

PROJECT MANUAL

CMHA COBBLESTONE MANOR

**1050 LAMPLIGHTER DRIVE
GROVE CITY, OHIO 43222**

PREPARED FOR:



**COLUMBUS METROPOLITAN
HOUSING AUTHORITY**
COMMUNITY. COMMITMENT. COLLABORATION.

880 EAST 11TH AVENUE
COLUMBUS, OHIO

PREPARED BY:



MOODY•NOLAN

300 SPRUCE STREET, SUITE 300
COLUMBUS, OHIO 43215
614-461-4664

KORDA ENGINEERING
CIVIL ENGINEERS
1650 WATERMARK DRIVE
COLUMBUS, OHIO 43215

JEZERINAC GEERS
STRUCTURAL ENGINEERING
5640 FRANTZ ROAD
DUBLIN, OH 43017

EDGE
LANDSCAPE ARCHITECT
330 W. SPRING STREET
COLUMBUS, OHIO 43215

**ADVANCED ENGINEERING
CONSULTANTS**
MEP/T/FP ENGINEERING
1405 DUBLIN ROAD
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SOL DESIGN
SUSTAINABILITY
501 EAST THIRTEENTH ST
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BLUNDALL ASSOCIATES
COST ESTIMATING
7223 ENGLE ROAD, SUITE 215
FORT WAYNE, IN

VOLUME 1

**PERMIT & BID SET
JUNE 8, 2023**

HUD PROJECT NO.
OHFA PROJECT NO.

PROJECT MOODY NOLAN
ARCHITECT:

SIGNATURE

TITLE

DATE

OWNER/
DEVELOPER: COLUMBUS METROPOLITAN HOUSING AUTHORITY

SIGNATURE

TITLE

DATE

GENERAL
CONTRACTOR:

SIGNATURE

TITLE

DATE

LENDER:

SIGNATURE

TITLE

DATE

BONDING
COMPANY:

SIGNATURE

TITLE

DATE

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SECTION 00 31 32
GEOTECHNICAL INVESTIGATIONS

PART 1 GENERAL

1.01 SOIL BORINGS

- A. Test borings have been made at the site of the improvements. Logs of the test borings are included.
 - 1. A copy of the report is included in this Project Manual.

- B. Logs of the test borings are not warranted by the Owner or the Architect, except that they reflect the best and only information available at the time of design.

END OF SECTION

SECTION 00 43 25A
SUBSTITUTION PROCEDURES

1.01 GENERAL

- A. This Section applies to substitute products and procedures requested by the Bidder to be added during the Bid period.
 - 1. Substitutions included with the Bid that have not been approved under this Section must be listed on the Substitution Sheet included with the Form of Proposal.
 - 2. Provide comparable information as required to enable evaluation of the proposed substitution to the specified performance and materials. It is not the responsibility of the Architect/Engineer to further investigate claims of equivalency. Burden of proof is solely the responsibility of the proposer.
- B. Requirements of this Section are in addition to the requirements of Instructions to Bidders, General Conditions and Supplementary Conditions.
- C. Requirements of this Section are part of the requirements specified in Section 00 43 25B - Substitution Request Form.

1.02 LIMITATIONS ON SUBSTITUTIONS

- A. Substitutions will NOT be considered unless Section 00 43 25B - Substitution Request Form attached in this Project Manual is used and the requirements of this Section and their Substitution Request Form are fully complied with.
 - 1. Other types of forms are NOT acceptable.
- B. Substitutions will NOT be considered when requested directly by subcontractor or supplier.
- C. Architect will determine the acceptability of all substitutions.

1.03 REQUEST FOR SUBSTITUTIONS

- A. Bidder's Representation
 - 1. Request for substitution constitutes a representation that the Bidder has investigated the proposed product and has determined that it is equal to or superior in all respects to the specified product.
 - 2. Request for substitution constitutes a representation that the Bidder will provide same type of warranty for substitution as for specified product.
 - 3. Request for substitution constitutes a representation that the Bidder will coordinate the installation of the accepted substitute, making such changes

as may be required for the Work to be complete in all respects.

4. Request for substitution constitutes a representation that the Bidder waives all claims for additional costs related to substitutions which consequently become apparent.
5. Request for substitution constitutes a representation that the cost data is complete and includes all related cost under his Contract.
6. Request for substitution constitutes a representation that the Bidder has thoroughly investigated the proposed substitute to determine if license fees and royalties are pending on the proposed substitute.

B. Request for substitutions shall be submitted on Section 00 43 25B - Substitution Request Form attached in this Project Manual. Legible copies of this form shall be made as required for Bidder's submittals. Each submittal request form shall be complete with data substantiating compliance of proposed substitution with requirements of Contract Documents including the following information:

1. Project title and Architect's project number.
2. Identification of product specified including specification section and paragraph number.
3. Identification of proposed substitute complete with manufacturer's name and address, trade name of product, model or catalog number and product data.
4. List of fabricator and supplier (with address and phone number) for proposed substitute.
5. The affect of substitution on dimensions, material thickness, wiring, piping, ductwork, etc. indicated in Contract Documents.
6. The affect of substitution on other trades.
7. The affect of substitution on construction schedule.
8. Differences in quality and performance between specified product and proposed product.
9. Comparison of manufacturer's guarantees of specified product and proposed substitute.
10. Availability of maintenance services and replacement materials for proposed substitute.
11. License fees and/or royalties pending on proposed substitute.

1.04 SUBMITTAL PROCEDURES

A. Submit a separate Section 00 43 25B - Substitution Request Form for each substitution.

1. Form shall be completely and properly filled in. If form is incomplete, the Architect reserves the right to reject and return form to Bidder for completion and compliance with this section and Form 00 43 25B.
2. Submit to Architect two copies of the completed and signed form.

B. Requests for substitutions of products will be considered no later than ten (10) days prior to Bid Opening Date to allow time for Architect's evaluation of

substitutions and the preparation of an addendum, if required.

- C. Architect will issue the Addendum to all Bidders to notify them of the Architect's decision to accept the requested substitution.

END OF SECTION

SECTION 00 43 25B

SUBSTITUTION REQUEST FORM

GENERAL: This form is part of the substitution requirements specified in Section 00 43 25A.

PROJECT TITLE & NO. _____

TO:MOODY NOLAN INC.
300 Spruce Street, Suite 300
Columbus, Ohio 43215
Telephone (614) 461-4664 FAX (614) 280-8881
Contact and Email: [\[add contact name and email address\]](#)

ATTN: _____

SPECIFIED ITEM _____
Section _____ Paragraph _____

PROPOSED SUBSTITUTE _____

Attach complete description, catalog, spec data, and laboratory tests if applicable

1. What effect will substitution have on dimensions, gauges, weights, etc. indicated in Contract Documents?

2. What effect will substitution have on wiring, piping, ductwork, etc. indicated in Contract Documents?

3. What effect will substitution have on other trades? _____

4. What effect will substitution have on construction schedule? _____

5. What are the differences in quality and performance between proposed substitute and specified product? _____

6. What are the differences in all sustainable design characteristics and performance between proposed substitute and specified product? _____

7. Manufacturer's guarantees of the specified products and proposed products are:
Same: _____ Different (Explain) _____

8. List (on separate sheet), if applicable, the availability of maintenance services and replacement materials for proposed substitute.
9. List (on separate sheet) names, addresses and phone numbers of fabricators and suppliers for proposed substitutes.
10. There [are ___] [are no ___] license fees and royalties pending on the proposed substitute. (Explain)

11. The undersigned certifies that this substitution meets all requirements of the Contract Documents except as specifically noted herein.

SUBMITTED TO BIDDER BY: (Supplier/Fabricator)

Firm _____

Address _____

Name and Title of Person Signing _____

Signature _____

Telephone No. _____ Date _____

SUBMITTED TO ARCHITECT BY: (Bidder)

Firm _____

Address _____

Name and Title of Person Signing _____

Signature _____

Telephone No. _____ Date _____

FAX No. _____ Email _____

12. ARCHITECT/ENGINEER'S REVIEW COMMENTS:

___ Tentatively Accepted
(pending issuance of
Addendum)

___ Rejected due to
incomplete form.

___ Not Accepted

___ Received Too Late

Signature _____

Date _____

Remarks _____

END OF SECTION

SECTION 01 31 00

PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Administrative and supervisory personnel.
 - 2. Requests for Interpretation (RFIs).
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

1.02 RELATED SECTIONS

- A. Project Meetings: Section 01 31 19.

1.03 DEFINITIONS

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

1.03 COORDINATION

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
- 1 Preparation of Contractor's Construction Schedule.
 - 2 Preparation of the Schedule of Values.
 - 3 Installation and removal of temporary facilities and controls.
 - 4 Delivery and processing of submittals.
 - 5 Progress meetings.
 - 6 Preinstallation conferences.
 - 7 Project closeout activities.
 - 8 Startup and adjustment of systems.
 - 9 Project closeout activities.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.04 SUBMITTALS

- A. Key Personnel Names: 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, and by each temporary telephone. Keep list current at all times.

1.05 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
1. Include special personnel required for coordination of operations with other contractors.

1.06 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI in the form specified.
1. RFIs shall originate with Contractor. RFIs submitted by entities other than Contractor will be returned with no response.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Project name.
 2. Date.
 3. Name of Contractor.
 4. Name of Architect.
 5. RFI number, numbered sequentially.
 6. Specification Section number and title and related paragraphs, as appropriate.
 7. Drawing number and detail references, as appropriate.
 8. Field dimensions and conditions, as appropriate.
 9. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 10. Contractor's signature.
 11. Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. Hard-Copy RFIs: Identify each page of attachments with the RFI number and sequential page number.
- D. Software-Generated RFIs: Software-generated form with substantially the same content as indicated above.
1. Attachments shall be electronic files in Adobe Acrobat PDF format.
- E. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow 15 days for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.

- e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Architect's actions on submittals.
 - g. Incomplete RFIs or RFIs with numerous errors.
2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within 7 days if Contractor disagrees with response.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 31 19
PROJECT MEETINGS

PART 1 GENERAL

1.01 SCOPE

- A. This section specifies administrative and procedural requirements for project meetings including:
 - 1. Pre-Construction Meeting.
 - 2. Progress Meetings.
 - 3. Specially called meetings.

1.02 RELATED SECTIONS

- A. Project Management and Coordination: Section 01 31 00.

1.03 DESCRIPTION

- A. Schedule and administer preconstruction meeting, progress meetings and specially called meetings throughout the progress of the work.
 - 1. Prepare agenda for meetings.
 - 2. Preside at meetings.
 - 3. Record the minutes; include all significant proceedings and decisions.
 - 4. Reproduce and distribute copies of minutes.
 - a. To all participants in the meeting.
 - b. To all parties affected by decisions made at the meeting.
- B. Make physical arrangements for meetings.
- C. Representatives of the Contractors, subcontractors and suppliers attending the meetings shall be qualified and authorized to act on behalf of the entity each represents.

1.04 PRE-CONSTRUCTION MEETING

- A. Scheduled within 15 days after date of Notice to Proceed.
- B. Location: A central site, convenient for all parties, designated by Architect.
- C. Attendance
 - 1. Owner's Representative
 - 2. Architect and Consultants

3. Major Subcontractors
4. Major Suppliers

D. Agenda: Discuss items of significance that could affect progress, including the following:

1. Tentative construction schedule.
3. Critical work sequencing and long-lead items.
4. Designation of key personnel and their duties.
5. Lines of communications.
5. Procedures for processing field decisions and Change Orders.
6. Procedures for RFIs.
7. Procedures for testing and inspecting.
8. Procedures for processing Applications for Payment.
9. Distribution of the Contract Documents.
10. Submittal procedures.
11. Preparation of Record Documents.
12. Use of the premises.
13. Work restrictions.
14. Working hours.
15. Responsibility for temporary facilities and controls.
16. Procedures for moisture and mold control.
17. Procedures for disruptions and shutdowns.
18. Construction waste management and recycling.
19. Parking availability and restrictions.
20. Office, work, and storage areas.
21. Equipment deliveries and priorities.
22. First aid.
23. Security.
24. Progress cleaning.
25. Owner's occupancy requirements.
26. Phasing.

1.05 PROGRESS MEETINGS

- A. Schedule regular periodic meetings, as required.
- B. Hold called meetings as required by progress of work.
- C. Location of the Meetings: Project field office of the General Contractor.
- D. Attendance
 1. Architect and consultants as needed.
 2. Prime Contractors.
 3. Subcontractors as appropriate to the agenda.
 4. Suppliers as appropriate to the agenda.
 5. Owner's Representative

E. Suggested Agenda

1. Review, approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems, conflicts.
4. Problems which impede Construction Schedule.
5. Review of off-site fabrication, delivery schedules.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Schedule.
8. Plan progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Review proposed changes for:
 - a. Effect on Construction Schedule and on completion date.
 - b. Effect on other contracts of the project.
13. Status of RFIs.
14. Status of proposal requests.
15. Pending changes.
16. Status of Change Orders.
17. Pending claims and disputes.
18. Documentation of information for payment requests.

END OF SECTION

SECTION 01 32 16

CONSTRUCTION SCHEDULES

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. These requirements generally describe the form of the construction schedule, a basic description of the schedule contents and the submittal procedures. Refer to General Conditions for additional requirements regarding the Contractor's necessity to maintain the approved construction schedule and the project completion.
- B. Authorization to proceed with the work will not be given until the construction schedule has been approved by the Architect.
- C. General Contractor: Provide a coordinated project construction schedule for the entire work.

1.02 FORM OF SCHEDULES

- A. Prepare schedules in the form of a time-scaled logic diagram, defined as a network logic diagram with connecting lines specifically identifying relationships between all activities of the work using the "Critical Path Method".
 - 1. Diagram may be machine plotted or hand drafted showing the activities duration time-scaled to the appropriate calendar in an easily readable format as approved by Architect. Base schedule on the early start early finish dates of the activities. All relationships between activities must be clearly noted including associated lag times, if required. The diagram must also have the critical path (the series of activities with the least value of total float) clearly marked. In addition, the Contractor must provide a tabular report indicating the early start, early finish, late start, late finish, and total float for every activity in the schedule.

1.03 CONTENT OF SCHEDULES

- A. Quantity of Activities: Defined by complexity of the project. An adequate number of activities are to be included in the project in order that sufficient detail of the demolition process (and resulting temporary construction) and weekly progress requirements are clearly stated.
- B. Where applicable, progress schedule must also include a shop drawing schedule with the activities "Prepare Shop Drawings", "Architect Review and Approval", and "Fabricate and Deliver to the Jobsite". This sequential series of activities must be assigned to each item on the project which requires a shop drawing or

performance data submittal prior to its installation. The shop drawing schedule shall be tied directly to the progress schedule, but shall be provided to the Architect as a separate time-scaled logic diagram.

1.04 PROGRESS REVISIONS

- A. Update schedule and submit in the above format each month with pay requests. Progress completion shall be defined as the remaining duration of any activity which started on or before the schedule update. In addition, revise the duration of all activities as more accurate scheduling information becomes available.
 - 1. Indicate progress of each activity to date of submission.
 - 2. Show changes occurring since previous submission of schedule:
 - a. Major changes in scope.
 - b. Activities modified since previous submission.
 - c. Revised projections of progress and completion.
 - d. Other identifiable changes.
- B. Provide a narrative report as needed to define:
 - 1. Problem areas, anticipated delays, and the schedule.
 - 2. Corrective action recommended, and its effect.

1.05 SUBMITTALS

- A. Submit initial schedules within 15 days after award of Contract.
 - 1. Architect will review schedules and return review copy within 10 days after receipt.
 - 2. If required, resubmit within 7 days after return of review copy.
- B. Submit revised progress schedules with each application for payment.
- C. Submit four opaque copies of initial schedule, large enough to show entire schedule for entire construction period.
 - 1. Submit an electronic copy of schedule, using software indicated, in .pdf format. Include type of schedule (Initial or Updated) and date on label.

1.06 DISTRIBUTION

- A. Distribute copies of the reviewed schedules to:
 - 1. Job site file.
 - 2. Subcontractors.
 - 3. Owner.
 - 4. Architect.
 - 5. Other concerned parties.

END OF SECTION

SECTION 01 33 23

SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.02 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.03 GENERAL REQUIREMENTS

- A. Requirements of this Section are in addition to the requirements of the General Conditions.
- B. This Section includes procedures for processing:
 - 1. Shop drawings.
 - 2. Product data.
 - 3. Samples.
 - 4. Certificates of compliance.
 - 5. Reports.
 - 6. Schedules.
 - 7. Design data.
 - 8. Other submittals listed.
- C. Submittals as approved do not constitute a change order.
- D. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

- a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- E. Submittals Schedule: See Section 01 32 16, Construction Schedules, for list of submittals and time requirements for scheduled performance of related construction activities.
1. Submittals received prior to receipt of the initial Submittals Schedule will be rejected.
 2. Submittals received prior to the time they are indicated on the Submittal Schedule to be submitted will be rejected.
- F. Make all submittals far enough in advance of scheduled dates for installation to provide sufficient time for reviews, for securing necessary approvals, for possible revisions and resubmittals, and for placing orders and securing delivery.
1. Delays caused by the tardiness of the Contractor in preparing and forwarding submittals will not be an acceptable basis for an extension of the Contract completion date or for consideration of alternate products which do not meet the specified requirements of this Project Manual.
 2. Initial Review: Allow 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 3. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 4. Resubmittal Review: Allow 14 days for review of each resubmittal.
 5. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is necessary, allow 14 days for initial review of each submittal.
 6. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 14 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- G. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.

- e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Submittal number or other unique identifier, including revision identifier.
 - 1) Submittal number shall use Specification Section number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Location(s) where product is to be installed, as appropriate.
 - l. Other necessary identification.
- H. Notify Architect in writing at time of submittal of deviations from the requirements of the Contract Documents. In addition, highlight, encircle, or otherwise specifically identify deviations.
- I. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will return submittals, without review, received from sources other than Contractor.
- 1. Transmittal Form: Provide locations on form for the following information:
 - a. Project name.
 - b. Date.
 - c. Destination (To:).
 - d. Source (From:).
 - e. Names of subcontractor, manufacturer, and supplier.
 - f. Category and type of submittal.
 - g. Submittal purpose and description.
 - h. Specification Section number and title.
 - i. Drawing number and detail references, as appropriate.
 - j. Submittal and transmittal distribution record.
 - k. Remarks.
 - l. Signature of transmitter.
 - 2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- J. Resubmittals: When Architect requires that a submittal be resubmitted, comply with requirements of this section.
- 1. Identify changes made since the previous submittal.
- K. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

- L. Electronic Files: At Contractor's written request, copies of Architect's electronic files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
 - 1. Execute Electronic File Transfer Agreement provided by the Architect to obtain files.
 - 2. The electronic files are provided for the Contractor's convenience and their use will be at the Contractors risk.
 - a. There are no assurances that the information in the electronic files is current. All dimensions must be field-verified.

1.04 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- B. Product Data
 - 1. Submit only pages which are pertinent.
 - a. Mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number.
 - b. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
 - 2. Modify manufacturer's standard schematic drawings and diagrams to supplement standard information and to provide information specifically applicable to the work. Delete information not applicable.
 - 3. Stamp and sign each set of manufacturer's product data before submitting to Architect to certify compliance with Contract Documents.
 - 4. Number of Copies Required: Submit two paper copies of Product Data, and in portable data file (.pdf) format, unless otherwise indicated. When submitting for Concurrent Consultant Review, submit two copies to Consultant and one copy to Architect. Architect will return one copy. Mark up and retain returned copy as a Project Record Document.
 - a. Reproduction and cost of reproduction of processed Product Data for distribution to concerned parties is Contractor's responsibility.
- C. Shop Drawings
 - 1. Reproduction of any portion of the Contract Documents for use as submittals for Shop Drawings is not acceptable.
 - 2. Submit Shop Drawings in a clear and thorough manner.
 - a. Title each drawing with Project name.
 - b. Identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.
 - 3. Identify the following:
 - a. Requirements of the individual section of Project Manual.
 - b. Field measurements.

- c. Field construction criteria.
 - d. Relation to adjacent or critical features of the Work or products.
 - e. Conformance of submittal with requirements of Contract Documents.
 4. Each sheet of Shop Drawings shall be stamped and signed by Contractor before submitting to Architect. Certify compliance with requirements of Contract Documents.
 5. Review by the Architect shall not relieve Contractor from his responsibility in preparing and submitting proper Shop Drawings in accordance with his current obligations.
 6. All submissions which, in the opinion of the Architect are incomplete, contain errors or have not been checked or only superficially checked, will be returned unchecked by the Architect for resubmission.
 7. Fabrication of products or start of work before required Shop Drawings are approved by Architect and returned to Contractor shall be at Contractor's risk.
 8. Number of Copies Required: Submit two paper copies of each submittal, and in portable data file (.pdf) format, unless indicated otherwise. When submitting for Concurrent Consultant Review, submit two copies to Consultant and one copy to Architect. Architect will return one copy. Mark up and retain one returned copy as a Project Record Drawing.
 - a. Reproduction and cost of reproduction of processed Shop Drawings for distribution to concerned parties is Contractor's responsibility.
 - b. This procedure is to be followed for each submission of a drawing or group of drawings until they are finally approved by the Architect.
- D. Office Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of appropriate Specification Section.
 3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

4. Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples Required: Submit two sets of Samples. Architect will retain one Sample set; the other will be returned.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least two sets of paired units that show approximate limits of variations.

