = Indicates presumptive evidence of a compound

Report of Analysis

Page 1 of 1

Client Sample ID: MATERIAL COMP #1

 Lab Sample ID:
 JC67399-2
 Date Sampled:
 06/05/18

 Matrix:
 SO - Solid
 Date Received:
 06/05/18

 Percent Solids:
 n/a

Project: South Fire, CT

Metals Analysis, TCLP Leachate SW846 1311

Result HW# MCL RL **Prep Method** Analyte Units DF Prep Analyzed By Method SW846 6010C ¹ SW846 3010A ² Lead 0.069 0.015 06/08/18 06/08/18 ND D008 5.0 mg/l 5

(1) Instrument QC Batch: MA44616

(2) Prep QC Batch: MP7561

RL = Reporting Limit

MCL = Maximum Contamination Level (40 CFR 261 7/1/11)





Misc. Forms

Dayton, NJ

Custody Documents and Other Forms

Includes the following where applicable:

- · Chain of Custody
- RCP Form
- Sample Tracking Chronicle
- QC Evaluation: CT RCP Limits

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800-5	800-588-7962 Send Results To: Tundarthy@ Eusaft					. Con	ч			(3)→											ß	
Sampler/s	Site Phone#	(nomas								ers	- ,	٨.									√S/W	
Lab Name	e: 565				rnaround Time(specify):	5	day	,	Contain	Lead	50 ×	1								e for I	
Lab ID	Sample ID			Location ID		Time (Military)	Matrix Code	Sample Type	Field Filtered	Total No. of Containers	0	135									Extra Volume for MS/MSD	
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Field Comments: 7CBs on Soxhlet extraction			Lab Comments: SGS-ACCUTEST MARLBOR				Sample Shipment and Delivery Details Number of coolers in shipment:					ails										
Dolingwished by (signature)			Received	by (signa	tate)	, .			Date		Time				d?(chec							
1 Monus Martin 6-5-18 11:45 2 Bc 6-5-18 16:05 3 Sext Paris 6/5/18 18:30				1	M.	/	,		6	-5-1	18	<i>]]:</i> :	45	Meth	od of S	hipme	nt:					
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(1) Matri SQ=Soil/S	(1) Matrix Code: Aa-Air, AQ-Air (C Matrix, CX=Caulk, GS=Soil Gas, LF=Free Prioduct, LH=Liquid Waste, MS=Mastic, Oil=Oil, PT=Paint, SC=Cement/Concrete, SE=Sediment, SF=Filter Sandpack, SL=Sludge, SN=Miscellaneous Solid/Building Materials, SQ=Soil, SQ=Soil Gas, LF=Free Prioduct, LH=Liquid Waste, MS=Mastic, Oil=Oil, PT=Paint, SC=Cement/Concrete, SE=Sediment, SF=Filter Sandpack, SL=Sludge, SN=Miscellaneous Solid/Building Materials, SQ=Soil, SQ=Soil Gas, LF=Free Prioduct, LH=Liquid Waste, MS=Mastic, Oil=Oil, PT=Paint, SC=Cement/Concrete, SE=Sediment, SF=Filter Sandpack, SL=Sludge, SN=Miscellaneous Solid/Building Materials, SQ=Soil, SQ=Soil																					

SQ=Source WHILE STATES, \$1=Source Water, \$M=SwadyWile; IA=Animal Issue, IV=Halt Issue, WG=Ground water, WHILEGENERGE, WGHC, WG

JC67399: Chain of Custody Page 1 of 2

SGS Sample Receipt Summary

Job Number: JC67399	Client:	Project:	
Date / Time Received: 6/5/2018 6:30:00 P	M Delivery Method:	Airbill #'s:	
Cooler Temps (Raw Measured) °C: Cooler Cooler Temps (Corrected) °C: Cooler	, ,,		
1. Custody Seals Fleselli. 😐 🗀	3. COC Present:	Sample Integrity - Documentation 1. Sample labels present on bottles: 2. Container labeling complete: 3. Sample container label / COC agree: Sample Integrity - Condition	Y or N V V V V V V V V V
3. Cooler media: Ice (Bag) 4. No. Coolers: 1		Sample recvd within HT: All containers accounted for: Condition of sample:	☑ □ Intact
Quality Control Preservation Y or N 1. Trip Blank present / cooler: □ ✓ 2. Trip Blank listed on COC: □ ✓ 3. Samples preserved properly: ✓ □ 4. VOCs headspace free: □ □		Sample Integrity - Instructions 1. Analysis requested is clear: 2. Bottles received for unspecified tests 3. Sufficient volume recvd for analysis: 4. Compositing instructions clear: 5. Filtering instructions clear:	Y or N N/A □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □ □
Test Strip Lot #s: pH 1-12:	216017 pH 12+:	208717 Other: (Specify)	-
Comments			

SM089-03 Rev. Date 12/7/17

JC67399: Chain of Custody

Page 2 of 2

Reasonable Confidence Protocol Laboratory Analysis QA/QC Certification Form

Laboratory Name:	SGS North America Inc.	Client:	Ensafe, Inc
------------------	------------------------	---------	-------------