E. Mock-Up Samples: Where samples are specified in the individual specification sections for use in constructing mock-ups, comply with requirements for "Office Samples", and process transmittal forms for mock-ups to provide a record of activity.

F. Submittals Schedule: See Section 01 32 16, Construction Schedules.

G. Schedule of Values and Application for Payment: See Section 01 29 00, Payment Procedures.

1.05 INFORMATIONAL SUBMITTALS

A. General: Prepare and submit Informational Submittals required by other Specification Sections.

1. Number of Copies: Submit one copy of each submittal, unless otherwise indicated. Architect will not return copy.
2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
3. Test and Inspection Reports: See Section 01 45 29, Testing Laboratory services.

B. Coordination Drawings: See Section 01 31 21, Coordination Drawings.

- C. Contractor's Construction Schedule: See Section 01 32 16, Construction Schedules.
- D. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- E. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- F. Installer Certificates: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- G. Manufacturer Certificates: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- H. Product Certificates: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- I. Material Certificates: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- J. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- K. Product Test Reports: Prepare written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- L. Research/Evaluation Reports: Prepare written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.

- M. Preconstruction Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- N. Compatibility Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- O. Field Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- P. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. See Section 01 78 23, Operation and Maintenance Data.
- Q. Design Data: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.
- R. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
 - 1. Preparation of substrates.
 - 2. Required substrate tolerances.
 - 3. Sequence of installation or erection.
 - 4. Required installation tolerances.
 - 5. Required adjustments.
 - 6. Recommendations for cleaning and protection.
- S. Manufacturer's Field Reports: Prepare written information documenting factory authorized service representative's tests and inspections. Include the following, as applicable:
 - 1. Name, address, and telephone number of factory-authorized service representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Statement that products at Project site comply with requirements.

4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement whether conditions, products, and installation will affect warranty.
 7. Other required items indicated in individual Specification Sections.
- T. Insurance Certificates and Bonds: Prepare written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- U. Material Safety Data Sheets (MSDSs): Submit information directly to Owner; do not submit to Architect, except as required in "Action Submittals" Article. Retain copies at jobsite.

1.06 DELEGATED DESIGN

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

PART 2 PRODUCTS

Not Applicable

PART 3 EXECUTION

3.01 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

3.02 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Reference the General Conditions for Architect's review responsibilities. Approval of a specific item does not indicate approval of an assembly of which the item is a component. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
 - 1. REVIEWED
 - 2. APPROVED
 - 3. APPROVED AS CORRECTED
 - 4. REVISE AND RESUBMIT
 - 4. REJECTED.
- C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 PROJECT CONDITIONS

- A. This Section is not intended to limit types and amounts of temporary construction facilities and controls required. Omission from this Section will not be accepted as an application that such temporary activity is not required for successful completion of the work and compliance with requirements of the Contract Documents.
- B. Provide and maintain each temporary construction facility and control when required for proper performance of the work. Terminate and remove when no longer needed or when permanent facilities, with proper authorization, are available for use.
- C. Obtain and pay for all required applications, fees, permits and inspections required for temporary construction facilities and controls.
- D. Install, operate, maintain and protect temporary construction facilities and controls in a manner and at locations which are safe, non-hazardous, sanitary and adequately protect project work, workmen and the public.

1.02 COST OF CONSUMED UTILITIES

- A. Water Service Use Charges: Water consumed during construction is to be metered. Cost of water consumed during construction will be paid for by the Contractor.
- B. Electric Power Service Use Charge: Cost of electric power consumed during construction is to be metered. Cost of electric power consumed during construction will be paid for by the General Contractor.
- C. Sewer Service Use Charges: The cost of providing portable toilets will be paid by the General Contractor. Where existing building toilet facilities are used, there will be no charge for sewer usage by all entities authorized to be at or to perform work at the project site.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

- A. Provide and maintain all temporary facilities in compliance with governing rules, regulations, codes, ordinances and laws of agencies and utility companies having jurisdiction over work involved in project.
- B. Be responsible for all temporary work provided, and obtain any necessary permits

and inspections for such work.

- C. Contractors shall confine equipment, storage of materials, and operation of workmen to the limits indicated or directed and shall abide by law, ordinances, conditions stated in permits and directions of the Architect.
- D. Do not interfere with normal use of roads in vicinity of project site except as indicated or as absolutely necessary to execute required work, and then only after proper arrangements have been made with authorities having jurisdiction, including traffic control as applicable.

1.04 SPECIAL PRECAUTIONS AND REQUIREMENTS

- A. Do not interfere with normal use of occupied areas in existing buildings, existing driveway access to existing building and existing building utility services, except as absolutely necessary to execute required work involving such facilities, and then only after proper arrangements have been made through the Owner with persons in charge of existing facilities.
- B. Do not block required exits from existing buildings.

1.05 TEMPORARY FIELD OFFICES, TRAILERS AND TELEPHONE

- A. General: Provide and maintain clean field office area for his use, his Subcontractor's Agents and the Architect, at which location he/she or his/her authorized agent shall be present, or to which either may be readily called at all times while the work is in progress. Located where directed by the Architect.
- B. Copies of permits, approved shop drawings, plans and specifications marked up-to-date with all revisions and all addenda shall be kept at said offices areas ready for use at all times.
- C. All expenses in connection with Contractor's field offices, including the installation cost and use of telephones, shall be borne by the Contractor.
- D. Maintain field office areas until final acceptance and then remove, unless the Architect orders or approves earlier removal.
- E. Pay all costs, including utility installation costs to the field office.
- F. Provide and maintain such additional storage trailers on the project as required. Located where directed by the Architect.
- G. Provide and maintain such additional storage trailers on the project as required. These shall be located where directed.
- H. Contractor may be required to relocate their offices, as directed by Architect, during construction as work progresses.

1.06 TEMPORARY SANITARY FACILITIES

- A. Provide temporary portable toilets, acceptable to public health authorities, as required to service the project. Maintain in a clean, sanitary condition. Locate as directed by Architect.

1.07 TEMPORARY WATER SERVICE

- A. General: Water is available from water main indicated on site drawings.

1.08 TEMPORARY HEAT AND VENTILATION

- A. Prior to permanent enclosure of the structure, provide temporary heat as necessary to complete the work.
 - 1. Provide weather protection as required to carry on work during inclement weather and to protect work and materials from damage by weather.
 - 2. Protection of work includes covering, temporary enclosures, heating materials and work under construction and for providing suitable working conditions.
 - 3. Furnish temporary heat by Owner approved types of units or equipment which is safe, will not affect surrounding areas of Contract Work and is properly supervised while in use.
- B. "Permanently enclosed" shall mean that permanent walls and roofs are in place and weather tight, windows are in place and glazed and all entrance enclosures are either permanently in place or provided with suitable temporary enclosures.
 - 1. Polyethylene sheet is not considered a suitable temporary enclosure. One-half inch thick plywood tightly fit, sealed and supported and maintained can be considered a temporary enclosure.
- C. After the structure is permanently enclosed, provide, operate and maintain until substantial completion, approved temporary heating, ventilating and humidity control units to maintain that portion of the structure at suitable temperature and humidity conditions to complete the work.
 - 1. Arrange temporary units to bring in sufficient outdoor air to ventilate the structure and to prevent build-up of harmful dusts and fumes and to remove excess moisture. During warm weather, provide an adequate supply of fresh air, when necessary, to properly ventilate moisture, dust, fumes from paints, cements or adhesives in tightly-enclosed areas where natural ventilation will not be sufficient.
 - 2. Provide temporary heating and ventilating to service the project. As a minimum, provide the following:
 - a. During normal working hours, minimum 50° F.
 - b. During placing, setting and curing of concrete, minimum 50° F.
 - c. For 10 days prior to placing interior finish materials and throughout interior finishing, painting, etc., and until final acceptance of work

- and occupancy by Owner, minimum 70° F.
 - d. Supply heat and ventilation in a manner which avoids rapid drying of material but permits material and building to dry so remaining moisture will not affect finish material.
 - e. Operate temporary systems each day, including Saturdays, Sundays and holidays. Include necessary labor and approved operating personnel.
 - f. Supply all fuel required for temporary heating and ventilating, including all material, labor and supervision to connect same.
 - g. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 3. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - a. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
 - 1) Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - 2) Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
 - b. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 - c. Perform daily construction cleanup and final cleanup using approved, HEPA filter-equipped vacuum equipment.
- D. When permanent systems are used for temporary construction use, assume full responsibility for maintaining such equipment during and after use. Included in maintenance are the following:
 - 1. Proper operation and maintenance of the mechanical equipment until acceptance of the project by Owner.
 - 2. Maintenance of temporary filters in all equipment to prevent accumulation of dust and dirt in coils, housings and ductwork.
 - 3. Prior to final inspection; replacement of temporary filters with new filters, thorough cleaning of coils and other equipment, putting entire system into first class condition, cleaning traps and devices, adjustment and removal of any and all materials and equipment not functioning properly.
 - 4. Owner and Architect must be given access to and opportunity to inspect equipment and maintenance procedures at all times. Owner involvement will not relieve the Contractor from the responsibilities specified herein.
- E. Use of permanent heating or cooling and ventilating equipment for temporary construction use shall not effect warranty. Warranty shall take effect at time of

project acceptance by Owner.

- F. Cost of Temporary Heat: Cost of fuel consumed in conjunction with temporary heat or permanent system used for temporary heat shall be paid by the Contractor.
 - 1. Electric resistance type heating units are not permitted.
- G. During periods of extremely low temperatures when water pipes could possibly freeze or when such conditions are forecast, temporary heating must be monitored 24-hours a day, 7 days a week.

1.10 TEMPORARY LIGHT AND POWER

- A. Provide necessary temporary electrical service and temporary wiring and outlets as required to meet project needs for temporary lighting and power at the start of the project, as work progresses and until acceptance by the Owner, excluding power to individual contractor's trailers.
 - 1. Extend temporary service from public utility service. Provide meter and extend service with disconnect to central location on site and to electric panel board location near Contractors' office trailer area. Provide system sized as required to service project construction needs.]
- C. Temporary Lighting: size and layout as required to service the project.

1.11 CONSTRUCTION AIDS

- A. Hoists and Cranes: Erect and maintain adequate hoisting facilities as required for the work.
- B. Shoring and Bracing: Provide all shoring and bracing required for safety and proper execution of their work. Remove these items when the work is completed.
- C. Temporary Partitions and Closures
 - 1. Provide temporary dustproof, security partitions in corridors, door openings and wall openings separating new work from existing building.
 - 2. Provide weatherproof barriers and closures at all exterior openings prior to final doors, windows, louvers or similar type items being installed.
 - 3. Construction methods and materials shall be approved by Architect prior to construction of partition, barrier or closure. However, construction shall be similar to plywood sheathing over wood studs with 6 mil plastic film applied over sheathing sealing all joints. Seal partitions at floor, walls and ceilings (roof).
 - a. Fire-Rated Construction: Where required, provide fire-rated materials to meet rated conditions of existing wall.
 - 4. Provide doors through temporary partitions with self closing devices and locks.

1.12 WEATHER PROTECTION

- A. Protect work and existing or adjacent property against weather, to maintain work, materials, apparatus and fixtures free from injury or damage during the entire construction period. Work likely to be damaged shall be covered or protected at the end of each day's work. Any work damaged by failure to provide protection required, shall be removed and replaced with new work at the Contractor's expense.
- B. Remove all snow and ice as may be required for proper protection and execution of the work and protection and safety of the public.
- C. Winter weather closures and temporary doors at all unclosed openings will be provided by the General Contractor.

1.13 WATCHMAN SERVICE

- A. If Contractors consider watchman services necessary or desirable for protection of their own interest, they may employ such service at their own complete expense.

1.14 SAFETY

- A. Safety requirements shall be in accordance with the General Conditions.
- B. The responsible Contractor shall provide and maintain guard lights at all barricades, railings, obstructions in the roadways or sidewalks and at all trenches or pits adjacent to walks or roadways.
- C. Strict attention and full adherence must be given the Williams - Steiger Occupational Safety and Health Act of 1970, U.S. Department of Labor.

1.15 SECURITY CONDITIONS

- A. Security of building must be maintained during "non-standard" working hours (premium time). This includes, but is not necessarily limited to, verifying all entrance doors and windows are secured.
- B. Contractor shall be responsible for all infractions of rules and regulations by his workers.
- C. Loitering or wandering through the corridors and into rooms not connected with the project or into other buildings on campus will not be permitted.
- D. Erect a 6 foot high fence with gates to enclose construction site.
 - 1. Material: Heavy chain link mesh with steel posts.
 - 2. Location: Around entire perimeter of the site.
 - 3. Provide metal gates, of same fabric as metal fence, where indicated.
 - 4. Maintain fence and gates in working order at all times.
 - 5. Except during working hours, keep gates locked at all times.

1.16 DUST CONTROL

- A. Control dust originating within project limits using water or a dust palliative acceptable to the Architect. When conditions create blowing dust and dirt that is considered higher than that normally encountered, cooperate with Architect in determining methods to help minimize blowing. This may involve, as a minimum, more frequent applications of dust palliative. Calcium chloride may not be used.

1.17 TEMPORARY SIGNS

- A. Temporary Directional Signs: Provide as required to adequately direct traffic and personnel on site.

1.19 STREETS AND TRAFFIC

- A. Cleaning and Repair
 - 1. Remove mud and spillage from public walks, streets and sewers without delay. Failure to clean areas promptly will result in areas being cleaned by the Owner at the Contractor's expense.
 - 2. Damage to roads or other facilities on the grounds, resulting from hauling, storage of materials, or other activities in connection with the work shall be repaired or replaced, at no expense to the Owner, by the Contractor causing the damage. Repairs or replacements shall be made to the satisfaction of the Architect.
- B. Traffic
 - 1. Notify local law enforcement agency at least two weeks in advance of any anticipated work affecting traffic flow.
 - a. To assure maintenance of flow and to safeguard all parties involved in planning to maintain flow, a field inspection should be made jointly by the Architect and Contractor personnel before performing any work which would interrupt normal traffic patterns.

1.20 PARKING

- A. Employees of Contractors and subcontractors must park vehicles in areas assigned to them. Parking on streets or in restricted areas is prohibited.

1.21 CONSTRUCTION LAYOUT AND FIELD ENGINEERING

- A. General
 - 1. Employ a registered surveyor.
 - 2. Be responsible for accuracy of all lines, elevations and measurements of the work.

3. Exercise proper precaution to verify dimensions shown on Drawings before layout of the work.
- B. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- C. General: Surveyor, registered in the State of **Ohio** to lay out the building on the site and to locate and fix all site items such as site improvements and utilities and furnish a certified plat of this work. Work includes:
1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 3. Inform installers of lines and levels to which they must comply.
 4. Check the location, level and plumb, of every major element as the Work progresses.
 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- D. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- E. 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.
- F. 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.
- G. Field Engineering
1. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - a. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the

- need to relocate permanent benchmarks or control points to Architect before proceeding.
- b. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
2. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - a. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - b. 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - c. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
 3. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
 4. Final Property Survey: Surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
 - a. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - b. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

END OF SECTION

SECTION 01 60 00
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements of this Section apply to the Work of all other Sections.
- B. Section Includes:
 - 1. Transportation and Handling.
 - 2. Storage and Protection.
 - 3. Standards.
 - 4. Manufacturers and Types.
 - 5. Fabrications.
 - 6. Shop Priming.
 - 7. Prohibited Materials and Methods.

1.02 RELATED SECTIONS

- A. Quality Requirements: Section 01 40 00.
- B. Cutting and Patching: Section 01 73 29.
- C. Shop Drawings, Product Data and Samples: Section 01 33 23.
- D. Execution Requirements: Section 01 73 00.

1.03 STANDARDS

- A. Standards, codes and regulations published by Manufacturer's Associations, governmental agencies and other regulatory authorities form a part of these Specifications as minimum requirements. Such references include the latest issue and all amendments up to 30 days prior to the Bid Date.
- B. "Governing Authority" means all federal, state and local laws and regulations.
- C. Where differences occur between the Contract Documents and such standards, the most restrictive requirement shall apply.
- D. Supply all materials and perform all work in accordance with the Manufacturer's Specifications and installation procedures, and in conformance with published trade and manufacturer's association standards, unless specifically noted otherwise herein.

1.04 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with construction schedules and installation, coordinate to avoid conflict with work and conditions at the site.
 - 1. Transport products by methods to avoid product damage.
 - 2. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 3. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and accepted submittals, and that products are properly protected and undamaged.
- B. Provide equipment and personnel to handle products by methods to prevent soiling or damage.

1.05 DELIVERY, HANDLING, STORAGE AND PROTECTION

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling
 - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected. Reject damaged and defective items.
- B. Storage products in accordance with manufacturer's instructions.
 - 1. Store products with seals and labels intact and legible.
 - 2. Store products to allow for inspection and measurement of quantity or counting of units.
 - 3. Store products subject to damage by the elements in weathertight enclosures.
 - 4. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

- C. Exterior Storage
 - 1. Store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. Cover products which are subject to deterioration with impervious coverings. Provide adequate ventilation to avoid condensation.
- D. Arrange storage in a manner to provide access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions, and free from damage.
- E. Protection After Installation: Provide coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove when no longer needed.

PART 2 PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

- A. Products include materials, equipment and systems.
- B. Products incorporated into the work:
 - 1. Comply with specifications and referenced standards as minimum requirements.
 - 2. Undamaged.
 - 2. Manufactured and fabricated products:
 - a. Design, fabricate and assemble in accordance with the best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing by the Architect.
 - 4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.
 - 5. New and unused at time of installation, except as otherwise indicated.
 - 6. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - 7. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

2.02 MANUFACTURER AND PRODUCT SELECTION PROCEDURES

- A. Specified Product: Where specifications name a single manufacturer and product or refer to a single manufacturer and product indicated on the drawings, provide the named product. Comparable products or substitutions for Contractor's convenience will not be considered.
- B. Specified Manufacturer: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- C. Multiple Specified Products: Where more than one manufacturer and specific product is listed, provide one of the products named. No substitutions will be permitted after signing the contract. Comparable products or substitutions for Contractor's convenience will not be considered
- D. Multiple Manufacturers: Where specifications include a list of manufacturers names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
- E. Basis of Design: Where specifications name a Basis of Design or refer to a Basis of Design product indicated on the drawings, the design is based on the product listed. Subject to compliance with requirements, provide the specified product or a product manufactured by one of the other manufacturers listed.
 - 1. The characteristics of the Basis-of-Design Product establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.
 - 2. Equipment or materials from these manufacturers will be acceptable contingent upon their meeting the design, appearance and functional standards established by the specified items. If equipment or a material of an acceptable manufacturer requires changes; electrically, mechanically, structurally, from what is indicated on the drawings, it shall be the responsibility of the Contractor requiring such change, to pay all costs involved with no additional costs to the Owner.
 - 3. Submit evaluations as follows:
 - a. Submit proposed comparable products for evaluation by the Architect at least two weeks prior to awarding contract to the manufacturer of a comparable product.
 - b. Obtain samples of Basis-of-Design product.
 - c. Select comparable products that comply with the characteristics specified. Submit evidence demonstrating compliance.
 - d. Submit samples of comparable products displayed side-by-side with samples of Basis-of-Design products.

Architect will determine whether the proposed comparable product is acceptable. Architect is not obligated to prove non-equivalence of proposed comparable products.

- F. Where a performance is specified and no manufacturer is listed, submit through the Shop Drawing procedure the name of the manufacturer, the product proposed, and detailed information showing its characteristics. Such proposal shall meet or exceed the specification, line item by line item, or be rejected.
- G. Equivalent components (articles, devices, materials, forms of construction, fixtures, etc.) may be submitted to the Architect for approval prior to bidding regardless of listed manufacturers.
- H. Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.03 FABRICATION

- A. Fabricate all items in the shop insofar as practicable. Where items cannot be completely shop fabricated and assembled for shipment, assemble and fit in shop, disassemble and ship. Identify parts for field assembly.
- B. Fabricate items to be straight, square, in proper alignment, and with hairline joints where joints are necessary and permitted. Pre-plan field joints to be as inconspicuous as possible; coordinate locations with Architect.

2.04 SHOP PRIMING

- A. Shop prime or seal surfaces of all products to receive paint materials in accordance with the requirements of Section 09 91 00.
- B. Apply a primer or sealer compatible with the specified paint materials.
- C. In the event such a primer is determined to be incompatible with the specified finish paint system, provide a barrier coat or remove the primer and reprime as directed, at no additional cost to the Owner.

2.05 PROHIBITED MATERIALS AND METHODS

- A. The following items are expressly prohibited:
 - 1. Attachment Related Items
 - a. Powder Fasteners: Powder fasteners are defined as anchors which are driven into place by any device which produces an impact force by use of a powder charge, compressed air, gas or any other propellant. Powder fasteners are prohibited.
 - b. Plug anchorage by use of wood, lead or plastic.

- c. Perforated steel strap iron for pipe or other support or anchorage.
- d. Suspension systems that are not independently supported.
 - 1) Ceiling grid systems shall not be supported from ductwork, electrical conduit, heating or plumbing lines, and vice versa.
 - 2) Each utility system and the ceiling system shall be a separate installation, each independently supported from the building structure.
 - 3) Where interference occurs, provide trapeze type hangers or other suitable supports for each system.
 - 4) Locate hangers and supports where they will not interfere with access to mixing boxes, fire dampers, valves, and other appurtenances requiring servicing.
- 2. Methods Related Items
 - a. The penetration of floors and walls by pipes, ducts, or other penetrations unless openings are appropriately fire stopped by fire doors or fire dampers, and voids around pipes, ducts, conduits, etc. are sealed with fireproof materials.
 - b. The use of ink marking pens on surfaces of any kind of materials receiving paint or other finish in exposed location.
- 3. Materials Related Items
 - a. Asbestos or asbestos containing materials.
 - b. Barbed wire in construction fencing.
 - c. Water soluble treatment of insulation jackets or facings, to impede or retard smoke or flames.

PART 3 EXECUTION

Not Applicable

END OF SECTION

SECTION 01 73 00
EXECUTION REQUIREMENTS

PART 1 GENERAL

1.01 SUMMARY

- A. Requirements of this Section apply to the Work of all other Sections.
- B. Section Includes:
 - 1. Examination of Substrate.
 - 2. Preparation.
 - 3. Installation.
 - 4. Workmanship.
 - 5. Protection.
 - 6. Overhead Attachments.
 - 7. Prohibited Methods.

1.02 RELATED SECTIONS

- A. Quality Control: Section 01 45 00.
- B. Cutting and Patching: Section 01 73 29.
- C. Shop Drawings, Product Data and Samples: Section 01 33 23.
- D. Product Requirements: Section 01 60 00.

1.03 STANDARDS

- A. Standards, codes and regulations published by Manufacturer's Associations, governmental agencies and other regulatory authorities form a part of these Specifications as minimum requirements. Such references include the latest issue and all amendments up to 30 days prior to the Bid Date.
- B. "Governing Authority" means all federal, state and local laws and regulations.
- C. Where differences occur between the Contract Documents and such standards, the most restrictive requirement shall apply.
- D. Supply all materials and perform all work in accordance with the Manufacturer's Specifications and installation procedures, and in conformance with published trade and manufacturer's association standards, unless specifically noted otherwise herein.

1.05 NON-CONFORMING WORK

- A. Faulty work or work not in conformance with the Contract Documents will not be permitted by the Architect.
 - 1. It is the responsibility of the Contractor to propose a remedy by means of detailed drawings and written documentation and submit such documentation to the Architect for comments.
 - 2. All costs for the removal and reconstruction of such work, as well as additional services of the Architect, shall be paid for by the Contractor.

PART 2 PRODUCTS - NOT APPLICABLE

PART 3 EXECUTION

3.01 EXAMINATION OF SUBSTRATE

- A. Examine the substrates or structure to which a product is to be applied or installed. Do not proceed until unsatisfactory conditions have been corrected. Starting the work indicates acceptance of conditions and the installer assumes full responsibility for results.
- B. Check the substrate or structure for proper tolerances and clearances. Tolerances are listed under individual specification Sections.

3.02 PREPARATION

- A. Substrate: Where the products are applied to a substrate, prepare the substrate as recommended by the product manufacturer. That generally includes the following:
 - 1. Bringing substrate to a uniform surface by smoothing uneven surfaces and filling holes, cracks and depressions with recommended filler or compatible type material.
 - 2. Depressed Slabs: Bring to required elevation to receive finished materials where finished materials cannot completely fill depression. Use approved cementitious filler or compatible type material. Coordinate depressed slab locations with finish material locations.
 - 3. Remove substances such as dust, oils and other foreign matter, not compatible with the product.
 - 4. Surfaces shall be dry, unless moisture content or wetting requirement is specified or recommended.
- B. Concrete Slabs: Provide steel shot abrasive cleaning of concrete slabs receiving designated finish flooring materials.
 - 1. Designated Finish Flooring Materials
 - a. Cementitious or cementitious set materials.

- b. Sheet flooring materials.
 - c. Waterproofing materials.
 - d. Paint materials.
 - e. Polymer or epoxy type seamless flooring.
2. Equipment: Electric powered portable unit with self-contained dust collection system. Size(s) of unit(s) and shot media suitable for conditions and proposed finish materials. WHEELABRATOR CORP. "Blastrac" or similar type system by SASE COMPANY INC., BW MANUFACTURING or INNOVATECH.
 3. Cleaning: Remove concrete surfaces to sufficient depth to remove bond breakers and contaminants such as curing compounds, oils, and other foreign matter which may be detrimental to the completed flooring installation.
 - a. Work smoothly and evenly over entire surface; avoid creating dips, ridges, or other imperfections which would show or telegraph in the completed installation.
 - b. Small transitions for different flooring materials may be obtained by multiple passes if carefully executed to create smooth even slope of not more than 1/8" in 2 feet.
 4. Clean floor as near as possible to flooring installation to avoid contamination from work of other trades. Protect clean floor from soiling with suitable sheet materials. Reclean soiled areas.

C. Inserts and Anchorages

1. Anchorages where not detailed are the responsibility of the installer to design a suitable connection, structurally sound, and aesthetically acceptable to the Architect. Furnish calculations, drawings and product data when requested by the Architect. Such information may or may not be returned as indicated in Section 01 33 23.
2. It is the responsibility of the installer to furnish built-in fastening devices for his/her product to the proper trade for installation as the work proceeds.
3. In the event such devices are not furnished in time to be built-in, it is the installer's responsibility to provide other methods for attaching their product. Submit drawings and other required data to the Architect.

D. Templates: Provide templates, diagrams and other coordinating documents to the proper Contractor, manufacturer or supplier of related items affecting the Work.

E. Dimensions

1. If the exact location of an item is not indicated by dimension on the Drawings or noted in the Specifications, the Architect reserves the right to determine such location in the field prior to roughing-in.
2. If the exact dimensions of a product are not indicated, the Architect reserves the right to determine dimensions prior to the ordering or fabrication of a product.
3. Such dimensional changes shall not be a basis for changes in the Contract Sum.

4. Where miscellaneous devices, such as thermostats, switches, controls, grilles, pipes, or outlets of any nature are not specifically located by the Contract Documents, request such location or obtain approval of the location prior to installation. If approval has not been obtained, the Architect may direct the relocation of such devices at the expense of the installer.

3.03 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.
 - a. Where pipes occur in partitions, furred-out spaces and chases, determine exact location and size and fit entirely concealed into allotted space. Report conflicts to Architect prior to installation.
 - b. Where two or more pipes are to be installed in parallel, or parallel to the piping of other trades, the piping shall be installed with sufficient space between the pipes to allow for the proper application of pipe covering, painting, and servicing.
 - c. Furnish advance information on locations and sizes of frames, boxes, sleeves and openings needed for the Work to installers.
 4. Install work to allow for installation of future work identified on drawings.
 5. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Install products in accordance with manufacturer's recommendations or the requirements of trade associations, listed standards, Shop Drawings and Contract Documents.
- C. If a conflict exists between these references, the most strict requirements govern. If printed instructions are not available, consult with the manufacturer or the manufacturer's field representative, where applicable.
- D. Provide hangers, auxiliary framing, and other means for installing ceiling suspension systems, lighting fixtures, diffusers, and other equipment in ceilings to avoid ductwork, piping, etc.
 1. Suspend from structural members (i.e. joists, beams, etc.), and not from ductwork or piping.
 2. Provide supplemental framing members (i.e. angles, tubes, light gage steel framing, etc.) to span between structural members where required to support items of this paragraph C.
- E. Install work that will not interfere with the proper installation of the Work of other

trades.

- F. Install work in a manner to facilitate operating, servicing and repairing.
- G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction from incompatible material as necessary to prevent deterioration.
- H. Mounting Heights: Where mounting heights are not indicated, install individual components at standard mounting heights recognized within the industry for the particular application indicated. Refer questionable mounting height decisions to the Architect for final decision.

3.04 SPACE PREFERENCE

- A. Carefully check and coordinate the location and level of all Work to avoid conflicts between all contractors. Where conflicts occur, the following preferences shall generally govern:
 - 1. Recessed electrical light fixtures
 - 2. High and medium pressure ductwork
 - 3. Low pressure ductwork
 - 4. Soil, waste, vent and storm piping
 - 5. Sprinkler piping
 - 6. Liquid heat transfer and refrigerant piping
 - 7. Domestic water piping
 - 8. Electrical conduits from branch circuits
- B. However, no ductwork or liquid heat transfer main shall have preference over plumbing piping below plumbing fixtures, nor over electrical conduits above or below electrical switchgear and panels. No piping conveying liquids shall be installed directly over electrical or elevator equipment. No piping shall be installed in electrical or elevator equipment rooms.
- C. Where headroom or space conditions resulting from application of these preferences appear inadequate, notify the Architect prior to installing the Work.
- D. Coordinate the mounting heights of busways, electrical equipment and raceways to clear the opening heights of doors, the height of vehicles and the heights of equipment which needs to be routinely removed, and out of paths required for maintenance.

3.05 WORKMANSHIP

- A. Install products straight, plumb, level and in line. Securely attach items to the substrate, using recommended adhesives, mechanical fasteners or other devices. Where holes are provided for attachment, do not field drill or cut new holes without the approval of the Architect.

- B. Where applicable, match finished work to the approved samples or mock-ups.
- C. Conceal fasteners wherever possible, unless exposed fasteners are permitted or specified.
- D. Weld in accordance with AWS standards; comply with AWS for qualifications of operators and for workmanship.
- E. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to the Architect for final decision.
- F. Recheck measurements and dimensions, before starting each installation.

3.06 PROTECTION

- A. Protect finished surfaces of product being installed and surrounding products from damage during installation. Provide protective devices as required and as recommended by the manufacturer. Cover work subject to damage at the end of each day's work.
- B. Coat concealed surfaces of metal products with a bituminous or other approved coating to prevent contact between dissimilar metals or other material which can cause deterioration.
- C. Correct damage by repairing or replacing as directed by the Architect. Repairing will be permitted only where the repair is undetectable and does not cause structural damage or interfere with proper functioning of the part.
- D. Protect finish of installed products until Substantial Completion of the Project by use of wrappings, covers or other approved protective devices. Remove such protection immediately prior to final cleaning.
- E. Limiting Exposures: Coordinate and supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Maintain exposures within the manufacturers recommended limits. Where applicable, such exposures include, but are not limited to, the following:
 - 1. Excessive static or dynamic loading
 - 2. Excessive internal or external pressure
 - 3. Excessive high or low temperatures
 - 4. Thermal shock
 - 5. Excessively high or low humidity
 - 6. Air contamination or pollution
 - 7. Water or ice
 - 8. Solvents
 - 9. Chemicals
 - 10. Light

11. Radiation
12. Puncture
13. Abrasion
14. Heavy traffic
15. Soiling, staining and corrosion
16. Bacteria
17. Rodent and insect infestation
18. Combustion
19. Electrical current
20. High speed operation
21. Improper lubrication
22. Unusual wear or other misuse
23. Contact between incompatible materials
24. Destructive testing
25. Misalignment
26. Excessive weathering
27. Unprotected storage
28. Improper shipping
29. Theft
30. Vandalism

- F. Take precautions to protect existing concrete and asphalt pavement from damage due to vehicle loads, parking, and storage.
1. Schedule loading to minimize pavement material consolidation during hot weather. Distribute wheel loads to the greatest extent possible.

3.07 OVERHEAD ATTACHMENTS

- A. Where overhead hangers are required, and not indicated on the drawings, provide one or more of the following as required:
1. Concrete inserts prior to placement of concrete or drilled type inserts after concrete is placed.
 2. Trapeze from adjacent structure with suitable steel framing.
 3. Connections to Structure: Suitable anchorage devices with a minimum load carrying capacity of 250 pounds plus safety factor of 4:1 for the applied load.
 - a. Concrete: Steel expansion anchors. See Prohibited Material and Methods specified in Section 01 60 00.
 - b. Steel: Bolted or welded connections to steel structure.
- B. Where metal deck is furnished with hanger tabs or similar devices, applied total load, including work of other trades, not to exceed 75 pounds for each device. Loads in excess of permitted limit to be supported by trapeze framing as specified above.
- C. Verify support requirements of heavy or unusual loads not specifically shown on drawings with Architect.

3.08 OPERATION AND MAINTENANCE

- A. Contractor shall maintain all systems and equipment operated during construction. The contractor responsible for the installation of the system shall operate and maintain it. Make all repairs and perform all maintenance to assure Work is turned-over to Owner in first class condition.
- B. Maintenance work includes:
 - 1. Lubrication
 - 2. Adjustments
 - 3. Filter replacements
 - 4. Chemical treatment.

END OF SECTION

SECTION 01 73 29

CUTTING AND PATCHING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Execute cutting, fitting or patching of Work, required to:
1. Make several parts fit properly.
 2. Uncover Work to provide for installation of ill-timed Work.
 3. Remove and replace defective Work.
 4. Remove and replace Work not conforming to requirements of Contract Documents.
 5. Remove samples of installed Work as specified for testing.
 6. Install specified Work in existing construction.
- B. In addition to contract requirements, upon written instructions of Architect:
1. Uncover Work to provide for Architect's observation of covered Work.
 2. Remove samples of installed materials for testing.
 3. Remove Work to provide for alteration of existing Work.
- C. Do not endanger any Work by cutting or altering Work or any part of it.

1.02 SUBMITTALS

- A. Prior to cutting which affects structural safety of Project, submit written notice to Architect, requesting consent to proceed with cutting, including:
1. Identification of Project.
 2. Description of Affected Work.
 3. Necessity for cutting.
 4. Affect on other Work, on structural integrity of Project.
 5. Description of proposed Work. Designate:
 - a. Scope of cutting and patching.
 - b. Contractor and trades to execute work.
 - c. Products proposed to be used.
 - d. Extent of refinishing.
 6. Alternative to cutting and patching.
- B. Should conditions of Work, or schedule indicate change of materials or methods, submit written recommendation to Architect, including:
1. Conditions indicating change.
 2. Recommendations for alternative materials or methods.

3. Submittals as required for Substitutions.

- C. Submit written notice to Architect, designating time Work will be uncovered, to provide observation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Patching of materials and surfaces shall be in accordance with the requirements of the Contract Documents. Where not otherwise defined, patching shall match adjacent surfaces and proper materials shall be provided accordingly.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of Work, including elements subject to movement or damage during cutting and patching.
- B. After uncovering Work, inspect conditions affecting installation of new products.

3.02 PREPARATION PRIOR TO CUTTING

- A. Provide shoring, bracing and support as required to maintain structural integrity of Project.
- B. Provide protection for other portions of the Project, including all Contractors' personnel.

3.03 PERFORMANCE

- A. Execute fitting and adjustment of products to provide finished installation to comply with specified tolerances, finishes.
- B. Execute cutting and demolition by method which will prevent damage to other Work, and will provide surface to receive installation of repairs and new Work.
1. No cutting shall be performed which will, in any way, reduce the structural strength of the building. Should such cutting be necessary, consult Architect and do not proceed with such operation unless written approval is given.
 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.
- C. Restore Work which has been cut or removed; install new products to provide

completed Work in accord with requirements of Contract Documents.

- D. Patching of materials and surfaces shall be in accordance with the requirements of the Contract Documents. Where not otherwise defined, patching shall match existing or adjacent surfaces and proper materials shall be provided accordingly.
 - 1. Wherever existing walls, floors, ceilings, etc., are cut, the exposed surfaces must be neatly finished by patching, painting, wall covering, etc., as required to blend patched areas into adjacent existing surfaces. Patched areas shall not be visible when viewing entire wall surface.
 - a. 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.
 - 2. Where painting or finishing of patched surfaces or application of wall or floor covering is required, finish the entire plane of surface in which patched area occurs.
 - 3. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 4. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.

3.04 SLEEVES AND OPENINGS

- A. Where pipes, conduits, ductwork or other materials pass through new walls, partitions, floors, roof or ceilings, provide suitable sleeves in these elements or provide openings where sleeves are not practical.
- B. Close sleeves and openings to prevent passage of smoke or fire using approved methods and materials to maintain the fire rating of the construction being penetrated. See Section 07 84 00.
- C. Where pipes, conduit, ductwork etc., pass through, behind, or above existing construction, provide all cutting, patching, and refinishing for doing this work as specified herein.
- D. Lintels: Provide steel or precast concrete lintels to span openings in masonry walls sized in accordance with schedule shown or as detailed on structural drawings. In general, lintels are not required for openings less than the width of masonry unit in which wall is being constructed. Penetrations under beams or other concentrated loads require approval of Architect.

3.05 CLEANING

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

END OF SECTION

SECTION 01 74 00

CLEANING

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

- A. Refer to General Conditions for additional requirements.
- B. Execute cleaning, during progress of the work and at completion of the work, as required by Contract Documents.

1.02 RELATED SECTIONS

- A. Cutting and Patching: Section 01 73 29.
- B. Cleaning for Specific Products or Work: Specification section for the work.

1.03 CLEANING AND DISPOSAL REQUIREMENTS

- A. Standards: Maintain project in accord with the following safety and insurance standards:
 - 1. Applicable Federal and State Requirements.
 - 2. National Fire Protection Association.
- B. Hazards Control: Each Prime Contractor shall comply with the following requirements:
 - 1. Store volatile wastes in covered metal containers, and remove from premises daily.
 - 2. Prevent accumulation of wastes which create hazardous conditions.
 - 3. Provide adequate ventilation during use of volatile or noxious substances.
- C. Conduct cleaning and disposal operations to comply with local ordinances and anti-pollution laws.
 - 1. Do not burn or bury rubbish and waste materials on project site.
 - 2. Do not dispose of volatile wastes such as mineral spirits, oil or paint thinner in storm or sanitary sewers.
 - 3. Do not dispose of waste into streams or waterways.
 - 4. Wet down dry materials and rubbish to prevent dust.
- D. Clean streets, highways, and private properties of all mud, earth, rubbish, rocks, refuse or other debris of any kind resulting from such work or related transportation to and from the work site.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Select and use cleaning materials and equipment with care to avoid scratching, marring, defacing, staining or discoloring surfaces cleaned.
- B. Use only cleaning materials recommended by manufacturer of surfaces to be cleaned.
 - 1. Use cleaning products that meet Green Seal GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.
- C. Use cleaning materials only on surfaces recommended by the cleaning material manufacturer.

PART 3 EXECUTION

3.01 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- B. Provide, maintain and empty 55 gallon metal and dumpster type containers for collection of waste materials, debris and rubbish. Locate containers as directed by Architect.
 - 1. Provide containers with adequate capacity to accommodate anticipated needs. If containers do not have adequate capacity, increase intervals of waste removal or capacity of containers until adequate capacity is provided.
- C. At reasonable intervals during progress of Work, but in no case less than once a week, dispose of waste materials, debris and rubbish.
- D. 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.
- E. 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.

- F. Clean interior surfaces before start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- G. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.
- H. Handle materials in a controlled manner with as few handlings as possible; do not drop or throw materials from heights.
- I. Vacuum interior building areas where work is performed prior to painting and other finish work. Continue vacuum cleaning on an as needed basis until building is ready for occupancy.
- J. Protect interior of ductwork during construction from accumulation of dirt, dust or debris.
- K. Clean trash from all chases and concealed spaces before final enclosure.

3.01 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
- B. General Contractor
 - 1. Provide, maintain and empty 55 gallon metal and dumpster type containers for collection of waste materials, debris and rubbish. Locate containers as directed in General Conditions. These containers will be utilized by all Prime Contractors and their subcontractors.
 - a. Provide containers with adequate capacity to accommodate anticipated needs. If containers do not have adequate capacity, increase intervals of waste removal or capacity of containers until adequate capacity is provided.
 - 2. At reasonable intervals during progress of Work, but in no case less than once a week, dispose of waste materials, debris and rubbish.
 - 3. Direct Special Attention To:
 - a. Provide non-staining layout lines and other markings on masonry and concrete. Use chalk lines wherever possible and remove when no longer needed.
 - b. Remove all stains from concrete surfaces, including floors.
 - c. Shop marks shall not appear on exposed surfaces of any item.
 - d. Remove concrete, mortar and paint spatters.
 - e. Clean both brick and concrete unit masonry.
 - f. Protect aluminum frames during construction and thoroughly clean upon completion of the installation.
 - 4. Clean interior surfaces before start of finish painting and continue cleaning on an as-needed basis until painting is finished.
 - 5. Vacuum interior building areas where work is performed prior to painting

and other finish work. Continue vacuum cleaning on an as needed basis until building is ready for occupancy.

- B. Protect interior of ductwork during construction from accumulation of dirt, dust or debris.

3.02 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
 - 1. Leave Project clean and ready for occupancy.
- B. Employ experienced workmen, or professional cleaners for final cleaning.
- C. At the completion of the work, remove all surplus material, false work, temporary structures, including foundations thereof, plants of any description and debris of every nature resulting from their operations and put the site in a neat and orderly condition.
- D. Clean exposed interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
- E. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- F. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- G. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior surfaces, including light fixtures and lenses; polish surfaces so designated to a shine finish.
 - 1. Clean finishes free of dust, stains, films and other foreign substances.
 - 2. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
- H. Remove temporary protection and labels not required to remain
- I. Clean surfaces of equipment; remove excess lubrication.
- J. Remove debris, rubbish, dirt, etc. from open concealed spaces, chases and above ceilings.
- K. Repair, patch and touch-up marred surfaces to specified finish, to match adjacent

surfaces.

- L. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- M. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.
- N. Clean plumbing fixtures to a sanitary condition.
- O. Clean light fixtures and lamps; polish lenses.