Project Location: South Fire, CT Project Number:

Sampling Date(s): 6/5/2018

Laboratory Sample ID(s): JC67399-1, JC67399-2

SW846 6010C. SW846 8082A

Methods:	SW846 6010C, SW846 8082A				
1	For each analytical method referenced in this laboratory report package, were all specified QA/QC performance criteria followed, including the requirement to explain any criteria falling outside of acceptable guidelines, as specified in the CTDEP method-specific Reasonable Confidence Protocol documents)?	Yes	V	No	□
1A	Where all the method specified preservation and holding time requirements met?	Yes	<u> </u>	No	
1B	VPH and EPH mehods only: Was the VPH or EPH method conducted without significant modifications (See section 11.3 of respective methods)	Yes	□ NA	No I	
2	Were all samples received by the laboratory in a condition consistent with that described on the associated chain-of-custody document(s)?	Yes	>	No	
3	Were samples received at an appropriate temperature (<6° C)?	Yes	<u> </u>	No	
4	Were all QA/QC performance criteria specified in the CTDEP Reasonable Confidence Protocol documents achieved?	Yes		No	<u>~</u>
5	a) Were reporting limits specified or referenced on the chain-of-custody?	Yes		No	7
	b) Were these reporting limits met?	Yes		No	7
6	For each analytical method referenced in this laboratory report package, were results reported for all constituents identified in the method-specific analyte lists presented in the Reasonable Confidence Protocol documents?	Yes	□	No	<u> </u>
7	Are project-specific matrix spikes and laboratory duplicates included in this data set?	Yes	7	No	

Note: For all questions to which the response was "No" (with the exception of question #7), additional information must be provided in an attached narrative. If the answer to question #1, #1A or #1B is "No", the data package does not meet the requirements for "Reasonable Confidence".

I, the undersigned, attest under pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete.

Authorized

Maney +. Cole Signature:

Position: Lab Director

Printed Name: Nancy F. Cole Date: 6/13/2018

Mid-Atlantic Laboratory

Internal Sample Tracking Chronicle

Ensafe, Inc

Job No:

JC67399

South Fire, CT

Sample Number	Method	Analyzed	Ву	Prepped	Ву	Test Codes
	Collected: 05-JUN-18 (NDOW CAULK	08:00 By: TM	Receiv	ved: 05-JUN-	18 By:	RL
	SW846 8082A SW846 8082A	12-JUN-18 18:36 13-JUN-18 12:34		12-JUN-18 12-JUN-18		P8082SOXHLETRCP P8082SOXHLETRCP
	Collected: 05-JUN-18 (L COMP #1	09:00 By: TM	Receiv	ved: 05-JUN-	18 By:	RL
JC67399-2	SW846 6010C	08-JUN-18 21:46	ND	08-JUN-18	СН	EPB

QC Evaluation: CT RCP Limits Job Number: JC67399

Job Number: JC67399
Account: Ensafe, Inc
Project: South Fire, CT
Collected: 06/05/18

Type Type	QC Sample ID	CAS#	Analyte	Sample Result Result Type Type	Units Limits
-----------	--------------	------	---------	--------------------------------	---------------------