3.02 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
 - 1. Leave Project clean and ready for occupancy.
- B. Contractor Requirements
 - 1. Conform to requirements of General Conditions.
 - 2. Employ experienced workmen, or professional cleaners for final cleaning.
 - 3. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
 - 4. Clean exposed interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Restore reflective surfaces to their original condition.
 - 5. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - 6. Sweep concrete floors broom clean in unoccupied spaces.
 - 7. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
 - 8. Remove grease, dust, dirt, stains, labels, fingerprints and other foreign materials from sight-exposed interior and exterior surfaces, including light fixtures and lenses; polish surfaces so designated to a shine finish.
 - 9. Clean finishes free of dust, stains, films and other foreign substances.
 - 10. Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
 - 11. Remove temporary protection and labels not required to remain
 - 12. Clean surfaces of equipment; remove excess lubrication.
 - 13. Remove debris, rubbish, dirt, etc. from open concealed spaces, chases and above ceilings.
 - 14. Repair, patch and touch-up marred surfaces to specified finish, to match

- adjacent surfaces.
15. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
 16. Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.
 17. Clean plumbing fixtures to a sanitary condition.
- C. Prior to Final Completion, or Owner occupancy, Contractor shall conduct an inspection of sight exposed interior and exterior surfaces, and all work areas, to verify that the entire work is clean.

END OF SECTION

SECTION 01 74 19

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Selective Demolition - for disposition of waste resulting from partial demolition of buildings, structures, and site improvements: Section 02 41 19.
- C. Structure Demolition - for disposition of waste resulting from demolition of buildings, structures, and site improvements: Section 02 41 16.
- D. Masonry – for disposal requirements for masonry waste: Section 04 00 00.

1.03 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE GOALS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.

1.05 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00, "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - 5. Review waste management requirements for each trade.

1.06 SUBMITTALS

- A. Waste Management Plan: Submit 2 copies of plan within 14 days after the Notice to Proceed.
- B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Include separate reports for demolition and construction waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in tons.
 - 4. Quantity of waste salvaged, both estimated and actual in tons.
 - 5. Quantity of waste recycled, both estimated and actual in tons.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in tons.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

- C. Waste Reduction Calculations: Before request for Substantial Completion, submit three (3) copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- H. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.
- I. Qualification Data: For waste management coordinator and refrigerant recovery technician.
- J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.07 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.
- B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19 "Project Meetings." Review methods and procedures related to waste management including, but not limited to, the following:
 - 1. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - 2. Review requirements for documenting quantities of each type of waste and its disposition.
 - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
5. Review waste management requirements for each trade.

1.08 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E1609 and requirements of this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
 3. Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.
 4. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 5. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 PLAN IMPLEMENTATION

- A. General: 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.
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
 1. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. 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 Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.02 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work: Salvage items for reuse and handle as follows:
 1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until installation.
 4. Protect items from damage during transport and storage.
 5. Install salvaged items to comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.
- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use: Salvage items for Owner's use and handle as follows:
 1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors.

- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.03 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- 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.

3.04 RECYCLING DEMOLITION WASTE

- A. Asphaltic Concrete Paving: Break up and transport paving to asphalt-recycling facility.
- B. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 1-1/2-inch size.
 - 2. Crush concrete and screen to comply with requirements in Division 31 Section "Earthwork" for use as satisfactory soil for fill or sub base.

- C. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Clean and stack undamaged, whole masonry units on wood pallets.
 - D. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.
 - E. Metals: Separate metals by type.
 - 1. Structural Steel: Stack members according to size, type of member, and length.
 - 2. Remove and dispose of bolts, nuts, washers, and other rough hardware.
 - F. Asphalt Shingles: Separate organic and glass fiber asphalt shingles and felts. Remove and dispose of nails, staples and accessories.
 - G. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
 - H. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in dry location.
 - I. Metal Suspension System: Separate metal members, including trim and other metals, from acoustical panels and tile and sort with other metals.
 - J. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - K. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
 - L. Plumbing Fixtures: Separate by type and size.
 - M. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
 - N. Lighting Fixtures: Separate lamps by type and protect from breakage.
 - O. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
 - P. Conduit: Reduce conduit to straight lengths and store by type and size.
- 3.05 RECYCLING CONSTRUCTION WASTE
- A. Packaging

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 2. Polystyrene Packaging: Separate and bag materials.
 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.
1. Comply with requirements in Division 32 Section "Plants" for use of chipped organic waste as organic mulch.
- C. Wood Materials:
1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
 - a. Comply with requirements in Division 32 Section "Plants." for use of clean sawdust as organic mulch.
- D. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.06 DISPOSAL OF WASTE

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

END OF SECTION

SECTION 018113
Seasons Grove
SUSTAINABLE DESIGN REQUIREMENTS

PART 1 - GENERAL

GENERAL CONDITIONS

- A. The General Conditions, Modifications to General Conditions, Supplementary or Special Conditions and any Instructions to Bidders shall apply to all Divisions of work.
- B. The requirements of State, Local or appropriate codes applicable to the work, whichever is the most stringent is a requirement of all Divisions of work.

WORK OF THIS SECTION

- A. LEED Certification requirements
- B. The intent of this project is to achieve a **Silver- level** LEED certification under the **LEED BD+C Homes and Multifamily Low-rise** rating system.
- C. Contractor shall coordinate work and requirements with Owner Contracted LEED Homes verification team comprising **LEED Provider and Green Rater**. Pertinent to LEED certifications the role of the verification team is to guide the construction team with certification process; review documentation, verify green requirements are met; and to perform third-party testing.

REFERENCES

- A. American Society of Heating, Refrigerating and Air-Conditioning Engineers:
 - 1. ASHRAE 52.2 - Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size.
 - 2. ASHRAE 62 - Ventilation for Acceptable Indoor Air Quality.
 - 3. ASHRAE 90.1 - Energy Efficient Design of New Buildings except Low-Rise Residential Buildings.
 - 4. ASHRAE 129 - Measuring Air-Change Effectiveness.
- B. ASTM International:
 - 1. ASTM E408 - Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques.
 - 2. ASTM E903 - Standard Test Method for Solar Absorption, Reflectance, and Transmittance of Materials Using Integrating Spheres.
- C. Bay Area Air Quality Management District: BAAQMD Regulation 8, Rule 51 –
- D. Adhesive and Sealant Products. Carpet and Rug Institute: CRI Green Label Testing Program.
- E. Forest Stewardship Council: FSC Guidelines- Forest Stewardship Council Guidelines.
- F. Green Seal: GS-11 - Product Specific Environmental Requirements.
- G. California Department of Public Health Standard Method V1.1–2010, using CA Section 01350, Appendix B.
- H. Sheet Metal and Air Conditioning Contractors: SMACNA IAQ - IAQ Guidelines for Occupied Buildings under Construction.
- I. South Coast Air Quality Management District: SCAQMD Rule 1168 - Adhesive and Sealant Applications.

- J. U.S. Environmental Protection Agency:
 - 1. EPA 832-R-92-005 - Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices.
 - 2. EPA Baseline IAQ - Testing for Indoor Air Quality, Baseline IAQ, and Materials Section 01445
 - 3. EPA 402-K-01-002 – A Step-by-Step Guide on how to Build Radon-Resistant Homes
- K. U.S. Green Building Council:
 - 1. LEED Version 4 - Reference Guide for Homes Design & Construction
- L. ENERGY STAR Qualified Homes
 - 1. Energy Star National Rater Design Review Checklist
 - 2. Energy Star National Rater Field Checklist
 - 3. Energy Star National HVAC Design Report
 - 4. Energy Star National HVAC Commissioning Checklist
 - 5. Energy Star Water Management System Builder Checklist

SUBMITTALS

- A. The contractor shall submit the following items directly to the Green Rater.
 - 1. Attendee list of On-site LEED Trades Training meeting moderated by LEED Verification Team (LEED Green Rater and/or Provider-QAD)
 - 2. Energy Star Water Management System Builder Checklist signed and initialed by General Contractor.
- B. Energy Star HVAC System Quality Installation Contractor Checklist signed and initialed by HVAC Contractor credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO)
 - 1. If tropical wood is used – Provide invoices for FSC certified wood with Chain of Custody Certificate number.
 - 2. Construction Waste Volume or Weight and Diversion Rate (Calculation and Waste Hauling Tickets)
 - 3. Provide documentation of dates and times of pre-occupancy flush schedule to Green Rater.
- C. Signed LEED Accountability Form certifying that all products meet or exceed the specified requirements and the requirements of LEED, as noted with "LEED". Submit this information as part of the product submittals.
- D. The contractor shall submit cut-sheets of products intended to comply with Environmentally Preferable Products (EPP). See LEED checklist for list of products intended to meet this requirement. EPP criteria are as follows:
 - 1. Recycled Content Requirement:
 - a. Minimum 25% post-consumer or 50% post-industrial. OR
 - b. The product contains at least 25% reclaimed material, including salvaged, refurbished, or reused materials.
 - c. Bio-based materials. Bio-based products must meet the Sustainable Agriculture Network's Sustainable Agriculture Standard. Bio-based raw materials must be tested using ASTM Test Method D6866 and be legally harvested, as defined by the exporting and receiving country.
 - d. Concrete that consists of at least 30% fly ash or slag used as a cement substitute and 50% recycled content or reclaimed aggregate OR 90% recycled content or reclaimed aggregate.
 - 2. Low Emissions Requirement– See specific requirements for Low-VOC paints, Adhesives and Sealants at end of this section.
 - 3. Local Production Requirement – Extracted, manufactured, and fabricated (all processes) within a 100-mile crow-fly distance of site.

QUALITY ASSURANCE

1. Perform work in accordance with the **LEED Version 4 - Reference Guide for Homes Design & Construction** for prerequisites and credits pertinent to this project listed in LEED Checklist included at the end of this section.
 - A. Maintain one copy of LEED for Homes Rating System document on site. Download at <https://www.usgbc.org/resources/leed-v4-homes-and-multifamily-midrise-current-version>
 - B. Perform inspections to assure conformance to Energy Star Qualified Homes Checklists throughout construction of the project. A copy of all pertinent Energy Star Inspection Checklists is enclosed at end of this section.
 - C. Monitor closely any requests for substitution for products that are related to LEED prerequisites and credits. Unless reviewed thoroughly substitutions may jeopardize projects' ability to obtain certification.
 - D. Perform storm water management and erosion control Work in accordance with EPA Best Management Practices or local erosion and sedimentation control standards, whichever is more stringent.
 - E. Perform Work to meet or exceed minimum energy efficiency and performance in accordance with Energy Star requirements and local energy code, whichever is more stringent.
 - F. Perform Work without use of CFC based refrigerants in HVAC building systems.
 - G. Perform ventilation Work in accordance with ASHRAE 62.
 - H. Develop and implement construction indoor air quality management plan including the following:
 1. Comply with minimum requirements of SMACNA IAQ.
 2. Protect stored and installed absorptive materials from moisture damage.
 - a. Store materials on elevated platforms under cover, and in dry location.
 - b. When materials are not stored in enclosed location, cover tops and sides of material with secured waterproof sheeting.
 3. Protect HVAC equipment during construction.
 - a. Shut down return side of HVAC system whenever possible during heavy construction or demolition.
 - b. When HVAC system is operated during heavy construction, furnish disposable temporary filters.
 4. Pre-Occupancy Flush: Flush the entire building with fresh air for a total of 48 hours after all construction is complete. Run continuous fans through the duration of the flush. Replace all HVAC filters upon completion.

PART 2 – PRODUCTS

PRODUCT SUBSTITUTION

- A. Monitor closely any requests for substitution for products that are related to LEED prerequisites and credits. Unless reviewed thoroughly substitutions may jeopardize projects' ability to obtain certification.

PART 3 - EXECUTION

LEED PREREQUISITES AND CREDITS (See enclosed LEED Checklist for more information)

INTEGRATIVE PROCESS

A. IP Credit 1.3 (option 3) – Trades Training

1. At the onset of construction organize a LEED trades training moderated by LEED Green Rater and/or Provider-QAD.
2. Following trades to attend - GC Project Manager, GC Site Superintendent, Mechanical-Electrical-Plumbing, Insulation, Framing, Drywall, Air-Infiltration Package.
3. Provide a minimum of 2-week notice to LEED Green Rater prior to training date.

SUSTAINABLE SITES

A. SS Prerequisite 1 - Construction Activity Pollution Prevention

1. Stockpile and protect disturbed topsoil from erosion (for reuse).
2. Control the path and velocity of runoff with silt fencing or comparable measures.
3. Protect on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures.
4. Provide swales to divert surface water from hillsides.
5. Use tiers, erosion blankets, compost blankets, filter socks, berms, or comparable measures to stabilize soils in any area with a slope of 15% (6.6:1) or more that is disturbed during construction.
6. Prevent air pollution from dust and particulate matter.
7. Construction sites larger than 1 acre must conform to the erosion and sedimentation requirements of the 2012 U.S. Environmental Protection Agency Construction General Permit or local equivalent, whichever are more stringent.

B. SS Prerequisite 2 - No Invasive Plants

1. Coordinate with Landscape Contractor to ensure no invasive plant species are introduced into landscape.

C. SS Credit 3 – Non-toxic Pest Control

1. For below-grade walls, use solid concrete foundation walls, masonry walls with a course of solid block bond beam, or concrete-filled block.
2. Design a minimum 6-inch inspection space between the surface of the planned landscape grade and non-masonry siding.
3. Seal all external cracks, joints, penetrations, edges, and entry points with appropriate caulking. Install rodent and corrosion-proof screens (e.g., copper or stainless-steel mesh) on all openings greater than 1/4 inch, except where code prohibits their installation (e.g., dryer vents).
4. Design discharge points for rain gutters, air-conditioning condensation lines, steam vent lines, or any other moisture source such that discharge is at least 24 inches from the foundation.
5. Design landscape features to provide a minimum 18-inch space between the exterior wall and any plantings.
6. Multifamily building projects **must** develop an integrated pest management policy that includes guidance for residents on pesticide use, housekeeping, and prompt reporting of pest problems; incorporate the policy in the Homeowner Education Manual.

WATER EFFICIENCY

A. WE Prerequisite 1 – Water Metering

1. Multifamily: Install a water meter for each building.

B. WE Credit 2 – Indoor Water Use

Provide product data showing flow rates for following fixtures:

1. Average flow rate of lavatory faucets shall be 1.00 gallons per minute or less. Each lavatory faucet or faucet aerator must be WaterSense labeled.
2. Average flow rate of showers shall be 1.50 gallons per minute or less. Each showerhead fixture and fitting must be WaterSense labeled.
3. Each clothes washer must be ENERGY STAR qualified.
4. The water pressure in the house must not exceed 60 pounds per square inch (414 kPa), with no detectable water leaks.

ENERGY & ATMOSPHERE

A. EA Prerequisite 1– Minimize Energy Performance (Single-Family and Multifamily Low-rise)

1. Meet the requirements of ENERGY STAR for Homes, version 3.
2. Complete the thermal enclosure system rater checklist, the HVAC system quality installation rater and contractor checklists, and the water management system builder checklist. Certified Passive House projects automatically meet the thermal enclosure system rater checklist requirement. Achieve a HERS index rating at or below the HERS index target or meet the requirements of the ENERGY STAR for Homes version 3.
3. At least one of the following appliances must be ENERGY STAR qualified and installed in each dwelling unit: refrigerator; OR dishwasher; OR clothes washer.
4. All duct runs must be fully ducted (i.e., building cavities may not be used as ducts).
5. Minimum envelope leakage – following areas of building envelope and demising walls shall be sealed, caulked, gasketed, or weather-stripped to minimize envelope leakage:
 - a. Joints around windows and doors.
 - b. Joints between walls and foundation; between conditioned spaces and attics, demising walls, crawl spaces or garage.
 - c. Seal joints between sill plate and drywall.
 - d. Seal joints between top plate and drywall.
 - e. All mechanical, plumbing, and electrical penetrations in exterior and demising walls. Mechanical chase shall be sealed at crawl space ceiling.
 - f. Exterior sheathing and house wrap.
 - g. Minimize entry of air from outdoors, attic, garage, and crawl space into exterior wall and interior wall cavities to ensure passing of air infiltration test.
 - h. Batt insulation shall be stapled to face of stud to ensure full contact of insulation with face of drywall. Cut insulation around all mechanical, plumbing, and electrical work.
6. Thermal Bypass Inspection - The Green Rater will conduct a visual Thermal Bypass Inspection to inspect proper installation and continuity of thermal insulation and air-tightness of envelope. This inspection must take place after exterior envelope insulation has been installed, but prior to and installation of any drywall. One inspection per floor shall be conducted. If additional inspections are deemed necessary due construction sequencing, Contractor shall notify the Architect and Green Rater immediately. Contractor shall schedule the inspection with no less than a two-week notice to the Green Rater. Contractor shall provide access to each unit and cooperate with conducting of the test. Additional inspections necessary due to incomplete work shall be back-charged to the Contractor. A sample Thermal Bypass Inspection Checklist is enclosed in section 018113.
7. Final Inspections - Upon substantial completion and prior to occupancy, the Green Rater will conduct a visual Final Inspection to verify green requirements incorporated in the project. The contractor shall notify the Green Rater at least four (4) weeks prior to the anticipated date for such inspection. Contractor shall provide access to each unit and cooperate with conducting of the test.

Additional inspections necessary due to incomplete work shall be back-charged to the Contractor.

8. Third-Party Testing -

Third-party Testing is to be scheduled and conducted in conjunction with the final inspection. The contractor shall notify the Green Rater at least four (4) weeks prior to the anticipated date for such inspection. Contractor shall provide access to each unit and cooperate with conducting of the test. The following tests shall be conducted by Green Rater:

- a. Air Infiltration Test (Blower door Test) – Mandatory – Measures air leakage through unit enclosure such as exterior walls, demising walls, ceilings, chases, etc.
- b. Distribution Loss Test (Duct Blaster Test) – Mandatory – Measures leakage through the mechanical distribution system
- c. Exhaust Test - Measures exhaust rate for bathroom fans and kitchen fans.
- d. Flow Test and Balancing – Measure air flow at each supply register and pressure differential between rooms.

B. EA Prerequisite 2 – Energy Metering

For Multifamily Buildings

1. Install an electricity meter or submeter for each residential unit and a gas meter for the entire building, or a gas meter or sub-meter for each unit. Single room–occupancy units, transitional and temporary housing, and designated supportive housing buildings do not need an energy meter in each unit but must have a whole-building energy meter.

C. EA Prerequisite 3 – Education of the Homeowner, Tenant, or Building Manager

1. General Contractor to provide to Owner or Owner’s Building Management an operations and maintenance manual, binder, or CD that includes all the following items:
 - a. the completed checklist of LEED-related features;
 - b. a copy of each signed accountability form;
 - c. copies of all ENERGY STAR for Home, version 3, checklists;
 - d. product manufacturers’ manuals for all installed equipment, fixtures, and appliances;
 - e. general information on efficient use of energy, water, and natural resources;
 - f. operations and maintenance guidance for any installed equipment, including space heating and cooling, mechanical ventilation, humidity control, radon protection, renewable energy, and irrigation, rainwater harvesting, or graywater systems (following 2009 EPA WaterSense Single-Family New Home Specifications, item 5.0, Homeowner Education);
2. LEED Green Rater to assist with following items for inclusion in manuals:
 - a. guidance on occupants’ activities and choices, including cleaning materials and methods, water-efficient landscaping, integrated pest management, effects of chemical fertilizers and pesticides, irrigation, lighting selection, and appliance selection;
 - b. information on local green power options; and
 - c. information on sharing utility data with USGBC via a USGBC-approved third party.
3. General Contractor to conduct a minimum one-hour walkthrough of the home with Owner and/or building manager. The walkthrough must feature the following:
 - a. identification of all installed equipment;
 - b. instruction in how to use and operate the equipment; and
 - c. information on its maintenance.

D. EA Credit 2 – Efficient Hot Water Distribution System

1. Option1 - Path1 - Maximum Allowable Pipe Length:
 - a. Total linear hot water pipe length not to exceed 21 feet or 3/4” dia.; 32 feet for 5/8” dia.; 42 feet for 1/2” dia.; and 50 feet for 3/8” dia.
 - b. Length requirements do not apply to cold water demand loads for following fixtures – toilets, tubs without showerheads, or stovetop pot-fillers.
 - c. For projects using circulating systems, meet all the following:
 - i. Circulating pump does not operate continuously, is on a timer, or is on a water temperature sensor.

- ii. Circulating pump is demand activated by a momentary contact switch, motion sensor, flow switch, door switch or voice command.
 - iii. After the pump starts, the controls allow the pump to operate until the water temperature in the return pipe rises not more than 10°F (6 °C) above the initial temperature of the water in the pipe. Controls limit the water temperature to a maximum of 105°F (40 °C). Controls limit pump operation to not more than 5 minutes per activation in the event that both means of shutting off the pump have failed.
 - iv. Circulating hot water systems have with an automatic or readily accessible manual switch to turn off the hot water circulating pump when not in use.
2. Option 3 – Pipe insulation
- a. Install at least R-4 insulation on all domestic hot water piping, including sub slab pipes. Insulation on all piping elbows and tees must adequately insulate changes in direction.
 - b. Run buried piping in a slab or below grade through a protective, waterproof raceway, channel, sleeve, or path whose internal dimensions and changes of direction are large enough that the piping and insulation can be removed and replaced without damaging the piping’s dimensional integrity.
 - c. The waterproof sleeve is not required for below-grade piping if the insulation manufacturer stipulates that the pipe insulation will maintain its insulating value in underground applications in damp soil when installed according to the manufacturer’s instructions. This exception does not apply to piping that runs through or under building slabs.

MATERIALS & RESOURCES

A. MR Prerequisite 1 – Certified Tropical Wood

- 1. All wood in the building must be non-tropical, reused or reclaimed, or certified by the Forest Stewardship Council, or USGBC-approved equivalent.
- 2. If tropical wood is used it must be FSC Certified. Provide vendor’s chain-of-custody certificate number must be shown on any invoice that includes FSC-certified products.

B. MR Prerequisite 2 – Durability Management

- 1. Meet the requirements of the ENERGY STAR for Homes, version 3, water management system builder checklist attached at end of this section.
- 2. Install all the applicable indoor moisture control measures:
 - a. Area directly above bathtub, spa, or shower (extending to ceiling), exposed wall or area behind fiberglass enclosure if wallboard is installed - Use non-paper-faced backer board or paper-faced product or coating over wallboard that meets standard ASTM D 3273 standard
 - b. Kitchen, bathroom, laundry room, spa area - Use water-resistant flooring; do not install carpet.
 - c. Install water resistant flooring (not carpet) within 3 feet of exterior doors accessible from ground.
 - d. Tank water heater in or over living space - Install drain and drain pan, drain pan and automatic water shut-off or flow restrictor, or floor drain with floor sloped to drain.
 - e. Clothes washer (or condensing clothes dryer) in or over living space - Install drain and drain pan, drain pan and automatic water shut-off or flow restrictor, floor drain with floor sloped to drain, or braided washer hose.
 - f. Conventional clothes dryer - Exhaust directly to outdoors

C. MR Credit 1 – Durability Management Verification

- 1. LEED verification team (Green Rater) to inspect and verify each measure listed in the ENERGY STAR for Homes, version 3, water management system builder checklist.
- 2. Allow Green Rater access to the premise to inspect items in ENERGY STAR for Homes, version 3, water management system builder checklist.

D. MR Credit 2 – Environmentally Preferable Products

1. Option 1 - Local Production - Use products that were extracted, processed, and manufactured locally within 100 miles of site and for the following components (at least 50% of the component). Contractor to provide documentation proving compliance with Environmentally Preferable Product requirements for the following products:
 - a. Aggregate for concrete and foundation
2. Option 2 – Environmentally Preferable Products –Use synthetic gypsum board products that contain at least 95% recycled content and non-synthetic gypsum board products that contain at least 10% post-consumer recycled content. Contractor to provide documentation proving compliance with Environmentally Preferable Product requirements for the following products:
 - a. Drywall, Interior Finish

E. MR Credit 4 – Material Efficient Framing

1. Implement any of the following advanced framing techniques for at least 90% of each component.
 - a. Use ladder blocking or drywall clips.
 - b. Use two-stud corners or California corners.
 - c. Space floor joists greater than 16 inches o.c. or.
 - d. Space roof rafters greater than 16 inches o.c.

INDOOR ENVIRONMENTAL QUALITY

A. EQ Prerequisite 1 – Ventilation

Multifamily

1. Local Exhaust
 - a. Design and install local exhaust systems in all bathrooms (including half-baths) and the kitchen to meet the requirements of ASHRAE Standard 62.2–2010, Sections 5 and 7 or local equivalent, whichever is more stringent. Provide minimum intermittent local exhaust flow rates of 100 cfm or 5ACH in kitchen, and 50 cfm in bathrooms.
 - b. Exhaust air to the outdoors. Do not route exhaust ducts to terminate in attics or interstitial spaces. Just recirculating range hoods or recirculating over-the-range microwaves do not satisfy the kitchen exhaust requirements.
 - c. Use ENERGY STAR–labeled bathroom exhaust fans in all bathrooms.
 - d. For exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (188 liters per second), provide makeup air at a rate approximately equal to the exhaust air rate. Makeup air systems must have a means of closure and be automatically controlled to start and operate simultaneously with the exhaust system.
2. Ventilation
 - a. Fresh air ventilation to dwelling units shall comply with ventilation requirements of ASHRAE 62.2–2010.
 - b. Do not use systems that rely on transfer air from pressurized hallways or corridors, adjacent dwelling units, attics, etc.
 - c. Project teams using exhaust-only ventilation systems must comply with flow rate required by ASHRAE 62.2–2010. If bathroom exhaust fan is used for exhaust-only fresh-air ventilation, then refer to HVAC drawings for exhaust fan run-time and controls. Coordinate continuous / intermittent fan run-time and controls with HVAC and Electrical contractor. Provide dual-speed bathroom exhaust fan with continuous speed set to 30 cfm in 1-Bedroom units, 45 cfm in 2-Bedroom units, and 45 cfm in 3-Bedroom units.
 - d. Continuous in-unit ventilation fans must be rated for sound at a maximum of 1.0 sone, per ASHRAE 62.2–2010, Section 7.2.1. Remote mounted fans need not meet these sound requirements.
 - e. Locate air inlets that are part of the ventilation design at least 10 feet (3 meters) from known sources of contamination, such as a stack, vent, exhaust hood, or vehicle exhaust. Place the intake such that entering air is not obstructed by snow, plantings, or

other material. Forced air inlets must be covered by screens to exclude rodents and insects (mesh not larger than 1/2 inch or 13 millimeters).

3. For all non-unit spaces, meet the minimum requirements of ASHRAE Standard 62.1–2010 or local equivalent, whichever is more stringent, Sections 4–7, Ventilation for Acceptable Indoor Air Quality (with errata). Mechanically ventilated spaces must be designed using the ventilation rate procedure or the applicable local code, whichever is more stringent. Ventilation fans that penetrate rated assemblies may require radiation and fire dampers to meet local building and fire codes.

B. EQ Prerequisite 2 – Combustion Venting

1. Do not install any unvented combustion appliances (ovens and ranges excluded).
2. Install a carbon monoxide (CO) monitor on each floor, hard-wired with a battery backup. In multifamily buildings, install a CO monitor on each floor of each unit.
3. For all fireplaces and woodstoves inside the building, provide doors that close or a solid glass enclosure. Interior fireplaces and woodstoves that are not closed-combustion or power-vented must pass BPI or RESNET combustion safety testing protocols to ensure that depressurization of the combustion appliance zone is less than 5 Pa.
4. Space- and water-heating equipment that involves combustion must meet one of the following:
 - a. it must be designed and installed with closed combustion (i.e., sealed supply air and exhaust ducting);
 - b. it must be designed and installed with power-vented exhaust; or
 - c. it must be located in a detached utility building or open-air facility.

C. EQ Prerequisite 3 – Garage Pollutant Protection

1. Place all air-handling equipment and ductwork outside the fire-rated envelope of the garage.
2. Tightly seal shared surfaces between the garage and conditioned spaces, including all of the following:
 - a. In conditioned spaces above the garage, seal all penetrations and all connecting floor and ceiling joist bays.
 - b. In conditioned spaces next to the garage, weather-strip all doors, install carbon monoxide detectors in rooms that share a door with the garage, seal all penetrations, and seal all cracks at the base of the walls.

D. EQ Prerequisite 4 – Radon-Resistant Construction

New Construction

1. Provide a Passive or Active Radon Mitigation System per following requirements:
 - a. Install polyethylene sheeting or extruded polystyrene (XPS) insulation beneath concrete slabs, including basement floors. Ensure sheeting is in direct contact with the concrete slab above. Install a capillary break at all crawlspace floors using ≥ 6 mil polyethylene sheeting, lapped 6 to 12 in.
 - b. Under the polyethylene sheeting or extruded polystyrene (XPS) insulation installed to meet ENERGY STAR Water Management System Builder Checklist Item 1.3:
 - i. Install a 4 in. layer of 1/2 in. diameter or greater clean aggregate; OR
 - ii. Install a 4 in. uniform layer of sand, overlain with either a layer of geotextile drainage matting throughout or strips of geotextile drainage matting along the perimeter installed according to the manufacturer's instructions.
 - c. A 3 or 4 in. diameter gas-tight vertical vent pipe, clearly labeled to conform with the radon-resistant standard used, e.g., "Radon Reduction System" or "Radon Pipe" or "Radon System." The vent pipe shall be connected to an open T-fitting in the aggregate layer (or connected to geotextile drainage matting according to the manufacturer's instructions) beneath the polyethylene sheeting, extending up through the conditioned spaces and terminating a minimum of 12 in. above the roof opening. For crawlspaces, install at least 5 ft. of horizontal perforated drain tile on either side of the T-fitting,

attached to the vertical radon vent pipe beneath the sheeting and running parallel to the long dimension of the house.

- d. Radon fan installed in the attic (i.e., an active system) OR an electrical receptacle installed in an accessible attic location near the radon vent pipe (i.e., a passive system) to facilitate future fan installation if needed.
2. The requirements for radon protection are automatically satisfied if the building is elevated by at least 2 feet (600 millimeters), with open air space between the building and ground. An enclosed vented crawlspace does not qualify. A garage under a building is an acceptable alternative.
3. Foundation air sealing with polyurethane caulk or the equivalent at all slab openings, penetrations and control or expansion joints.

E. EQ Prerequisite 5 – Air Filtering

1. Install air filters with a minimum efficiency reporting value (MERV) of 8 or higher on all recirculating space conditioning systems, per ASHRAE 62.2–2010. Design ductwork and specify the central blower to account for the pressure drop across the filter. Air filter housings must be airtight to prevent bypass or leakage.
2. Non-ducted systems are exempt from the minimum MERV 8 requirements but must have an internal air filter in the air-handling unit.
3. Install air filters rated MERV 6 or higher for mechanically supplied outdoor air for systems with 10 feet (3 meters) of ductwork or more, per ASHRAE 62.2–2010, Section 6.7.

F. EQ Prerequisite 6 – Environmental Tobacco Smoke

Multifamily

1. Provide signage to:
 - a. prohibit smoking in common areas,
 - b. prohibit smoking within 25 feet of building entrances.
 - c. or prohibit smoking on the entire property.

G. EQ Prerequisite 7 – Compartmentalization

1. Compartmentalize each residential unit to minimize leakage between units. Minimize uncontrolled pathways for environmental tobacco smoke and other indoor air pollutants between units by sealing penetrations in walls, ceilings, and floors and by sealing vertical chases (including utility chases, garbage chutes, mail drops, and elevator shafts) adjacent to the units.
2. Weather-strip all doors in the residential units leading to common hallways to minimize air leakage into the hallway. Weather-strip all exterior doors and operable windows to minimize leakage from outdoors.
3. Demonstrate acceptable sealing of residential units by a blower door test. Follow the procedure described by RESNET or the ENERGY STAR Multifamily High Rise Program Testing and Verification Protocols, Version 1.0, with an allowable maximum leakage of 0.30 cfm50 per square foot (0.07 cmm50 per square meter) of enclosure (i.e., all surfaces enclosing the apartment, including exterior and party walls, floors, and ceiling) for new construction buildings.
4. Third-party Testing is to be scheduled and conducted in conjunction with the final inspection. The contractor shall notify the Green Rater at least four (4) weeks prior to the anticipated date for such inspection. Contractor shall provide access to each unit and cooperate with conducting of the test. The following tests shall be conducted by Green Rater:
 - a. Air Infiltration Test (Blower door Test) – Mandatory – Measures air leakage through unit enclosure.

H. EQ Credit 1.1 (option 1) – Enhanced Ventilation - Enhanced Local Exhaust

1. Use one of the following strategies in every bathroom with a shower, bathtub, or spa (i.e., half-baths are exempt) to control the use of the local exhaust fan:
 - a. an occupancy sensor;

- b. an automatic humidistat controller;
- c. a continuously operating exhaust fan; or
- d. a delay timer that operates the fan for at least 20 minutes

I. EQ Credit 2.3 (option 3) – Contaminant Control - Preoccupancy Flush

1. At installation, seal all permanent ducts and vents to minimize contamination from construction. Remove seals after all phases of construction are completed. After construction ends and before occupancy, flush the home with fresh air, according to the following guidelines:
 - a. Remove any dust and debris from ducts.
 - b. Flush the entire home for 48 hours, keeping all windows and interior doors open; the 48 hours may be nonconsecutive if necessary.
 - c. Keep all windows open and run a fan (e.g., HVAC system fan) continuously, or flush the home with all HVAC fans and exhaust fans operating continuously at the highest flow rate.

J. EQ Credit 3.1 (option 1) – Balancing of H&C Distribution Systems - Multiple Zones

1. Single-family houses with less than 800 square feet (74 square meters) of conditioned floor area and multifamily buildings whose average unit size is less than 1,200 square feet (110 square meters) automatically meet the requirements of this credit.

K. EQ Credit 3.3 (option 3) – Balancing of H&C Distribution Systems - Pressure Balancing

1. Facilitate for Green Rater or a Third-Party to test each bedroom for pressure difference of more than 3 Pa (0.012-inch w.c.) with respect to the main body of the house when doors are closed, and the air handler is operating on highest speed.

L. EQ Credit 7 – Low Emitting Products

1. In the interior of the home, use products that have been tested and found compliant with the California Department of Public Health Standard Method V1.1–2010, using CA Section 01350, Appendix B, New Single-Family Residence Scenario, for emissions testing guidance. At least 90% of a component must meet the requirements to earn credit.
 - a. For site-applied interior paints and coatings, meet the requirements of CA Section 01350.
 - b. For flooring, meet the requirements of CA Section 01350.

TABLE 1. Acceptable certifications for emissions and content requirements		
CERTIFICATION	TESTING STANDARD REFERENCED IN LEED	APPLICABLE CATEGORIES
SCS Indoor Advantage Gold	CDPH Standard Method v1.1 ANSI/BIFMA M7.1-2011	General Emissions Evaluation (many product categories), Furniture
FloorScore	CDPH Standard Method v1.1	Flooring
Carpet and Rug Institute (CRI) Green Label Plus	CDPH Standard Method v1.1	Carpeting, carpet padding, adhesives
Greenguard Children and Schools	CDPH Standard Method v1.1	General Emissions Evaluation (many product categories including exterior applied products)
Collaborative for High Performance Schools (CHPS)	CDPH Standard Method v1.1	General Emissions Evaluation (many product categories)
CARB ULEF label	N/A	Composite Wood

ENCLOSURES

Low-Rise

Renovation & New Construction

- 1 LEED for Homes Scorecard and Credit Categories
- 2 Energy Star National Rater Design Review Checklist
- 3 Energy Star National Rater Field Checklist
- 4 Energy Star National HVAC Design Report
- 5 Energy Star National HVAC Commissioning Checklist
- 6 Energy Star Water Management System Builder Checklist

END OF SECTION

LEED BD+C: Homes and Multifamily Lowrise v4 - LEED v4

Seasons Grove Scorecard (ID: 100056789)

Project Address 100056789, Seasons Grove, 1050 Lamplighter Drive Grove City, OH



Note: The information on this tab is READ-ONLY. To edit this information, see the Credit Category tabs.

Total		Certification Level:	Not Certified	Verified	19
	Integrative Process	Preliminary Y	2 of 2	M 0	Verified 0
IPc	Integrative Process		2 of 2	0	
	Location and Transportation	Preliminary Y	7 of 15	M 0	Verified 0
LTP	Floodplain Avoidance		Required		Not Verified
LTC	LEED for Neighborhood Development		0 of 15	0	
LTC	Site Selection		2 of 8	0	
LTC	Compact Development		3 of 3	0	
LTC	Community Resources		2 of 2	0	
LTC	Access to Transit		0 of 2	0	
	Sustainable Sites	Preliminary Y	3 of 7	M 0.5	Verified 0
SSp	Construction Activity Pollution Prevention		Required		Not Verified
SSp	No Invasive Plants		Required		Not Verified
SSc	Heat Island Reduction		0 of 2	0	
SSc	Rainwater Management		1 of 3	0	
SSc	Nontoxic Pest Control		2 of 2	0.5	
	Water Efficiency	Preliminary Y	4 of 12	M 1	Verified 0
WEp	Water Metering		Required		Not Verified
WEc	Total Water Use		0 of 12	0	
WEc	Indoor Water Use		4 of 6	0	
WEc	Outdoor Water Use		0 of 4	1	
	Energy and Atmosphere	Preliminary Y	19.5 of 38	M 1	Verified 19
EAp	Minimum Energy Performance		Required		Not Verified
EAp	Energy Metering		Required		Not Verified
EAp	Education of the Homeowner, Tenant or Building Manager		Required		Not Verified
EAc	Annual Energy Use		19.5 of 29	0	19
EAc	Efficient Hot Water Distribution System		0 of 5	0	
EAc	Advanced Utility Tracking		0 of 2	0	
EAc	Active Solar-Ready Design		0 of 1	0	
EAc	HVAC Start-Up Credentialing		0 of 1	1	



Materials and Resources		Preliminary	Y	4 of 10	M	3	Verified	0
MRp	Certified Tropical Wood	Required					Not Verified	
MRp	Durability Management	Required					Not Verified	
MRc	Durability Management Verification			1 of 1		0		
MRc	Environmentally Preferable Products			1.5 of 4		1		
MRc	Construction Waste Management			0 of 3		2		
MRc	Material-Efficient Framing			1.5 of 2		0		



Indoor Environmental Quality		Preliminary	Y	9 of 16	M	0.5	Verified	0
EQp	Ventilation	Required					Not Verified	
EQp	Combustion Venting	Required					Not Verified	
EQp	Garage Pollutant Protection	Required					Not Verified	
EQp	Radon-Resistant Construction	Required					Not Verified	
EQp	Air Filtering	Required					Not Verified	
EQp	Environmental Tobacco Smoke	Required					Not Verified	
EQp	Compartmentalization	Required					Not Verified	
EQc	Enhanced Ventilation			1 of 3		0		
EQc	Contaminant Control			1 of 2		0		
EQc	Balancing of Heating and Cooling Distribution Systems			2 of 3		0		
EQc	Enhanced Compartmentalization			0 of 1		0		
EQc	Enhanced Combustion Venting			2 of 2		0		
EQc	Enhanced Garage Pollutant Protection			2 of 2		0		
EQc	Low-Emitting Products			1 of 3		0.5		



Innovation		Preliminary	Y	3 of 6	M	1.5	Verified	0
INp	Preliminary Rating	Required					Not Verified	
INc	Innovation			3 of 5		0.5		
INc	LEED Accredited Professional			0 of 1		1		



Regional Priority		Preliminary	Y	3 of 4	M	1	Verified	0
RPC	Regional Priority			3 of 4		1		

Point Floors

The project earned at least 8 points total in Location and Transportation and Energy and Atmosphere	<input type="text" value="Yes"/>
The project earned at least 3 points in Water Efficiency	<input type="text" value="No"/>
The project earned at least 3 points in Indoor Environmental Quality	<input type="text" value="No"/>

Total		Preliminary	Y	54.5 of 110	M	8.5	Verified	19
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Certification Thresholds Certified: 40-49, Silver: 50-59, Gold: 60-79, Platinum: 80-110

Integrative Process

Preliminary Y 2 Maybe 0 Verified 0

IP Credit Integrative Process

Up to 2 points

Preliminary Y M Verified

Exemplary Performance: Achieve all three options

Option 1. Integrative Project Team (1 point)

Y M V

Team members, in addition to the builder and verification team, include capabilities in at least three of the following skill sets: architecture or residential building design; mechanical or energy engineering; building science or performance testing; green building or sustainable design; and civil engineering, landscape architecture, habitat restoration, or land-use planning.

All team members referenced above were involved in at least three of the following phases of the design and construction process: conceptual or schematic design; LEED planning; preliminary design; energy and envelope systems analysis or design; design development; and construction.

Meetings were conducted with the project team at least monthly to review project status, introduce new team members to project goals, discuss problems, formulate solutions, review responsibilities, and identify next steps.

AND/OR

Option 2. Design Charrette (1 point)

Y M V

A full-day workshop (or two half-day workshops) was conducted with the project team, as defined in Option 1, no later than the design development phase.

Date(s)
 Duration

AND/OR

Option 3. Trades Training (1 point)

Y M V

At least eight hours of training on the green aspects of the project and how the trades can contribute to achieving each LEED for Homes prerequisite and attempted credit was conducted before construction but after trades have been hired for the project.

Date(s)
 Duration
 Trainer

Location and Transportation

Preliminary Y 7 Maybe 0 Verified 0

LT Prerequisite Floodplain Avoidance

Required

Select one of the following:

- True The project is not built on land within a flood hazard area.
- The project is built on land within a flood hazard area and in accordance with flood provisions.
- The project is built on land within a flood hazard area and is a previously developed building and hardscape.

Verified

LT Credit LEED for Neighborhood Development

15 points

Preliminary Y M Verified

- Name of LEED for Neighborhood Development project
- LEED ND project ID number
- Rating system and version
- LEED ND certification date

LT Credit Site Selection

Up to 8 points

Exemplary Performance: Earn all 9 points

Preliminary Y M Verified

Option 1. Sensitive Land Protection (3-4 points) Y M V

Path 1. Previously Developed (4 points) Y M V

- Total buildable land area (acre or sq ft)
- Previously developed buildable land area (acre or sq ft)
- Percentage of lot previously developed (%)

OR

Path 2. Avoidance of Sensitive Land (3 points) Y M V

All new buildings, hardscapes, roads, or parking areas of the project are located on land that meets the following criteria:

- (Select one) Does not consist of prime farmland, unique farmland, or farmland of statewide or local importance.
- (Select one) Was not public parkland prior to acquisition.
- (Select one) Is not in a flood hazard area shown on a legally adopted flood hazard map or otherwise legally designated by the local jurisdiction or state.
- (Select one) Is not on land specifically identified as habitat for species listed in the U.S. Endangered Species Act; the state's endangered species act; NatureServe GH, G1, or G2 lists; or those listed under local equivalent standards (for projects outside the U.S.) that are not covered by NatureServe data.
- (Select one) Is not on land within 50 ft (15 m) of wetlands or within the setback distance from wetlands prescribed by local, state or national regulations, whichever is more stringent.
- (Select one) Is not on land within 100 ft (30 m) of water bodies, including seas, lakes, rivers, streams and tributaries.