07/10/	G*******						
OP12686	SW846 8082A	A					
OD12606 DC1	12674 11 2	A1 1016	DCD	DEC	138 ^a	0/	10 140
OP12686-BS1	12674-11-2	Arcelor 1360	BSP	REC REC	138 ^a	%	40-140
OP12686-BS1	11096-82-5	Aroclor 1260	BSP			%	40-140
OP12686-BS1	877-09-8	Tetrachloro-m-xylene (sig#1)	BSP	SURR	111	%	30-150
OP12686-BS1	877-09-8	Tetrachloro-m-xylene (sig#2)	BSP	SURR	136	%	30-150
OP12686-BS1	2051-24-3	Decachlorobiphenyl (sig#1)	BSP	SURR	132	%	30-150
OP12686-BS1	2051-24-3	Decachlorobiphenyl (sig#2)	BSP	SURR	133	%	30-150
OP12686-BSD	12674-11-2	Aroclor 1016	BSD	REC	127	%	40-140
OP12686-BSD	12674-11-2	Aroclor 1016	BSD	RPD	8	%	30
OP12686-BSD	11104-28-2	Aroclor 1221	BSD	RPD	0	%	30
OP12686-BSD	11141-16-5	Aroclor 1232	BSD	RPD	0	%	30
OP12686-BSD	53469-21-9	Aroclor 1242	BSD	RPD	0	%	30
OP12686-BSD	12672-29-6	Aroclor 1248	BSD	RPD	0	%	30
OP12686-BSD	11097-69-1	Aroclor 1254	BSD	RPD	0	%	30
OP12686-BSD	11096-82-5	Aroclor 1260	BSD	REC	119 b	%	40-140
OP12686-BSD	11096-82-5	Aroclor 1260	BSD	RPD	9 b	%	30
OP12686-BSD	11100-14-4	Aroclor 1268	BSD	RPD	0	%	30
OP12686-BSD	37324-23-5	Aroclor 1262	BSD	RPD	0	%	30
OP12686-BSD	877-09-8	Tetrachloro-m-xylene (sig#1)	BSD	SURR	96	%	30-150
OP12686-BSD	877-09-8	Tetrachloro-m-xylene (sig#2)	BSD	SURR	109	%	30-150
OP12686-BSD	2051-24-3	Decachlorobiphenyl (sig#1)	BSD	SURR	138	%	30-150
OP12686-BSD	2051-24-3	Decachlorobiphenyl (sig#2)	BSD	SURR	119	%	30-150
OP12686-MS	12674-11-2	Aroclor 1016	MS	REC	139	%	40-140
OP12686-MS	11096-82-5	Aroclor 1260	MS	REC	409 c	%	40-140
OP12686-MS	877-09-8	Tetrachloro-m-xylene (sig#1)	MS	SURR	99	%	30-150
OP12686-MS	877-09-8	Tetrachloro-m-xylene (sig#2)	MS	SURR	88	%	30-150
OP12686-MS	2051-24-3	Decachlorobiphenyl (sig#1)	MS	SURR	112	%	30-150
OP12686-MS	2051-24-3	Decachlorobiphenyl (sig#2)	MS	SURR	102	%	30-150
OP12686-MSD	12674-11-2	Aroclor 1016	MSD	REC	111	%	40-140
OP12686-MSD	12674-11-2	Aroclor 1016	MSD	RPD	23	%	50
OP12686-MSD	11104-28-2	Aroclor 1221	MSD	RPD	0	%	50
OP12686-MSD	11141-16-5	Aroclor 1232	MSD	RPD	0	%	50
OP12686-MSD	53469-21-9	Aroclor 1242	MSD	RPD	0	%	50
OP12686-MSD	12672-29-6	Aroclor 1248	MSD	RPD	0	%	50
OP12686-MSD	11097-69-1	Aroclor 1254	MSD	RPD	68 ^d	%	50
OP12686-MSD	11096-82-5	Aroclor 1260	MSD	REC	251 ^c	%	40-140
OP12686-MSD	11096-82-5	Aroclor 1260	MSD	RPD	48 ^d	%	50
OP12686-MSD	11100-14-4	Aroclor 1268	MSD	RPD	0	%	50
OP12686-MSD	37324-23-5	Aroclor 1262	MSD	RPD	0	%	50
OP12686-MSD	877-09-8	Tetrachloro-m-xylene (sig#1)	MSD	SURR	80	%	30-150
OP12686-MSD	877-09-8	Tetrachloro-m-xylene (sig#2)	MSD	SURR	82	%	30-150
OP12686-MSD	2051-24-3	Decachlorobiphenyl (sig#1)	MSD	SURR	138	%	30-150
OP12686-MSD	2051-24-3	Decachlorobiphenyl (sig#2)	MSD	SURR	89	%	30-150
01 12000 MDD	2031 21 3	2 concinor conpilority (618112)	1,101	SCILIC	37	, 5	50 150

^{*} Sample used for QC is not from job JC67399

QC Evaluation: CT RCP Limits

Job Number: JC67399
Account: Ensafe, Inc
Project: South Fire, CT
Collected: 06/05/18

QC Sample ID	CAS#	Analyte	Sample Type	Result Type	Result	Unit	ts Limits
OP12686-MB1	877-09-8	Tetrachloro-m-xylene (sig#1)	MB	SURR	108	%	30-150
OP12686-MB1	877-09-8	Tetrachloro-m-xylene (sig#2)	MB	SURR	135	%	30-150
OP12686-MB1	2051-24-3	Decachlorobiphenyl (sig#1)	MB	SURR	122	%	30-150
OP12686-MB1	2051-24-3	Decachlorobiphenyl (sig#2)	MB	SURR	132	%	30-150
JC67399-1	877-09-8	Tetrachloro-m-xylene (sig#1)	SAMP	SURR	93	%	30-150
JC67399-1	877-09-8	Tetrachloro-m-xylene (sig#1)	SAMP	SURR	115	%	30-150
JC67399-1	877-09-8	Tetrachloro-m-xylene (sig#2)	SAMP	SURR	100	%	30-150
JC67399-1	877-09-8	Tetrachloro-m-xylene (sig#2)	SAMP	SURR	89	%	30-150
JC67399-1	2051-24-3	Decachlorobiphenyl (sig#1)	SAMP	SURR	119	%	30-150
JC67399-1	2051-24-3	Decachlorobiphenyl (sig#1)	SAMP	SURR	129	%	30-150
JC67399-1	2051-24-3	Decachlorobiphenyl (sig#2)	SAMP	SURR	102	%	30-150
JC67399-1	2051-24-3	Decachlorobiphenyl (sig#2)	SAMP	SURR	130	%	30-150

⁽a) Reported from 2nd signal, 1st signal used for confirmation.