AND/OR

Option 2. Infill Development (2 points)

Y M V

Percent of land within a 1/2 mile (800 meters) from the project boundary that is previously developed

Alternatively, for projects within city limits of towns with populations less than 20,000

Percent of land adjacent to the project boundary that is previously developed

AND/OR

Option 3. Open Space (1 point)

Y M V

Select one of the following:

Built within 1/2 mile (800 meters) of open space that is at least 3/4 acres (0.3 hectares)

Create publicly available open space on the project site

AND/OR

Option 4. Street Network (1 point)

Y M V

Qualifying intersection density (intersections per square mile)

AND/OR

Option 5. Bicycle Network and Storage (1 point)

Y M V

Bicycle Network

Select one of the following. The project has a functional entry and/or bicycle storage within 200 yd (180 m) of a bicycle network that connects to:

At least 10 uses

A school or employment center

A bus rapid transit stops, rail stations, and/or ferry terminals

Bicycle Storage for Multifamily Buildings

Number of building occupants

Number of residential units

Number of short-term spaces provided

Number of short-term spaces required

Number of long-term spaces provided

Number of long-term spaces required

Bicycle Storage for Single Family Homes

The project is a single family home with garage.

LT Credit Compact Development

Up to 3 points

Exemplary Performance for Single and Multifamily Lowrise Only: 35 DU/acre (86.5 DU/hectare)

Preliminary Y M Verified

Total project boundary area (acre)

Buildable land area (acre)

Number of dwelling units

DU/acre of buildable land

LT Credit Community Resources

Up to 2 points

Exemplary Performance: 16 uses for 1/2 point, 20 uses for 1 point.

Preliminary Y M Verified

Number of community resources within a 1/2 mile (800 meters) walking distance

LT Credit Access to Transit

Up to 2 points

Exemplary Performance: For multiple transit types, 720 weekday trips and 432 weekend trips; For commuter rail or ferry, 120 weekday trips.

For projects with multiple transit types

Number of weekday trips
 Number weekend day trips

For projects with commuter rail or ferry service only

Number of weekday trips

Preliminary Y M Verified

Sustainable Sites

Preliminary Y 3

Maybe 0.5

Verified 0

SS Prerequisite Construction Activity Pollution Prevention

Required

Verified

Confirm all of the following measures were implemented on the project, as applicable:

- Stockpiled and protected disturbed topsoil from erosion.
- Controlled the path and velocity of runoff with silt fencing or comparable measures.
- Protected on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures.
- Provided swales to divert surface water from hillsides.
- Used tiers, erosion blankets, compost blankets, filter socks, berms, or comparable measures to stabilize soils in any area with a slope of 15% (6.6:1) or more that was disturbed during construction.
- Prevented air pollution from dust and particulate matter.

For construction sites larger than 1 acre

Select one of the following:

- The project team created an implemented an Erosion and Sedimentation Control (ESC) plan that conforms to the requirements of the 2012 U.S. Environmental Protection Agency Construction General Permit (CGP).
- The project team created an implemented an Erosion and Sedimentation Control (ESC) plan that conforms to local standards and codes, which are as or more stringent than the 2012 EPA Construction General Permit (CGP).

SS Prerequisite No Invasive Plants

Required

Verified

- No invasive plant species have been introduced into the landscape.

SS Credit Heat Island Reduction

Up to 2 points

Option 1. Shading and Option 2. Nonabsorptive Materials (1-2 points)

Preliminary Y M Verified

Hardscapes

- Area of shaded hardscapes (sq ft)
- Area of unshaded paving materials with an initial SR value of at least 0.33 (sq ft)
- Area of unshaded vegetation in open pavers (sq ft)
- Remaining hardscape area (not earning credit) (sq ft)
- Total hardscape area (driveways, walkways, patios, etc.) (sq ft)

Roof

- Area of ENERGY STAR qualified roof (sq ft)
The ENERGY STAR roofing program had a sunset date effective June 1, 2022. Single family projects can use the LEED v4.1 Single Family pathway for 'High-Reflectance Roof. Use roofing materials that have an aged SRI equal to or greater than the values in Table 1. See the rating system for Table 1.' LEED v4 Multifamily projects can pursue the LEED v4.1 Multifamily credit substitution approach as outlined in the LEED v4.1 Guide.
- Area of vegetated roof (sq ft)
- Remaining roof area (not earning credit) (sq ft)
- Total roof area (sq ft)
- Percentage of area with shading or nonabsorptive material (%)

SS Credit Rainwater Management

Up to 3 points

Preliminary Y M Verified

Exemplary Performance: For Case 1, manage 100% of all stormwater on-site.

Case 1. Low Impact Development (1-3 points)

Y M V

Site Characteristics

Total lot area (sq ft)

Roof

<input type="text"/>	Vegetated roof area (sq ft)
<input type="text"/>	Roof area directed to a qualifying infiltration feature (sq ft)
<input type="text" value="27211.00"/>	Remaining roof area (not earning credit) (sq ft)
<input type="text" value="27,211"/>	Total roof area (sq ft)

Non-roof Site Area

Softscape

Total landscape softscape area (sq ft)

Hardscape

<input type="text"/>	Permeable paving (sq ft)
<input type="text"/>	Qualifying open pavers (sq ft)
<input type="text"/>	Hardscapes directed to qualifying infiltration features (sq ft)
<input type="text" value="55818.00"/>	Remaining hardscape area (not earning credit) (sq ft)
<input type="text" value="55,818"/>	Total hardscape area (driveways, walkways, patios, etc.) (sq ft)

Qualifying area, as a percentage of total lot area

Qualifying area, as percentage of total lot area (%)

Reduction of total impermeable area

<input type="text" value="83,029"/>	Total impermeable area of the project (sq ft)
<input type="text" value="#N/A"/>	Reference home size (sq ft)
<input type="text" value="0.0%"/>	Impermeable area as a percentage of reference home size

OR

Case 2. NPDES Projects (2-3 points)

Y M V

Percentile rainfall event

SS Credit Nontoxic Pest Control

Up to 2 points

Exemplary Performance: Projects that achieve 2 points can earn another ½ point for each additional strategy, up to a total of 1 point.

Preliminary Y M Verified

Select all of the following that have been included in the project.

- Install a steel mesh barrier termite control system. (1 point)
- Install a physical termite barrier system (e.g., basaltic rock) approved by code. (1 point)
- For below-grade walls, use solid concrete foundation walls, masonry walls with a course of solid block bond beam, or concrete-filled block. (0.5 point)
- Install post-tension slabs. (0.5 point)
- Treat all cellulosic structural material (e.g., wood framing) with a registered pesticide containing borates, following the manufacturer's directions for preconstruction treatment. (0.5 point)
- Use noncellulosic material for all structural elements. (0.5 point)
- Install ports or openings for all plumbing elements that penetrate the slab, to allow access for inspection and treatment of pest infestations. (0.5 point)
- Install a registered termite bait system and provide for ongoing maintenance as required by the manufacturer. (0.5 point)
- Design a minimum 6-inch (150 millimeters) inspection space between the surface of the planned landscape grade and nonmasonry siding. (0.5 point)
- Seal all external cracks, joints, penetrations, edges, and entry points with appropriate caulking. Install rodent- and corrosion-proof screens (e.g., copper or stainless steel mesh) on all openings greater than ¼ inch (6 millimeters), except where code prohibits their installation. (0.5 point)
- Design discharge points for rain gutters, air-conditioning condensation lines, steam vent lines, or any other moisture source such that discharge is at least 24 inches (600 millimeters) from the foundation. (0.5 point)
- Design landscape features to provide a minimum 18-inch (450 millimeters) space between the exterior wall and any plantings. (0.5 point)

For multifamily projects

- Develop an integrated pest management policy. The policy must include guidance for residents on pesticide use, housekeeping and prompt reporting of pest problems and incorporate policy in the Homeowner Education Manual. (Required)

Water Efficiency

Preliminary Y 4 Maybe 1 Verified 0

WE Prerequisite Water Metering

Required Verified

OR
Case 2. Multifamily V

- A water meter or submeter is installed for each unit.
- True A water meter or submeter is installed for the whole building.

WE Credit Total Water Use

Up to 12 points
Exemplary Performance: 70% reduction of indoor and outdoor water consumption

Preliminary Y M Verified

0.00% Total reduction of indoor and outdoor water consumption as calculated in the [Water Reduction Calculator](#) (%)

For single family projects
 The water pressure does not exceed 60 psi (415 kPa). There are no detectable water leaks. Any installed water softeners are demand initiated.

For multifamily projects
 There are no detectable water leaks. Any installed water softeners are demand initiated.

WE Credit Indoor Water Use

Up to 6 points Preliminary Y 4 M 0 Verified 0

OR
Case 2. Multifamily and Midrise Y 4 M V

True There are no detectable water leaks.

Note: No additional credit is awarded if the fixtures and fittings in non-unit spaces are more efficient than those of in-unit spaces.
 Meet any of the following for in-unit spaces and non-unit spaces:

Lavatory Faucet (1-2 points)
 True All installed lavatory faucets and/or faucet aerators are WaterSense labeled.
 1.00 Average rated flow volume across all lavatory faucets (gpm)

Showerheads (1-2 points)
 True All installed showerhead fixtures and fittings are WaterSense labeled.
 1.50 Average rated flow volume per shower compartment (gpm)

Toilets (1 point)
 All installed toilet fixtures and fittings are WaterSense labeled.
 Average rated flush volume across all toilets (gpf)

Clothes Washers (1 point)
 All clothes washers are ENERGY STAR qualified or performance equivalent

WE Credit Outdoor Water Use

Up to 4 points

Preliminary Y **M** **1** **Verified**

<60	Turf grass area as a percentage of total landscape softscape area (%)
	Native or adapted plant area as a percentage of total landscape softscape area (%)

Energy and Atmosphere

Preliminary Y 19.5 Maybe 1 Verified 19

EA Prerequisite Minimum Energy Performance

Required

Verified

1. ENERGY STAR for Homes version 3

ENERGY STAR version 3 checklists are complete

HERS index rating

ENERGY STAR HERS index target

OR

ENERGY STAR Builder Option Package has been followed and all requirements met.

2. ENERGY STAR Qualified Appliances

Select at least one of the following:

ENERGY STAR refrigerator is installed.

ENERGY STAR dishwasher is installed.

ENERGY STAR clothes washer is installed.

3. Duct Runs

All duct runs are fully ducted.

EA Prerequisite Energy Metering

Required

Verified

OR

Case 2. Multifamily

V

Electric submeters are installed in each residential unit.

A whole-building gas meter or submeter for each residential unit is installed.

EA Prerequisite Education of Homeowner, Tenant, or Building Manager

Required

Verified

An operations and maintenance manual, binder, or CD has been/will be provided to all individuals or organizations responsible for the maintenance of the home.

A minimum one-hour walkthrough of the home with the occupants has been conducted.

EA Credit Annual Energy Use

Up to 29 points Preliminary Y M Verified

Exemplary Performance: For Option 1, 100% reduction; For Option 2, -10 HERS index rating.

Projects may choose to pursue either Option 1 or Option 2 based on the option that produces the most points.

Y M V

Option 1. LEED Energy Budget (1-29 points)

LEED Energy Budget (MMBtu/year)

Annual energy consumption (MMBtu/year)

Percent reduction below LEED Energy Budget (%)

Total Points

Other major energy users not included in the energy rating (if any):

Heated driveway

Spa

Private pool

Heated garage

Other (describe in detail)

OR
Option 2. HERS Index with Home Size Adjuster (0.5-29 points) Y M V

63	HERS index rating
2.00	Number of bedrooms
1100.00	Conditioned floor area of the house (sq ft)
1,600	ENERGY STAR for Homes, version 3, reference home floor area (sq ft)
7	HSA points
12	Points for achieving HERS index rating
19	Total (HSA points + Points for achieving HERS index rating)

EA Credit Efficient Hot Water Distribution System

Up to 5 points **Preliminary** Y M **Verified**

Option 1. Efficient Hot Water Distribution (2 points) Y M V

Note: Projects using heat traces that serve a single unit or house are awarded only half credit.

For projects using circulating systems (required for both Path 1 AND Path 2 below)

- Circulating pump does not operate continuously, is on a timer, or is on a water temperature sensor.
- Circulating pump is demand activated by a momentary contact switch, motion sensor, flow switch, door switch or voice command.
- After the pump starts, the controls allow the pump to operate until the water temperature in the return pipe rises not more than 10°F (6 °C) above the initial temperature of the water in the pipe. Controls limit the water temperature to a maximum of 105°F (40 °C). Controls limit pump operation to not more than 5 minutes per activation in the event that both means of shutting off the pump have failed.
- Circulating hot water systems have with an automatic or readily accessible manual switch to turn off the hot water circulating pump when not in use.

For projects using heat-traced piping systems

- Piping is insulated.

Path 1. Maximum Allowable Pipe Length (2 points) Y M V

<input type="text"/>	Pipe or tube length installed (ft)
<input type="text"/>	Nominal pipe size (in)
<input type="text"/>	Maximum pipe or tube length allowed for water heaters, boilers with no circulation loop or heat traced pipe or in multifamily buildings a central circulation loop or heat traced pipe (ft)
<input type="text"/>	Maximum pipe or tube length allowed for circulation loop or heat traced pipe serving a single unit or house (ft)

OR
Path 2. Maximum Allowable Pipe Volume (2 points) Y M V

<input type="text"/>	Volume of hot or tempered water from source to termination (oz)
----------------------	---

OR
Option 2. Performance Test (3 points) Y M V

Note: Projects using heat traces that serve a single unit or house are awarded only half credit.

For projects using circulating systems (required for both Case 1 AND Case 2 below)

(Select one) Circulating pump does not operate continuously, is on a timer, or is on a water temperature sensor.

(Select one) Circulating pump is demand activated by a momentary contact switch, motion sensor, flow switch, door switch or voice command.

(Select one) After the pump starts, the controls allow the pump to operate until the water temperature in the return pipe rises not more than 10°F (6 °C) above the initial temperature of the water in the pipe. Controls limit the water temperature to a maximum of 105°F (40 °C). Controls limit pump operation to not more than 5 minutes per activation in the event that both means of shutting off the pump have failed.

(Select one) Circulating hot water systems have with an automatic or readily accessible manual switch to turn off the hot water circulating pump when not in use.

For projects using heat-traced piping systems

(Select one) Piping is insulated.

Case 1. Hot water source is a water heater or boiler with no circulation loop or heat traced pipe; or in multifamily buildings a central circulation loop or heat traced pipe.

Y M V

(Select one) Meets WaterSense Labeled New Homes requirements

OR

Tested volume of water stored in piping (gal)

OR
Case 2. Hot water source is a circulation loop or heat traced pipe serving a single unit or house

Y M V

Tested volume of water stored in piping (gal)

AND/OR

Option 3. Pipe Insulation (2 points)

Y M V

Insulation R-value

EA Credit Advanced Utility Tracking

Up to 2 points Preliminary Y M Verified
 Exemplary Performance: Meter separate energy usage information for at least four end uses.

Case 1. Single Family Y M V

Option 1. Electric and Water (1 point)

Y M V

Select one of the following:

(Select one) A permanent energy-monitoring system that records at intervals of one hour or less has been installed.

(Select one) The house has an automatic in-ground irrigation system and landscaped irrigated area larger than 1,000 sq ft (93 sq m) and has installed a submeter to monitor all irrigation system components.

AND/OR

Option 2. Third-Party Utility Reporting (1 point)

Y M V

(Select one) The homeowner has shared all applicable utility data with USGBC via a USGBC-approved third-party.

Case 2. Multifamily Y M V

Option 1. Electric and Water (1 point)

Y M V

Select one of the following:

(Select one) A permanent energy-monitoring system that records at intervals of one hour or less has been installed in each unit.

(Select one) The project has an automatic in-ground irrigation system and landscaped irrigated area larger than 1,000 sq ft (93 sq m) and has installed a submeter to monitor all irrigation system components.

AND/OR

Option 2. Third-Party Utility Reporting (1 point)

Y M V

Path 1. Whole-Building Master Meter

Y M V

(Select one) The building owner has shared all applicable utility data with USGBC via a USGBC-approved third-party.

OR

Path 2. Individual Unit Meters

Y M V

(Select one) At least 50% of unit owners or occupants have shared all applicable utility data with USGBC via a USGBC-approved third-party.

EA Credit Active Solar-Ready Design

1 point

Preliminary Y M **Verified**

Exemplary Performance: Achieve Option 1 and Option 2.

Option 1. Photovoltaic-Ready Design (1 point)

Y M V

Note: Projects that install a photovoltaic (PV) system that meets the requirements of EA Credit Renewable Energy are not eligible for this credit.

(Select one) The house meets EPA's solar photovoltaic specifications for a renewable energy-ready home.

AND/OR

Option 2. Solar Direct Hot Water-Ready Design (1 point)

Y M V

Note: Projects that install a solar direct hot water (DHW) system that meets the requirements of EA Credit Efficient Domestic Hot Water Equipment are not eligible for this credit.

(Select one) Meets EPA's solar water heating specifications for a renewable energy-ready home.

EA Credit HVAC Start-Up Credentialing

1 point

Preliminary Y M **Verified**

Name of technician

Company of technician

Technician commissioning all heating, cooling, and ventilation systems has the following credential

The south-facing glazing area is at least 50% greater than the sum of the glazing area on the east- and west-facing walls.

Materials and Resources

Preliminary Y 4 Maybe 3 Verified 0

MR Prerequisite Certified Tropical Wood

Required

Verified

True All wood in the building is nontropical, reused or reclaimed, or certified by the Forest Stewardship Council, or USGBC-approved equivalent.

MR Prerequisite Durability Management

Required

Verified

True ENERGY STAR for Homes, version 3, water management system checklist is collected from builder.

Confirm all of the following have been implemented on the project:

True Nonpaper-faced backer board, or a product or coating over wallboard that meets standard ASTM D 3273 standard, was installed on the area above bathtub, spa or shower, and in areas behind fiberglass enclosures where wallboard is installed.

True Water-resistant flooring was installed in the kitchen, bathroom(s), laundry room, spa area(s). No carpet was installed in these areas.

True Water-resistant flooring was installed in entryways within 3 feet of exterior door(s).

True A drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for all tank water heaters in or over living space.

True A braided washer hose, drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for clothes washer in or over living space.

True Conventional clothes dryers exhaust directly to outdoors.

MR Credit Durability Management Verification

1 point

Preliminary Y 1 M Verified

True Each measure in the ENERGY STAR for Homes, version 3, water management system builder checklist was verified by the verification team.

MR Credit Environmentally Preferable Products

Up to 4 points

Preliminary Y 1.5 M 1 Verified 0

Exemplary Performance: For Option 2, achieve a minimum of 4 points to earn another 2 points for purchasing products that meet the requirements.

Option 1. Local Production

Preliminary Y 0.5 M Verified

Select which the following were extracted, processed, and manufactured within 100 miles (160 km) of the project site:

100.00 Percentage of locally produced framing (%) (0.5 point)

Percentage of locally produced aggregate for concrete and foundation (%) (0.5 point)

Percentage of locally produced drywall and interior sheathing (%) (0.5 point)

AND/OR

Option 2. Environmentally Preferable Products

Preliminary Y M Verified

Select the criteria met by at least 90% of the component:

No Floor Covering (2 points)	
Floor Covering (1 point)	
Insulation (1 point)	Maybe
Sheathing (1 point)	
Framing (1 point)	
Drywall (1 point)	For synthetic, 95% recycled content (pre-, post-, or combination)
Concrete (1 point)	
Roofing (1 point)	
Siding (1 point)	

Select criteria met for at least 3 of the following additional components by at least 90% of the component (1 point):

Doors	
Cabinets	
Counters	
Interior Trim	
Decking/Patio	
Windows	

MR Credit Construction Waste Management

Up to 3 points

Exemplary Performance: For renovation projects, track and divert at least 50% of demolition waste.

Preliminary Y M Verified

<input type="text"/>	LEED Reference Home Baseline Waste (lbs)
<input type="text"/>	Total Construction Waste (including recycled waste) (lbs)
<input type="text"/>	Recycled Waste (lbs)
0.00	Project Construction Waste (lbs)
<input type="text"/>	Percent reduction below baseline (%)

MR Credit Material-Efficient Framing

Up to 2 points

Exemplary Performance: Achieve a minimum of 2 points to earn up to 1/2 point for each additional requirement met.

Preliminary Y M Verified

Select one of the following for at least 90% of each component: (1 point)

- No more than one horizontal 2x top plate on walls by aligning studs with joists and roof rafters was installed.
- Window and door headers were placed in the rim joist.
- Raised (directly beneath the top plate), single-ply headers not more than 2 inches nominal thickness in a 2x4 wall or 4 inches nominal thickness in a 2x6 wall, were installed.
- Structural insulated panels (SIPs) were installed for walls.

Select at least 2 of the following for at least 90% of each component: (0.5 point)

- Headers were sized for actual loads.
- Ladder blocking or drywall clips were used.
- Two-stud corners or California corners were used.

Select all that apply for at least 90% of each component: (0.5 point each)

- Interior wall studs were spaced greater than 16 inches (400 mm) o.c.
- Floor joists were spaced greater than 16 inches (400 mm) o.c.
- Roof rafters were spaced greater than 16 inches (400 mm) o.c.

Indoor Environmental Quality

Preliminary Y 9

Maybe 0.5

Verified 0

EQ Prerequisite Ventilation

Required

Verified

OR

Case 2. Multifamily

V

Local Exhaust

Confirm all of the following have been implemented on the project:

True Local exhaust systems meeting the requirements of ASHRAE Standard 62.2–2010, Sections 5 and 7 or local equivalent, whichever is more stringent, were installed in all bathrooms (including half-baths) and the kitchen.

True Local exhaust systems exhaust air directly to the outdoors.

True All bathroom exhaust fans are ENERGY STAR-labeled or an HRV or ERV is used.

True For exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (188 liters per second), makeup air is provided at a rate approximately equal to the exhaust air rate. Makeup air systems have a means of closure and can be automatically controlled to start and operate simultaneously with the exhaust system.

Whole Unit Mechanical Ventilation

True The project meets ASHRAE Standard 62.2-2010 Sections 4 and 7 or local equivalent, whichever is more stringent.

Non-Unit Spaces

True The project meets the minimum requirements of ASHRAE Standard 62.1-2010 Sections 4 -7 or local equivalent, whichever is more stringent.

The project is located in a nonattainment area for PM2.5. The project has installed MERV 11 or higher filters.

The project is located in a nonattainment area for ozone.

EQ Prerequisite Combustion Venting

Required

Verified

The project has earned the EPA Indoor airPLUS label

OR

True No unvented combustion appliances were installed (ovens and ranges excluded).

True A carbon monoxide (CO) monitor is installed on each floor, hard-wired with a battery backup.

For projects with fireplaces or woodstoves installed

N/A Provide doors that close or a solid glass enclosure.

N/A Closed-combustion, power-vented or passes BPI or RESNET combustion safety protocols

For projects where space and water heating equipment involving combustion are installed

Select one of the following:

N/A Equipment is installed with closed combustion (i.e. sealed supply air and exhaust ducting)

N/A Equipment is installed with power-vented exhaust

N/A Equipment is located in a detached utility building or open-air facility

EQ Prerequisite Garage Pollutant Protection

Required

Verified

The project has earned the EPA Indoor airPLUS label
OR

True All air-handling equipment and ductwork is placed outside the fire-rated envelope of the garage.
 True Shared surfaces between the garage and conditioned spaces are tightly sealed.

Conditioned Spaces Above Garage

N/A All penetrations and all connecting floor and ceiling joist bays are sealed.

Conditioned Spaces Next to Garage

N/A All doors are weather-stripped.

N/A Carbon monoxide detectors are installed in rooms that share a door with the garage.

N/A All penetrations and all cracks at the base of the walls are sealed.

EQ Prerequisite Radon-Resistant Construction

Required

Verified

Exemplary Performance: For projects in radon zones 2 and 3, install a qualifying passive radon ventilation system.

EPA Indoor airPLUS label

V

The project has earned the EPA Indoor airPLUS label

OR

Case 1. New Construction

V

1 EPA radon zone

For projects in EPA radon zone 1

True There is a capillary break per the Indoor airPLUS specifications.
 True An electrical outlet has been provided near vent piping in the attic to facilitate future fan installation.
 True A gas-tight vertical vent pipe extending up through the conditioned spaces and terminating above the roof opening has been installed.

OR

The house is elevated by at least 2 feet (600 millimeters) with open air space between building and ground or there is a garage under the building.

OR

Case 2. Renovation of Existing Building

V

EPA radon zone

For renovation projects in EPA radon zone 1 with no slab work being performed

Radon test results (pCi/L)
 If results are greater than 4 pCi/L, an active ventilation system has been installed.

EQ Prerequisite Air Filtering

Required

Verified

- The project has earned the EPA Indoor airPLUS label
- OR
- MERV rating of filters on recirculating space conditioning systems
- MERV rating of filters on mechanically supplied outdoor air systems with 10 ft (3 m) or more of ductwork

EQ Prerequisite Environmental Tobacco Smoke

Required

Verified

- For multifamily projects*
- Smoking is prohibited in all common areas of the building.
 - Smoking is prohibited outside the project building(s) except in designated smoking areas located at least 25 ft (7.5 m) from all entries, outdoor air intakes, and operable windows.
 - Signage communicating the smoking policy has been installed.

EQ Prerequisite Compartmentalization

Required

Verified

- For multifamily and attached single-family projects*
- Each residential unit has sealed penetrations through walls, ceilings, and floors and vertical chases adjacent to units.
 - All doors in the residential units leading to common hallways have weather-stripping.
 - All exterior doors and operable windows have weather-stripping.
 - Blower door test results (cfm50)
 - Envelope enclosure area (sq ft)
 - Leakage per area of enclosure (cfm50/sq ft)

EQ Credit Enhanced Ventilation

Up to 3 points

Preliminary Y M Verified

Option 1. Enhanced Local Exhaust (1 point)

Y M V

Bathroom exhaust fan control type in every bathroom with a shower, bathtub, or spa

AND/OR

Option 2. Enhanced Whole-House Ventilation (2 points)

Y M V

A balanced whole-house ventilation system was designed and installed that meets ASHRAE 62.2-2010 sections 4 and 7 in each home or unit.

The system does not exceed ASHRAE 62.2-2010 requirements by more than 10%.

EQ Credit Contaminant Control

Up to 2 points

Preliminary Y M Verified

Exemplary Performance: Achieve a minimum of 2 1/2 points to earn another 1/2 point.

Option 1. Walk-off Mats (0.5 point)

Y M V

For all primary entryways, a permanent walk-off mat that is at least 4 feet (1.2 meters) long and allows access for cleaning has been installed.

For multifamily projects

For exterior entryways in common areas, permanent systems that are at least 10 feet (3 meters) long have been installed.

AND/OR

Option 2. Shoe Removal and Storage (0.5 point)

Y M V

A shoe removal and storage space is near the primary entryway.

No conventional carpet is installed in shoe removal and storage area.

AND/OR

Option 3. Preoccupancy Flush (0.5 point)

Y M V

The project has earned the EPA Indoor airPLUS label

OR

At installation, all permanent ducts and vents were sealed to minimize contamination from construction.

After construction ends and before occupancy

Any dust and debris was removed from ducts.

The home was flushed out for 48 hours, with all windows open, a fan run continuously or all HVAC fans and exhaust fans.

AND/OR

Option 4. Air Testing (1 point)

Y M V

The building was tested for indoor air contaminants and maximum concentrations were not exceeded.

EQ Credit Balancing of Heating and Cooling Distribution Systems

Up to 3 points

Preliminary Y M Verified

Case 1. Forced-Air Systems

Y M V

Option 1. Multiple Zones (1 point)

Y M V

A system with at least two space-conditioning zones with independent thermostatic controls has been installed.

OR

The project is a single family home less than 800 sq ft (74 sq m) or a multifamily building whose average unit size is less than 1,200 sq ft (110 sq m).

AND/OR

Option 2. Supply Air-Flow Testing (1 point)

Y M V

The supply air-flow rates are within +/- 20% (or +/- 25 cfm or 11 lps) of calculated values from ACCA Manual J.

AND/OR

Option 3. Pressure Balancing (1 point)

Y M V

The pressure differential between bedroom and rest of the house is less than 3 Pa.

OR

Case 2. Radiative Systems

Y M V

Option 1. Multiple Zones (1 point)

Y M V

A system with at least two zones with independent thermostatic controls has been installed
 Each zone has a separate loop and pump controlled automatically by a thermostat control.

OR

The project is a single family home less than 800 sq ft (74 sq m) or a multifamily building whose average unit size is less than 1,200 sq ft (110 sq m).

AND/OR

Option 2. Room-by-Room Controls (2 points)

Y M V

Room-by-room thermostatic controls are installed.

EQ Credit Enhanced Compartmentalization

1 point

Preliminary Y M **Verified**

Leakage per area of enclosure (cfm50/sq ft)

EQ Credit Enhanced Combustion Venting

Up to 2 points

Preliminary Y M **Verified**

Option 1. No Fireplace or Woodstove (2 points)

Y M V

No fireplaces or woodstoves have been installed.

OR

Option 2. Enhanced Combustion Venting Measures (1 point)

Y M V

The project has earned the EPA Indoor airPLUS label

OR

EPA qualified wood- or pellet-burning fireplaces with either power or direct venting have been installed.
 A natural gas, propane, or alcohol stove approved by a safety testing facility and has power or direct venting has been installed.
 A natural gas, propane, or alcohol stove has a permanently fixed glass front or gasketed door and an electronic pilot.

EQ Credit Enhanced Garage Pollutant Protection

Up to 2 points

Preliminary Y M **Verified**

Case 1. Single Family

Y M V

Option 1. Exhaust Fan in Garage (1 point)

Y M V

The project has earned the EPA Indoor airPLUS label
OR

Meet all of the following:

- An exhaust fan is installed in the garage and is rated at least 75 cfm (35 lps).
- The exhaust fan meets Energy Star cfm/w performance requirements.
- The exhaust fan vents directly to the outdoors.
- The exhaust fan has an automatic timer control linked to an occupant sensor, a light switch, a garage door opening-closing mechanism, or a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm, or equivalent.
- The exhaust fan has an automatic timer set to provide at least three air changes each time the fan is turned on.

OR

Option 2. No Garage, or Detached Garage, or Carport (2 points)

Y M V

Select one of the following:

- No garage has been constructed.
- A detached garage has been constructed.
- A carport has been constructed.

OR

Case 2. Multifamily

Y M V

Option 1. Exhaust Fan in Multicar Garage (1 point)

Y M V

Meet all of the following:

- All of the requirements in ASHRAE 62.1-2010 for garage ventilation have been met.
- The garage has sufficient exhaust to create negative pressure with respect to adjacent spaces with the doors to the garage closed.
- Self-closing doors have been installed. Deck-to-deck partitions or a hard lid ceiling have been installed.
- The exhaust fan either runs continuously or is on a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm.

OR

Option 2. Exhaust Fan in Small Garage (1 point)

Y M V

Meet all of the following:

- An exhaust fan that meets ENERGY STAR minimum efficacy levels (cfm/W) has been installed.
- Installed direct-exhaust fans are 100 cfm (47 lps) or greater.
- Installed ducted exhaust fans are 130 cfm (61 lps) or greater.
- The exhaust fan either runs continuously or has an automatic timer control linked to an occupant sensor, a light switch, a garage door opening-closing mechanism, or a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm, or equivalent.
- The exhaust fan has an automatic timer set to provide at least three air changes each time the fan is turned on.

OR

Option 3. No Garage, or Detached Garage (2 points)

Y M V

- No garage has been constructed.
- A detached garage has been constructed.

EQ Credit Low-Emitting Products

Up to 3 points

Preliminary Y 1 M 0.5 Verified

Select all that apply. At least 90% of a component must meet the requirement:

True Site-applied interior paints and coatings have been tested and meet the requirements of CA Section 01350. (0.5 point)

True Flooring has been tested and meets the requirements of CA Section 01350. (0.5 point)

Maybe Insulation has been tested and meets the requirements of CA Section 01350. (0.5 point)

Site-applied adhesives and sealants have been tested and meet the requirements of CA Section 01350. (0.5 point)

Composite wood products have been tested and meet the California Air Resources Board requirements for ultra-low-emitting formaldehyde (ULEF) resins or no-added formaldehyde based resins. (1 point)

Innovation

Preliminary Y 3 Maybe 1.5 Verified 0

IN Prerequisite Preliminary Rating

Required

Verified

True Preliminary rating and meeting are complete.

IN Credit Innovation

To achieve all five innovation points, a project team must achieve at least one pilot credit, at least one innovation credit and no more than two exemplary performance
Up to 5 points

Preliminary Y M Verified

Option 1. Innovation (1 point)

Y M V

Describe the intent of the proposed innovation credit.

AND/OR

Option 2. Pilot (1 point)

Y M V

Pilot credit name

AND/OR

Option 3. Additional Strategies (0.5-3 points)

Y M V

Exemplary Performance: 1-2 points

Strategy
Credit name

IN Credit LEED Accredited Professional

1 point

Preliminary Y M Verified

Name of credential holder

Regional Priority

Preliminary Y 3 Maybe 1 Verified 0

RP Credit Regional Priority

Up to 4 points

Preliminary Y M Verified

Regional priority credits may be found on www.usgbc.org/rpc.

Regional Priority Credit Name	Required Threshold
EA HVAC Start-up Credentialing	1 -MAYBE
LT Site Selection	4
SS Heat Island Reduction	2
EA Building Orientation for Passive Solar	1
EA Annual Energy Use	13 - YES
MR Durability Managaement Verification	1 - YES
SS Rainwater Management	2
Total Water Use (threshold: 5) OR Indoor Water Use (threshold: 3)	3 - YES



National Rater Design Review Checklist

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If pursuing Path A - HVAC Grading, complete this page. ¹

Home Address: _____ City: _____ State: _____ Permit Date: _____

1. Partnership Status	Must Correct	Rater ² Verified
1.1 Rater has verified and documented that builder has an ENERGY STAR partnership agreement using energystar.gov/partnerlocator . ³	<input type="checkbox"/>	<input type="checkbox"/>
2. High-Performance Fenestration		
2.1 Specified fenestration meets or exceeds 2009 IECC requirements. ⁴	<input type="checkbox"/>	<input type="checkbox"/>
3. High-Performance Insulation		
3.1 Specified ceiling, wall, floor, and slab insulation levels comply with one of the following options:		
3.1.1 Meets or exceeds 2009 IECC levels ^{5, 6, 7} OR ;	<input type="checkbox"/>	<input type="checkbox"/>
3.1.2 Achieves $\leq 133\%$ of the total UA resulting from the U-factors in 2009 IECC Table 402.1.3, per guidance in Footnote 5d, AND specified home infiltration does not exceed the following: ^{6, 7} 3 ACH50 in CZs 1, 2 2.5 ACH50 in CZs 3, 4 2 ACH50 in CZs 5, 6, 7 1.5 ACH50 in CZ 8	<input type="checkbox"/>	<input type="checkbox"/>
4a. Review of ANSI / RESNET / ACCA Std. 310 HVAC Design Report with ENERGY STAR Supplement		
4a.1 HVAC design report compliant with ANSI / RESNET / ACCA Std. 310, with the ENERGY STAR supplement, collected for records, with no items left blank .	<input type="checkbox"/>	<input type="checkbox"/>
4a.2 ANSI / RESNET / ACCA Std. 310 Rater Design Review Checklist completed for applicable housing type, with all items marked, "Rater Verified".	<input type="checkbox"/>	<input type="checkbox"/>
4a.3 Cooling sizing % is within the cooling sizing limit selected by the HVAC designer.	<input type="checkbox"/>	<input type="checkbox"/>
Rater Name: _____ Date of Review: _____		
Rater Signature: _____ Rater Company Name: _____		



National Rater Design Review Checklist

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If pursuing Path B - HVAC Credential, complete this page.

Home Address: _____ City: _____ State: _____ Permit Date: _____

	Must Correct	Rater ² Verified
1. Partnership Status		
1.1 Rater has verified and documented that builder has an ENERGY STAR partnership agreement using energystar.gov/partnerlocator . ³	<input type="checkbox"/>	<input type="checkbox"/>
1.2 Rater has verified and documented ⁸ that HVAC contractor holds credential required to complete National HVAC Commissioning Checklist, unless all equipment to be installed in home to be certified is an exempted type, in which case check "N/A". ⁹ <input type="checkbox"/> N/A HVAC Contractor Company Name: _____	<input type="checkbox"/>	<input type="checkbox"/>
2. High-Performance Fenestration		
2.1 Specified fenestration meets or exceeds 2009 IECC requirements. ⁴	<input type="checkbox"/>	<input type="checkbox"/>
3. High-Performance Insulation		
3.1 Specified ceiling, wall, floor, and slab insulation levels comply with one of the following options:		
3.1.1 Meets or exceeds 2009 IECC levels ^{5,6,7} OR ;	<input type="checkbox"/>	<input type="checkbox"/>
3.1.2 Achieves $\leq 133\%$ of the total UA resulting from the U-factors in 2009 IECC Table 402.1.3, per guidance in Footnote 5d, AND specified home infiltration does not exceed the following: ^{6,7} 3 ACH50 in CZs 1, 2 2.5 ACH50 in CZs 3, 4 2 ACH50 in CZs 5, 6, 7 1.5 ACH50 in CZ 8	<input type="checkbox"/>	<input type="checkbox"/>
4b. Review of ENERGY STAR National HVAC Design Report¹⁰		
4b.1 National HVAC Design Report collected for records, with no items left blank .	<input type="checkbox"/>	<input type="checkbox"/>
4b.2 National HVAC Design Report reviewed by Rater for the following parameters (National HVAC Design Report Item # in parenthesis):		
4b.2.1 Cooling season and heating season outdoor design temperatures used in loads (3.3) are within the limits defined for the State and County, or US Territory, where the home will be built, or the designer has provided an allowance from EPA to use alternative values. All limits are published at energystar.gov/hvacdesigntemps . Note that revised (i.e., 2019 Edition) limits are required to be used for all HVAC Design Reports generated after 10/01/2020. ¹¹	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.2 Number of occupants used in loads (3.4) is within ± 2 of the home to be certified. ¹²	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.3 Conditioned floor area used in loads (3.5) is between 100 sq. ft. smaller and 300 sq. ft. larger than the home to be certified. ¹³	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.4 Window area used in loads (3.6) is between 15 sq. ft. smaller and 60 sq. ft. larger than the home to be certified, or, for homes to be certified with > 500 sq. ft. of window area, between 3% smaller and 12% larger. ¹⁴	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.5 Predominant window SHGC used in loads (3.7) is within 0.1 of predominant value in the home to be certified. ¹⁵	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.6 Sensible, latent, & total heat gain are documented (3.10 - 3.12) for the orientation of the home to be certified. ¹⁶	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.7 The variation in total heat gain across orientations (3.13) is ≤ 6 kBtuh. ¹⁶	<input type="checkbox"/>	<input type="checkbox"/>
4b.2.8 Cooling sizing % (4.13) is within the cooling sizing limit (4.15) selected by the HVAC designer.	<input type="checkbox"/>	<input type="checkbox"/>
Rater Name: _____ Date of Review: _____		
Rater Signature: _____ Rater Company Name: _____		



National Rater Design Review Checklist

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Footnotes

1. Path A – HVAC Grading shall not be used until an Effective Date has been defined by RESNET for ANSI / RESNET / ACCA Std. 310. Path A – HVAC Grading shall then use ANSI / RESNET / ACCA Std. 310 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the Effective Date and Transition Period End Date defined by RESNET. RESNET interpretations of Standard 310 shall also be followed.
2. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, or an equivalent designation as determined by a Verification Oversight Organization such as RESNET; and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/newhomestraining.
3. Raters are only required to document the partnership status of a builder once, for the first home that the Rater certifies for them.
4. All windows, doors and skylights shall meet or exceed the component U-factor and SHGC requirements specified in 2009 IECC Table 402.1.1. If no NFRC rating is noted on the window or in product literature (e.g., for site-built fenestration), select the U-factor and SHGC value from Tables 4 and 10, respectively, in 2013 ASHRAE Fundamentals, Chapter 15. Select the highest U-factor and SHGC value among the values listed for the known window characteristics (e.g., frame type, number of panes, glass color, and presence of low-e coating). Note that the U-factor requirement applies to all fenestration while the SHGC only applies to the glazed portion. The following exceptions apply:
 - a. An area-weighted average of fenestration products shall be permitted to satisfy the U-factor requirements;
 - b. An area-weighted average of fenestration products $\geq 50\%$ glazed shall be permitted to satisfy the SHGC requirements;
 - c. 15 square feet of glazed fenestration per dwelling unit shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above;
 - d. One side-hinged opaque door assembly up to 24 square feet in area shall be exempt from the U-factor requirements and shall be excluded from area-weighted averages calculated using a) and b), above;
 - e. Fenestration utilized as part of a passive solar design shall be exempt from the U-factor and SHGC requirements, and shall be excluded from area-weighted averages calculated using a) and b), above. Exempt windows shall be facing within 45 degrees of true South and directly coupled to thermal storage mass that has a heat capacity $> 20 \text{ btu} / \text{ft}^2 \times \text{°F}$ and provided in a ratio of at least 3 sq. ft. per sq. ft. of South facing fenestration. Generally, thermal mass materials will be at least 2 in. thick.

In PHIUS+ or PHI certified homes, where triple-glazed window assemblies with thermal breaks / spacers between the panes are used, such windows meet the intent of Item 2.1 and shall be excluded when assessing compliance of a) through e), above.

5. Specified levels shall meet or exceed the component insulation levels in 2009 IECC Table 402.1.1. The following exceptions apply:
 - a. Steel-frame ceilings, walls, and floors shall meet the insulation levels of 2009 IECC Table 402.2.5. In CZ 1 and 2, the continuous insulation requirements in this table shall be permitted to be reduced to R-3 for steel-frame wall assemblies with studs spaced at 24 in. on center. This exception shall not apply if the alternative calculations in d) are used;
 - b. For ceilings with attic spaces, R-30 shall satisfy the requirement for R-38 and R-38 shall satisfy the requirement for R-49 wherever the full height of uncompressed insulation at the lower R-value extends over the wall top plate at the eaves. This exemption shall not apply if the alternative calculations in d) are used;
 - c. For ceilings without attic spaces, R-30 shall satisfy the requirement for any required value above R-30 if the design of the roof / ceiling assembly does not provide sufficient space for the required insulation value. This exemption shall be limited to 500 sq. ft. or 20% of the total insulated ceiling area, whichever is less. This exemption shall not apply if the alternative calculations in d) are used;
 - d. An alternative equivalent U-factor or total UA calculation may also be used to demonstrate compliance, as follows:

An assembly with a U-factor equal or less than specified in 2009 IECC Table 402.1.3 complies.