⁽b) Reported from the 1st signal. The %D of the CCV on the 2nd signal exceeds the method criteria of 20%, so it being used for confirmation only.

⁽c) Outside control limits due to presence of other Aroclor pattern.

⁽d) Outside control limits due to matrix interference.

^{*} Sample used for QC is not from job JC67399



GC/LC Semi-volatiles

Dayton, NJ

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries
- Surrogate Recovery Summaries

Page 1 of 1

Method: SW846 8082A

Method Blank Summary Job Number: JC67399

ENSCTN Ensafe, Inc Account: **Project:** South Fire, CT

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP12686-MB1	5G79383.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886

The QC reported here applies to the following samples:

JC67399-1

CAS No.	Compound	Result	RL	Units Q
12674-11-2	Aroclor 1016	ND	50	ug/kg
11104-28-2	Aroclor 1221	ND	50	ug/kg
11141-16-5	Aroclor 1232	ND	50	ug/kg
53469-21-9	Aroclor 1242	ND	50	ug/kg
12672-29-6	Aroclor 1248	ND	50	ug/kg
11097-69-1	Aroclor 1254	ND	50	ug/kg
11096-82-5	Aroclor 1260	ND	50	ug/kg
11100-14-4	Aroclor 1268	ND	50	ug/kg
37324-23-5	Aroclor 1262	ND	50	ug/kg

CAS No.	Surrogate Recoveries		Limits
877-09-8	Tetrachloro-m-xylene	108%	24-152%
877-09-8	Tetrachloro-m-xylene	135%	24-152%
2051-24-3	Decachlorobiphenyl	122%	10-166%
2051-24-3	Decachlorobiphenyl	132%	10-166%

6.2.

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Method: SW846 8082A

Blank Spike/Blank Spike Duplicate Summary

Job Number: JC67399

Account: ENSCTN Ensafe, Inc **Project:** South Fire, CT

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP12686-BS1	5G79384.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886
OP12686-BSD	5G79385.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886

The QC reported here applies to the following samples:

JC67399-1

CAS No. Con	npound	Spike ug/kg	BSP ug/kg	BSP %	BSD ug/kg	BSD %	RPD	Limits Rec/RPD
12674-11-2 Aro	olon 1016	200	276	138 a	254	127	8	61-146/30
11104-28-2 Aro		200	ND	136 -	ND	127	nc	70-130/30
11141-16-5 Aro			ND		ND		nc	70-130/30
53469-21-9 Aroo	clor 1242		ND		ND		nc	70-130/30
12672-29-6 Aroc	clor 1248		ND		ND		nc	70-130/30
11097-69-1 Aro	clor 1254		ND		ND		nc	70-130/30
11096-82-5 Aroc	clor 1260	200	259	130 b	237	119 ^b	9 b	62-148/30
11100-14-4 Aroc	clor 1268		ND		ND		nc	-/30
37324-23-5 Aroc	clor 1262		ND		ND		nc	-/30

CAS No.	Surrogate Recoveries	BSP	BSD	Limits
	Tetrachloro-m-xylene	111%	96%	24-152%
	Tetrachloro-m-xylene	136%	109%	24-152%
	Decachlorobiphenyl	132%	138%	10-166%
	Decachlorobiphenyl	133%	119%	10-166%

⁽a) Reported from 2nd signal, 1st signal used for confirmation.

⁽b) Reported from the 1st signal. The %D of the CCV on the 2nd signal exceeds the method criteria of 20%, so it being used for confirmation only.

^{* =} Outside of Control Limits.

6.3.1

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Method: SW846 8082A

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: JC67399

Account: ENSCTN Ensafe, Inc Project: South Fire, CT

Sample	File ID	DF	Analyzed	Ву	Prep Date	Prep Batch	Analytical Batch
OP12686-MS	5G79387.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886
OP12686-MSD	5G79388.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886
JC67399-1	5G79386.D	1	06/12/18	TR	06/12/18	OP12686	G5G1886
JC67399-1	5G79407.D	5	06/13/18	TR	06/12/18	OP12686	G5G1887

The QC reported here applies to the following samples:

JC67399-1

CAS No.	Compound	JC67399-1 ug/kg Q	Spike ug/kg	MS ug/kg	MS %	Spike ug/kg	MSD ug/kg	MSD %	RPD	Limits Rec/RPD
12674-11-2	Aroclor 1016	ND	741	1030	139	741	820	111	23	24-178/46
11104-28-2	Aroclor 1221	ND		ND			ND		nc	70-130/50
11141-16-5	Aroclor 1232	ND		ND			ND		nc	70-130/50
53469-21-9	Aroclor 1242	ND		ND			ND		nc	70-130/50
12672-29-6	Aroclor 1248	ND		ND			ND		nc	70-130/50
11097-69-1	Aroclor 1254	20400 b		88600			43400		68* a	70-130/50
11096-82-5	Aroclor 1260	ND	741	3030	409* c	741	1860	251* c	48* a	15-185/45
11100-14-4	Aroclor 1268	ND		ND			ND		nc	-/50
37324-23-5	Aroclor 1262	ND		ND			ND		nc	-/50

CAS No.	Surrogate Recoveries	MS	MSD	JC67399-1	JC67399-1	Limits
877-09-8	Tetrachloro-m-xylene	99%	80%	93%	115%	24-152%
877-09-8	Tetrachloro-m-xylene	88%	82%	89%	100%	24-152%
2051-24-3	Decachlorobiphenyl	112%	138%	119%	129%	10-166%
2051-24-3	Decachlorobiphenyl	102%	89%	102%	130%	10-166%

⁽a) Outside control limits due to matrix interference.

⁽b) Result is from Run #2.

⁽c) Outside control limits due to presence of other Aroclor pattern.

^{* =} Outside of Control Limits.

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Surrogate Recovery Summary

Job Number: JC67399

Account: ENSCTN Ensafe, Inc **Project:** South Fire, CT

Method: SW846 8082A Matrix: SO

Samples and QC shown here apply to the above method

Lab Sample ID	Lab File ID	S1 ^a	S1 b	S2 ^a	S2 b
JC67399-1	5G79386.D	93	89	119	102
JC67399-1	5G79407.D	115	100	129	130
OP12686-BS1	5G79384.D	111	136	132	133
OP12686-BSD	5G79385.D	96	109	138	119
OP12686-MB1	5G79383.D	108	135	122	132
OP12686-MS	5G79387.D	99	88	112	102
OP12686-MSD	5G79388.D	80	82	138	89

Surrogate Recovery Compounds Limits

S1 = Tetrachloro-m-xylene 24-152% S2 = Decachlorobiphenyl 10-166%

(a) Recovery from GC signal #1

(b) Recovery from GC signal #2



Metals Analysis

Dayton, NJ

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY Part 2 - Method Blanks

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

QC Batch ID: MP7561 Matrix Type: LEACHATE Methods: SW846 6010C

Units: mg/l

Prep Date:

06/08/18

TIEP Date.					00/00/10
Metal	RL	IDL	MDL	MB raw	final
Aluminum	1.0	.095	.17		
Antimony	0.50	.012	.022		
Arsenic	0.50	.006	.014		
Barium	1.0	.003	.0063		
Beryllium	0.025	.001	.002		
Bismuth	0.10	.016	.025		
Boron	0.50	.0075	.067		
Cadmium	0.025	.002	.0035		
Calcium	10	.028	.14		
Chromium	0.050	.0035	.0043		
Cobalt	0.25	.002	.0036		
Copper	0.050	.0055	.016		
Iron	0.50	.018	.16		
Lead	0.50	.011	.013	0.00030	<0.50
Lithium	0.25	.017	.076		
Magnesium	10	.12	.32		
Manganese	0.075	.0007	.0021		
Molybdenum	0.10	.002	.007		
Nickel	0.050	.0025	.0067		
Potassium	10	.3	1.2		
Selenium	0.50	.019	.033		
Silicon	1.0	.009	.22		
Silver	0.050	.0035	.016		
Strontium	0.050	.001	.0015		
Sulfur	0.25	.016	.075		
Thallium	0.50	.009	.0082		
Tin	0.050	.0045	.012		
Titanium	0.050	.0035	.0092		
Tungsten	0.25	.011	.071		
Vanadium	0.25	.004	.0064		
Zinc	0.10	.001	.002		
Zirconium	0.050	.0015	.01		

Associated samples MP7561: JC67399-2

BLANK RESULTS SUMMARY Part 2 - Method Blanks

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

06/08/18

QC Batch ID: MP7561 Methods: SW846 6010C

Matrix Type: LEACHATE Units: mg/l

MB IDL MDL Metal RL raw final

Results < IDL are shown as zero for calculation purposes (*) Outside of QC limits (anr) Analyte not requested

Prep Date:

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

QC Batch ID: MP7561 Methods: SW846 6010C Matrix Type: LEACHATE Units: $\mbox{mg/l}$

Prep Date: 06/08/18

Trop bace.	DGE		00700710	
Metal	BSP Result	Spikelot MPSPK2	% Rec	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Bismuth				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper				
Iron				
Lead	2.0	2.0	100.0	80-120
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium	anr			
Silicon				
Silver	anr			
Strontium				
Sulfur				
Thallium				
Tin				
Titanium				
Tungsten				
Vanadium				
Zinc				
Zirconium				

Associated samples MP7561: JC67399-2

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

QC Batch ID: MP7561 Methods: SW846 6010C

Matrix Type: LEACHATE Units: mg/l

Prep Date: 06/08/18

Results < IDL are shown as zero for calculation purposes (*) Outside of QC limits

(*) Outside of QC limits (anr) Analyte not requested

SERIAL DILUTION RESULTS SUMMARY

Login Number: JC67399 Account: ENSCTN - Ensafe, Inc Project: South Fire, CT

QC Batch ID: MP7561 Matrix Type: LEACHATE Methods: SW846 6010C

Units: ug/l

06/08/18 Prep Date:

Metal	JC67308- Original	-1A l SDL 5:25	%DIF	QC Limits
Aluminum				
Antimony				
Arsenic	anr			
Barium	anr			
Beryllium				
Bismuth				
Boron				
Cadmium	anr			
Calcium				
Chromium	anr			
Cobalt				
Copper				
Iron				
Lead	14.0	0.00	100.0(a)	0-10
Lithium				
Magnesium				
Manganese				
Molybdenum				
Nickel				
Potassium				
Selenium	anr			
Silicon				
Silver	anr			
Sodium				
Strontium				
Sulfur				
Thallium				
Tin				
Titanium				
Tungsten				
Vanadium				
Zinc				
Zirconium				

Page 1

SERIAL DILUTION RESULTS SUMMARY

Login Number: JC67399
Account: ENSCTN - Ensafe, Inc
Project: South Fire, CT

QC Batch ID: MP7561 Methods: SW846 6010C

Matrix Type: LEACHATE Units: ug/l

Prep Date: 06/08/18

JC67308-1A QC Metal Original SDL 5:25 %DIF Limits

Associated samples MP7561: JC67399-2

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

(a) Percent difference acceptable due to low initial sample $\,$ concentration (< 50 times IDL).

Attachment C
Building Materials Sample Summary



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
01A	Brown Carpet	N	Dormitory	Over Sample 02A	
01B	Brown Carpet	N	Dormitory	Over Sample 02B	
01C	Brown Carpet	N	Dormitory	Over Sample 02C	
02A	Yellow Flooring Mastic	N	Dormitory	Under sample 1A	
02B	Yellow Flooring Mastic	N	Dormitory	Under Sample 1B	
02C	Yellow Flooring Mastic	N	Dormitory	Under Sample 1C	
03A	Beige Floor Tile	N	Dormitory	Under Sample 2A	
03B	Beige Floor Tile	N	Dormitory	Under Sample 2B	
03C	Beige Floor Tile	N	Dormitory	Under Sample 2C	
04A	Black Mastic	N	Dormitory	Under Sample 3A	
04B	Black Mastic	N	Dormitory	Under Sample 3B	
04C	Black Mastic	N	Dormitory	Under Sample 3C	
05A	White 2' x 2' Ceiling Tile	Y	Dormitory		
05B	White 2' x 2' Ceiling Tile	Y	Dormitory		
05C	White 2' x 2' Ceiling Tile	Y	Dormitory		
06A	Pink Loose Fiberglass Type Insulation	N	Dormitory	Ceiling	
06B	Pink Loose Fiberglass Type Insulation	N	Dormitory	Ceiling	
06C	Pink Loose Fiberglass Type Insulation	N	Dormitory	Ceiling	
07A	Bright White 2'x2' Ceiling Tile	Y	Dormitory	Replacement	
07B	Bright White 2'x2' Ceiling Tile	Y	Dormitory	Replacement	
07C	Bright White 2'x2' Ceiling Tile	Y	Dormitory	Replacement	
08A	White Cloth Pipe Wrap	N	Dormitory		
08B	White Cloth Pipe Wrap	N	Dormitory		
08C	White Cloth Pipe Wrap	N	Dormitory		
09A	Yellow Fiberglass Type Insulation	N	Dormitory	Ceiling	
09B	Yellow Fiberglass Type Insulation	N	Dormitory	Ceiling	
09C	Yellow Fiberglass Type Insulation	N	Dormitory	Ceiling	
10A	White Cement 2" Elbow Insulation	Y	Dormitory		



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
10B	White Cement 2* Elbow Insulation	Y	Dormitory		
10C	White Cement 2* Elbow Insulation	Y	Dormitory		
11A	White Flexible Caulk	N	Dormitory		Window A
11B	White Flexible Caulk	N	Dormitory		Window B
11C	White Flexible Caulk	N	Dormitory		Window C
12A	Dark grey rubber baseboard	N	Rec Room	Over Sample 13a	
12B	Dark grey rubber baseboard	N	Rec Room	Over Sample 13b	
12C	Dark grey rubber baseboard	N	Rec Room	Over Sample 13c	
13A	Yellow mastic	N	Rec Room	Under Sample 12a	
13B	Yellow mastic	N	Rec Room	Under Sample 12b	
13C	Yellow mastic	N	Rec Room	Under Sample 12c	
14A	Off-white Floor Tile	N	Rec Room	Underneath brown carpet and yellow mastic	
14B	Off-white Floor Tile	N	Rec Room	Underneath brown carpet and yellow mastic	
14C	Off-white Floor Tile	N	Rec Room	Underneath brown carpet and yellow mastic	
15A	Black mastic	N	Rec Room	Under 14A	
15B	Black mastic	N	Rec Room	Under 14B	
15C	Black mastic	N	Rec Room	Under 14C	
16A	Blue Carpet with Yellow Accent	N	North East Office	Over Sample 17A	
16B	Blue Carpet with Yellow Accent	N	North East Office	Over Sample 17B	
16C	Blue Carpet with Yellow Accent	N	North East Office	Over Sample17C	
17A	Yellow mastic	N	North East Office	Under 16A	
17B	Yellow mastic	N	North East Office	Under 16B	
17C	Yellow mastic	N	North East Office	Under 16C	
18A	Black mastic	N	North East Office	Under 17A	
18B	Black mastic	N	North East Office	Under 17B	
18C	Black mastic	N	North East Office	Under 17C	
19A	White 2'x2' Pinhole and chisel Pattern Ceiling Tile	Y	North East Office		Ceiling
19B	White 2'x2' Pinhole and chisel Pattern Ceiling Tile	Y	North East Office		Ceiling



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
19C	White 2'x2' Pinhole and chisel Pattern	N	North East Office		Ceiling
20A	White 2'x2' Pinhole and Worm Pattern - Maroon Backing	Y	North East Office		
20B	White 2'x2' Pinhole and Worm Pattern - Maroon Backing	Y	North East Office		
20C	White 2'x2' Pinhole and Worm Pattern - Maroon Backing	Y	North East Office		
21A	Blue Rubberized Cove Base	N	North East Office	Over Sample 22A	
21B	Blue Rubberized Cove Base	N	North East Office	Over Sample 22B	
21C	Blue Rubberized Cove Base	N	North East Office	Over Sample 22c	
22A	Yellow mustic	N	North East Office	Under sample 21A	
22B	Yellow mastic	N	North East Office	Under sample 21B	
22C	Yellow mastic	N	North East Office	Under sample 21C	
23A	White Flexible Caulk	N	Center - Main Hallway		Around Door Jamb
23B	White Flexible Caulk	N	Center - Main Hallway		Around Door Jamb
23C	White Flexible Caulk	N	Center - Main Hallway		Around Door Jamb
24A	Beige sandy texture gypsum type ceiling tile	Y	Men's Bathroom		
24B	Beige sandy texture gypsum type ceiling tile	Y	Men's Bathroom		
24C	Beige sandy texture gypsum type ceiling tile	Y	Men's Bathroom		
25 A	Concrete Block with Beige Tile Type Surface	Y	Men's Bathroom		
25B	Concrete Block with Beige Tile Type Surface	Y	Men's Bathroom		
25C	Concrete Block with Beige Tile Type Surface	Y	Men's Bathroom		
26A	Beige Rubberized Cove Base	N	Men's Bathroom		
26B	Beige Rubberized Cove Base	N	Men's Bathroom		
26C	Beige Rubberized Cove Base	N	Men's Bathroom		
27A	Yellow mastic	N	Men's Bathroom	Under Sample 26A	
27B	Yellow mastic	N	Men's Bathroom	Under Sample 26B	
27C	Yellow mastic	N	Men's Bathroom	Under Sample 26C	
28A	Off-white I inch ceramic type flooring tile	N	Men's Bathroom		
28B	Off-white I inch ceramic type flooring tile	N	Men's Bathroom		
28C	Off-white I inch ceramic type flooring tile	N	Men's Bathroom		
29A	Brown I inch ceramic type flooring tile	N	Men's Bathroom		
29B	Brown I inch ceramic type flooring tile	N	Men's Bathroom		
29C	Brown I inch ceramic type flooring tile	N	Men's Bathroom		
30A	Grey grout	N	Men's Bathroom		Occurs to the side of tile



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
30B	Grey grout	N	Men's Bathroom		Occurs to the side of tile
30C	Grey grout	N	Men's Bathroom		Occurs to the side of tile
31A	White Paper Tile Backing	N	Men's Bathroom	Occurs Under 28A	
31B	White Paper Tile Backing	N	Men's Bathroom	Occurs Under 28B	
31C	White Paper Tile Backing	N	Men's Bathroom	Occurs Under 28C	
32A	Red carpet	N	North West Office	Occurs over 33A	
32B	Red carpet	N	North West Office	Occurs Over 33B	
32C	Red carpet	N	North West Office	Occurs Over 33C	
33A	Yellow mastic	N	North West Office	Occurs Under 32A	
33B	Yellow mastic	N	North West Office	Occurs Under 32B	
33C	Yellow mastic	N	North West Office	Occurs Under 32C	
34A	Beige flooring tile	N	North West Office	Occurred Under Sample 33A	
34B	Beige flooring tile	N	North West Office	Occurred Under Sample 33B	
34C	Beige flooring tile	N	North West Office	Occurred Under Sample 33C	
35A	Black mastic	N	North West Office	Occurs Under 34A	
35B	Black mastic	N	North West Office	Occurs Under 34B	
35C	Black mastic	N	North West Office	Occurs Under 34C	
36A	Brown rubberized cove base	N	North West Office		
36B	Brown rubberized cove base	N	North West Office		
36C	Brown rubberized cove base	N	North West Office		
37A	Yellow mastic	N	North West Office	Occurs under 36A	
37B	Yellow mastic	N	North West Office	Occurs under 36B	
37C	Yellow mastic	N	North West Office	Occurs under 36C	
38A	Beige Rubberized Cove Base	N	Tax Office		
38B	Beige Rubberized Cove Base	N	Tax Office		
38C	Beige Rubberized Cove Base	N	Tax Office		
39A	Yellow mastic	N	Tax Office	Occurs under 39A	
39B	Yellow mastic	N	Tax Office	Occurs Under 39B	



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
39C	Yellow mastic	N	Tax Office	Under sample 39C	
40A	Red and brown carpet	N	Tax Office		
40B	Red and brown carpet	N	Tax Office		
40C	Red and brown carpet	N	Tax Office		
41A	Beige mastic	N	Tax Office	Occurred below sample 40A	
41B	Beige mastic	N	Tax Office	Occurred below sample 40B	
41C	Beige mastic	N	Tax Office	Occurred below sample 40C	
42A	Black foam type carpet backing	N	Tax Office	Occurred below sample 41A	
42B	Black foam type carpet backing	N	Tax Office	Occurred below sample 41B	
42C	Black foam type carpet backing	N	Tax Office	Occurred below sample 41C	
43A	Yellow mastic	N	Tax Office	Occurred below sample 40A	
43B	Yellow mastic	N	Tax Office	Occurred below sample 40B	
43C	Yellow mastic	N	Tax Office	Occurred below sample 40C	
44A	White sheet rock	Y	Tax Office		Ceiling
44B	White sheet rock	Y	Tax Office		Ceiling
44C	White sheet rock	Y	Tax Office		Ceiling
45A	White Joint Compound	Y	Tax Office		Ceiling
45B	White Joint Compound	Y	Tax Office		Ceiling
45C	White Joint Compound	Y	Tax Office		Ceiling
46A	Compound Tape	N	Tax Office		Ceiling
46B	Compound Tape	N	Tax Office		Ceiling
46C	Compound Tape	N	Tax Office		Ceiling
47A	White 2×2 foot ceiling tile with pin holes and chisel marks	Y	Tax Office Lobby		
47B	White 2×2 foot ceiling tile with pin holes and chisel marks	Y	Tax Office Lobby		
47C	White 2 x 2 foot ceiling tile with pin holes and chisel marks	Y	Tax Office Lobby		
48A	Black adhesive and craft paper	N	Tax Office Lobby		Black adhesive and craft paper over pink fiberglass insulation
48B	Black adhesive and craft paper	N	Tax Office Lobby		Black adhesive and craft paper over pink fiberglass insulation
48C	Black adhesive and craft paper	N	Tax Office Lobby		Black adhesive and craft paper over pink fiberglass insulation



Project #: 0888823246

Date: 05/31/2018

Sampled By: Tim Myjak

Sample #	Description (color and texture)	Friable (Y/N)	Location	Under/Over	Notes
49A	Beige flooring tile	N	Tax Office Lobby	Occurred over sample 50A	
49B	Beige flooring tile	N	Tax Office Lobby	Occurred over sample 50B	
49C	Beige flooring tile	N	Tax Office Lobby	Occurred over sample 50C	
50A	Black mastic		Tax Office Lobby	Occurred Under sample 49	
50B	Black mastic	N	Tax Office Lobby	Occurred Under sample 49	
50C	Black mastic	N	Tax Office Lobby	Occurred Under sample 49	
51A	Olive Green Rubberized Cove Base	N	Tax Office Lobby		
51B	Olive Green Rubberized Cove Base	N	Tax Office Lobby		
51C	Olive Green Rubberized Cove Base	N	Tax Office Lobby		
52A	Yellow mastic	N	Tax Office Lobby	Occurred under 51A	
52B	Yellow mastic	N	Tax Office Lobby	Occurred under 51B	
52C	Yellow mastic	N	Tax Office Lobby	Occurred under 51C	
53A	Blue asphalt type roof shingles with surface aggregate	N	Exterior Roof		
53B	Blue asphalt type roof shingles with surface aggregate	N	Exterior Roof		
53C	Blue asphalt type roof shingles with surface aggregate	N	Exterior Roof		
54A	Black rolled sub roofing with aggregate	N	Exterior Roof	Occurs Under sample 53	
54B	Black rolled sub roofing with aggregate	N	Exterior Roof	Occurs Under sample 53	
54C	Black rolled sub roofing with aggregate	N	Exterior Roof	Occurs Under sample 53	
55A	Black roof tar	N	Exterior Roof		Misc, protrusions and patches
55B	Black roof tar	N	Exterior Roof		Misc. protrusions and patches - Plastic PVC vent pipe
55C	Black roof tar	N	Exterior Roof		Misc. protrusions and patches - Vent duct
56A	Black tar and paper	N	Exterior Roof		White fibers - Under stone
56B	Black tar and paper	N	Exterior Roof		White fibers - Under stone
56c	Black tar and paper	N	Exterior Roof		White fibers - Under stone
57A	Black tar paper	N	Exterior Roof		Under an inch and a half of sand, over wood.
57B	Black tar paper	N	Exterior Roof		
57C	Black tar paper	N	Exterior Roof		