A total building thermal envelope UA that is less than or equal to the total UA resulting from the U-factors in Table 402.1.3 also complies. The performance of all components (i.e., ceilings, walls, floors, slabs, and fenestration) can be traded off using the UA approach. Note that Items 3.1 through 3.3 of the National Rater Field Checklist shall be met regardless of the UA tradeoffs calculated. The UA calculation shall be done using a method consistent with the ASHRAE Handbook of Fundamentals and shall include the thermal bridging effects of framing materials. The calculation for a steel-frame envelope assembly shall use the ASHRAE zone method or a method providing equivalent results, and not a series-parallel path calculation method.
6. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Alternatively, the thermal break is permitted to be created using $\geq R-3$ rigid insulation on top of an existing slab (e.g., in a home undergoing a gut rehabilitation). In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).
7. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house, slab insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the home's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted details is available at: energystar.gov/slabeledge.
8. Raters' documentation of the HVAC contractor credential must be updated at least once every 12 months.
9. HVAC contractors must be credentialed by an EPA-recognized HVAC Quality Installation Training and Oversight Organization (H-QUITO) if a split air conditioner, unitary air conditioner, air-source heat pump, or water-source (i.e., geothermal) heat pump up to 65 kBtu/h with a forced-air distribution system (i.e., ducts) or a furnace up to 225 kBtu/h with a forced-air distribution system (i.e., ducts) will be installed in the home to be certified. For all other permutations of equipment (e.g., boilers, mini-split / multi-split systems) and distribution systems, a credential is not required. An explanation of this credentialing process and links to H-QUITOs, which maintain lists of credentialed contractors, can be found at energystar.gov/newhomeshvac.



National Rater Design Review Checklist

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10. The Rater shall collect one National HVAC Design Report per system design per plan. Regardless of whether the “site-specific design” or “group design” box has been checked in Item 1.6 of the National HVAC Design Report, the system design as documented on the National HVAC Design Report must fall within the tolerances in Item 4b.2 for the home to be certified. The report is only required to be collected once per system design, even if multiple homes are built using this design (e.g., in a production environment where the same plan is built multiple times, only one report is required as long as no aspect of the system design changes between homes). The Rater is only responsible for verifying that the designer has not left any items blank on the National HVAC Design Report and for verifying the discrete objective parameters in Item 4b.2 of this Checklist, not for verifying the accuracy of every input on the National HVAC Design Report.
11. Visit energystar.gov/hvacdesigntemps for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR certified homes and the process for a designer to obtain an allowance from EPA. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Fauquier County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93 F, then the same report could be used in Fairfax County (which has a higher limit of 94 F) but not in Arlington County (which has a lower limit of 92 F).
12. To determine the number of occupants among all HVAC systems in the home, calculate the number of bedrooms, as defined below, and add one. The number of occupants used in loads must be within ± 2 of the home to be certified, unless Item 1.5 of the National HVAC Design Report indicates that the system is a cooling system for temporary occupant loads.

A bedroom is defined by ANSI / RESNET / ICC Standard 301-2014 as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A “den”, “library”, or “home office” with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.

An egress window, as defined in 2009 IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:

 - have a sill height of not more than 44 inches above the floor; AND
 - have a minimum net clear opening of 5.7 sq. ft.; AND
 - have a minimum net clear opening height of 24 in.; AND
 - have a minimum net clear opening width of 20 in.; AND
 - be operational from the inside of the room without the use of keys, tools or special knowledge.
13. Conditioned Floor Area for the home to be certified shall be calculated in accordance with the definition in ANSI / RESNET / ICC Standard 301-2019.
14. Window area for the home to be certified shall be calculated in accordance with the on-site inspection protocol provided in Normative Appendix B of ANSI / RESNET / ICC Standard 301-2019.
15. “Predominant” is defined as the SHGC value used in the greatest amount of window area in the home.
16. Orientation represents the direction that the front door of the house is facing. The designer is only required to document the loads for the orientation(s) that the house might be built in. For example, if a house plan will only be built one time in a specific orientation (e.g., a site-specific design), then the designer only needs to document the loads for this one orientation.



National Rater Field Checklist

ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 10)

Home Address: _____	City: _____	State: _____	Permit Date: _____		
Thermal Enclosure System		Must Correct	Builder Verified ¹	Rater Verified ²	N/A ³
1. High-Performance Fenestration & Insulation					
1.1 Fenestration meets or exceeds specification in Item 2.1 of the National Rater Design Review Checklist.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
1.2 Insulation meets or exceeds specification in Item 3.1 of the National Rater Design Review Checklist. ⁴		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
1.3 All insulation achieves Grade I install. per ANSI / RESNET / ICC Std. 301. Alternatives in Footnote 5. ^{5,6}		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
2. Fully-Aligned Air Barriers⁷ - At each insulated location below, a complete air barrier is provided that is fully aligned as follows:					
<u>Ceilings:</u> At interior or exterior horizontal surface of ceiling insulation in Climate Zones 1-3; at interior horizontal surface of ceiling insulation in Climate Zones 4-8. Also, at exterior vertical surface of ceiling insulation in all climate zones (e.g., using a wind baffle that extends to the full height of the insulation in every bay or a tabbed baffle in each bay with a soffit vent that prevents wind washing in adjacent bays). ⁸					
2.1 Dropped ceilings / soffits below unconditioned attics, and all other ceilings.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<u>Walls:</u> At exterior vertical surface of wall insulation in all climate zones; also at interior vertical surface of wall insulation in Climate Zones 4-8. ⁹					
2.2 Walls behind showers, tubs, staircases, and fireplaces.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3 Attic knee walls and skylight shaft walls. ¹⁰		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.4 Walls adjoining porch roofs or garages.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.5 Double-walls and all other exterior walls.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
<u>Floors:</u> At exterior vertical surface of floor insulation in all climate zones and, if over unconditioned space, also at interior horizontal surface including supports to ensure alignment. Alternatives in Footnotes 12 & 13. ^{11, 12, 13}					
2.6 Floors above garages, floors above unconditioned basements or crawlspaces, and cantilevered floors.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.7 All other floors adjoining unconditioned space (e.g., rim / band joists at exterior wall or at porch roof).		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Reduced Thermal Bridging					
3.1 For insulated ceilings with attic space above (i.e., non-cathedralized), Grade I insulation extends to the inside face of the exterior wall below and is $\geq R-21$ in CZ 1-5; $\geq R-30$ in CZ 6-8. ¹⁴		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2 For slabs on grade in CZ 4-8, 100% of slab edge insulated to $\geq R-5$ at the depth specified by the 2009 IECC and aligned with the thermal boundary of the walls. ^{15, 16}		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3 Insulation beneath attic platforms (e.g., HVAC platforms, walkways) $\geq R-21$ in CZ 1-5; $\geq R-30$ in CZ 6-8.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4 At above-grade walls separating conditioned from unconditioned space, one of the following options used (rim / band joists exempted): ¹⁷					
3.4.1 Continuous rigid insulation, insulated siding, or combination of the two is: $\geq R-3$ in CZ 1-4; $\geq R-5$ in CZ 5-8 ^{18, 19, 20} ; OR ;		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.2 Structural Insulated Panels OR ; Insulated Concrete Forms OR ; Double-wall framing OR ; ^{18, 21}		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3 Advanced framing, including all of the Items below: ²²					
3.4.3a Corners insulated $\geq R-6$ to edge ²³ ; AND ;		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3b Headers above windows & doors insulated $\geq R-3$ for 2x4 framing or equivalent cavity width, and $\geq R-5$ for all other assemblies (e.g., with 2x6 framing) ²⁴ ; AND ;		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3c Framing limited at all windows & doors to one pair of king studs, plus one pair of jack studs per window opening to support the header and sill; AND ;		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3d Interior / exterior wall intersections insulated to same R-value as rest of exterior wall; ²⁵ AND ;		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4.3e Minimum stud spacing of 16 in. o.c. for 2x4 framing in all Climate Zones and, in CZ 6-8, 24 in. o.c. for 2x6 framing. ²⁶		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Air Sealing (Unless otherwise noted below, "sealed" indicates the use of caulk, foam, or equivalent material)					
4.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations to unconditioned space sealed, with blocking / flashing as needed.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
4.2 Recessed lighting fixtures adjacent to unconditioned space ICAT labeled and gasketed. Also, if in insulated ceiling without attic above, exterior surface of fixture insulated to $\geq R-10$ in CZ 4-8.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3 Above-grade sill plates adjacent to conditioned space sealed to foundation or sub-floor. Gasket also placed beneath above-grade sill plate if resting atop concrete / masonry & adjacent to cond. space. ^{27,28}		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4 Continuous top plate or blocking is at top of walls adjoining unconditioned space, and sealed.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5 Drywall sealed to top plate at all unconditioned attic / wall interfaces using caulk, foam, drywall adhesive (but not other construction adhesives), or equivalent material. Either apply sealant directly between drywall and top plate or to the seam between the two from the attic above.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.6 Rough opening around windows & exterior doors sealed. ²⁹		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	-
4.7 Walls that separate attached garages from occupiable space sealed and, also, an air barrier installed and sealed at floor cavities aligned with these walls.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.8 In multifamily buildings, the gap between the common wall (e.g. the drywall shaft wall) and the structural framing between units sealed at all exterior boundaries.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.9 Doors adjacent to unconditioned space (e.g., attics, garages, basements) or ambient conditions made substantially air-tight with weatherstripping or equivalent gasket.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.10 Attic access panels, drop-down stairs, & whole-house fans equipped with durable $\geq R-10$ cover that is gasketed (i.e., not caulked). Fan covers either installed on house side or mechanically operated. ³⁰		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



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HVAC System ³¹ (National HVAC Design Report Item # in parenthesis)			Must Correct	Rater Verified ²	N/A ³
5. Heating & Cooling Equipment - Complete Path A - HVAC Grading ³² or Path B - HVAC Credential					
Path A	5a.1 Blower fan volumetric airflow is Grade I or II per ANSI / RESNET / ACCA Std. 310.		<input type="checkbox"/>	<input type="checkbox"/>	-
	5a.2 Blower fan watt draw is Grade I or II per ANSI / RESNET / ACCA Std. 310.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5a.3 Refrigerant charge is Grade I per ANSI / RESNET / ACCA Std. 310. See Footnote 33 for exemptions. ³³		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Path B	5b.1 HVAC manufacturer & model number on installed equipment matches either of the following (check box): ³⁴ <input type="checkbox"/> National HVAC Design Report (4.3, 4.4, & 4.17) <input type="checkbox"/> Written approval received from designer		<input type="checkbox"/>	<input type="checkbox"/>	-
	5b.2 External static pressure measured by Rater at contractor-provided test locations and documented below: ³⁵ Return-Side External Static Pressure: _____ IWC Supply-Side External Static Pressure: _____ IWC		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	5b.3 Permitted, but not required: National HVAC Commissioning Checklist collected, with no items left blank.		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Duct Quality Installation (Applies to Heating, Cooling, Ventilation, Exhaust, & Pressure Balancing Ducts, unless noted)			Required for LEED		
6.1 Ductwork installed without kinks, sharp bends, compressions, or excessive coiled flexible ductwork. ³⁶			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.2 Bedrooms pressure-balanced (e.g., using transfer grilles, jump ducts, dedicated return ducts, undercut doors) to achieve a Rater-measured pressure differential ≥ -3 Pa and $\leq +3$ Pa with respect to the main body of the house when all air handlers are operating. Test configuration and an alternative compliance option in Footnote 37. ³⁷			<input type="checkbox"/>	<input type="checkbox"/>	-
6.3 All supply and return ducts in unconditioned space, including connections to trunk ducts, are insulated to \geq R-6 ³⁸			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4 Rater-measured total duct leakage meets one of the following two options. Alternative in Footnote 40: ^{39, 40, 41}					
6.4.1 Rough-in: The greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM25, with air handler & all ducts, building cavities used as ducts, & duct boots installed. In addition, all duct boots sealed to finished surface, Rater-verified at final. ⁴²			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.4.2 Final: The greater of ≤ 8 CFM25 per 100 sq. ft. of CFA or ≤ 80 CFM25, with the air handler & all ducts, bldg. cavities used as ducts, duct boots, & register grilles atop the finished surface (e.g., drywall, floor) installed. ⁴³			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6.5 Rater-measured duct leakage to outdoors the greater of ≤ 4 CFM25 per 100 sq. ft. of CFA or ≤ 40 CFM25. ^{39, 44}			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Whole-House Mechanical Ventilation System					
7.1 Rater-measured ventilation rate is within either ± 15 CFM or $\pm 15\%$ of design value (2.3). ⁴⁵			<input type="checkbox"/>	<input type="checkbox"/>	-
7.2 A readily-accessible ventilation override control installed and also labeled if its function is not obvious (e.g., a label is required for a standalone wall switch, but not for a switch that's on the ventilation equipment). ⁴⁶			<input type="checkbox"/>	<input type="checkbox"/>	-
7.3 No outdoor air intakes connected to return side of the HVAC system, unless controls are installed to operate intermittently & automatically based on a timer and to restrict intake when not in use (e.g., motorized damper).			<input type="checkbox"/>	<input type="checkbox"/>	-
7.4 System fan rated ≤ 3 sones if intermittent and ≤ 1 sone if continuous, or exempted. ⁴⁷			<input type="checkbox"/>	<input type="checkbox"/>	-
7.5 If system utilizes the HVAC fan, then the specified fan type is ECM / ICM (4.7), or the controls will reduce the standalone ventilation run-time by accounting for hours when the HVAC system is heating or cooling.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.6 Bathroom fans are ENERGY STAR certified if used as part of the whole-house system. ⁴⁸			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7.7 Air inlet location (Complete if ventilation air inlet location was specified (2.12, 2.13); otherwise check "N/A"): ^{49, 50}			-	-	<input type="checkbox"/>
7.7.1 Inlet pulls ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.			<input type="checkbox"/>	<input type="checkbox"/>	-
7.7.2 Inlet is ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources not exiting the roof, and ≥ 3 ft. distance from dryer exhausts and sources exiting the roof. ⁵¹			<input type="checkbox"/>	<input type="checkbox"/>	-
7.7.3 Inlet is provided with rodent / insect screen with ≤ 0.5 inch mesh.			<input type="checkbox"/>	<input type="checkbox"/>	-
8. Local Mechanical Exhaust - In each kitchen and bathroom, a system is installed that exhausts directly to the outdoors and meets one of the following Rater-measured airflow and manufacturer-rated sound level standards: ^{45, 52}					
Location		Continuous Rate	Intermittent Rate ⁵³		
8.1 Kitchen	Airflow	≥ 5 ACH, based on kitchen volume ^{54, 55}	≥ 100 CFM and, if not integrated with range, also ≥ 5 ACH based on kitchen volume ^{54, 55, 56}		
	Sound	Recommended: ≤ 1 sone	Recommended: ≤ 3 sones		
8.2 Bathroom	Airflow	≥ 20 CFM	≥ 50 CFM		
	Sound	Required: ≤ 1 sone	Recommended: ≤ 3 sones		
9. Filtration					
9.1 MERV 6+ filter(s) installed in each ducted mech. system, located to facilitate occupant access & regular service. ⁵⁷			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.2 Filter access panel includes gasket and fits snugly against exposed edge of filter when closed to prevent bypass. ⁵⁸			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9.3 All return air and mechanically supplied outdoor air passes through filter prior to conditioning.			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Combustion Appliances					
10.1 Furnaces, boilers, & water heaters are mechanically drafted or direct-vented. Alternatives in Footnote 61. ^{59, 60, 61}			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.2 Fireplaces are mechanically drafted or direct-vented. Alternatives in Footnote 62. ^{59, 60, 62}			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.3 If unvented combustion appliances other than cooking ranges or ovens are located inside the home's pressure boundary, the Rater has followed Section 802 of RESNET's Standards, encompassing ANSI/ACCA 12 QH-2014, Appendix A, Section A3 (Carbon Monoxide Test), and verified the equipment meets the limits defined within. ^{59, 63}			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Rater Name: _____		Rater Pre-Drywall Inspection Date: _____		Rater Initials: _____	
Rater Name: _____		Rater Final Inspection Date: _____		Rater Initials: _____	
Builder Employee: _____		Builder Inspection Date: _____		Builder Initials: _____	



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Footnotes

1. At the discretion of the Rater, the builder may verify up to eight items in Sections 1-4 of this Checklist. When exercised, the builder's responsibility will be formally acknowledged by the builder signing off on the checklist for the item(s) that they verified. However, if a quality assurance review indicates that Items have not been successfully completed, the Rater will be responsible for facilitating corrective action.
2. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, or an equivalent designation as determined by a Verification Oversight Organization such as RESNET; and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/newhomestraining.
3. The column titled "N/A," which denotes items that are "not applicable," should be used when the checklist Item is not present in the home or conflicts with local requirements.
4. In addition, the infiltration shall not exceed the limits specified in Item 3.1.2 of the National Rater Design Review Checklist, if this option has been used to comply with Item 3.1.
5. Two alternatives are provided: a) Grade II cavity insulation is permitted to be used for assemblies that contain a layer of continuous, air impermeable insulation $\geq R-3$ in Climate Zones 1 to 4, $\geq R-5$ in Climate Zones 5 to 8; b) Grade II batts are permitted to be used in floors if they fill the full width and depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving Grade I is the compression caused by the excess insulation.
6. Ensure compliance with this requirement using ANSI / RESNET / ICC Std. 301 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the Effective Date and Transition Period End Date defined by RESNET. RESNET interpretations of Standard 301 shall also be followed.
7. For purposes of this Checklist, an air barrier is defined as any durable solid material that blocks air flow between conditioned space and unconditioned space, including necessary sealing to block excessive air flow at edges and seams and adequate support to resist positive and negative pressures without displacement or damage. EPA recommends, but does not require, rigid air barriers.
Open-cell or closed-cell foam shall have a finished thickness ≥ 5.5 in. or 1.5 in., respectively, to qualify as an air barrier unless the manufacturer indicates otherwise.
If flexible air barriers such as house wrap are used, they shall be fully sealed at all seams and edges and supported using fasteners with caps or heads ≥ 1 in. diameter unless otherwise indicated by the manufacturer. Flexible air barriers shall not be made of kraft paper, paper-based products, or other materials that are easily torn. If polyethylene is used, its thickness shall be ≥ 6 mil.
8. All insulated ceiling surfaces, regardless of slope (e.g., cathedral ceilings, tray ceilings, conditioned attic roof decks, flat ceilings, sloped ceilings), must meet the requirements for ceilings.
9. All insulated vertical surfaces are considered walls (e.g., above and below grade exterior walls, knee walls) and must meet the air barrier requirements for walls. The following exceptions apply: air barriers recommended, but not required, in adiabatic walls in multifamily dwellings; and, in Climate Zones 4 through 8, an air barrier at the interior vertical surface of insulation is recommended but not required in basement walls or crawlspace walls. For the purpose of these exceptions, a basement or crawlspace is a space for which $\geq 40\%$ of the total gross wall area is below-grade.
10. Exterior air barriers are not required for attic knee walls that are ≤ 24 in. in height if an interior air barrier is provided and insulation extends in all directions from the top of this interior air barrier into unconditioned space at the following levels: CZ 1-5: $\geq R-21$; CZ 6-8: $\geq R-30$.
11. EPA highly recommends, but does not require, an air barrier at the interior vertical surface of floor insulation in Climate Zones 4-8.
12. Examples of supports necessary for permanent contact include staves for batt insulation or netting for blown-in insulation. Alternatively, supports are not required if batts fill the full depth of the floor cavity, even when compression occurs due to excess insulation, as long as the R-value of the batts has been appropriately assessed based on manufacturer guidance and the only defect preventing the insulation from achieving the required installation grade is the compression caused by the excess insulation.
13. Alternatively, an air barrier is permitted to be installed at the exterior horizontal surface of the floor insulation if the insulation is installed in contact with this air barrier, the exterior vertical surfaces of the floor cavity are also insulated, and air barriers are included at the exterior vertical surfaces of this insulation.
14. The minimum designated R-values must be achieved regardless of the trade-offs determined using an equivalent U-factor or UA alternative calculation. Note that if the minimum designated values are used, then higher insulation values may be needed elsewhere to meet Item 1.2. Also, note that these requirements can be met by using any available strategy, such as a raised-heel truss, alternate framing that provides adequate space, and / or high-density insulation.
15. Consistent with the 2009 IECC, slab edge insulation is only required for slab-on-grade floors with a floor surface less than 12 inches below grade. Slab insulation shall extend to the top of the slab to provide a complete thermal break. If the top edge of the insulation is installed between the exterior wall and the edge of the interior slab, it shall be permitted to be cut at a 45-degree angle away from the exterior wall. Alternatively, the thermal break is permitted to be created using $\geq R-3$ rigid insulation on top of an existing slab (e.g., in a home undergoing a gut rehabilitation). In such cases, up to 10% of the slab surface is permitted to not be insulated (e.g., for sleepers, for sill plates). Insulation installed on top of slab shall be covered by a durable floor surface (e.g., hardwood, tile, carpet).
16. Where an insulated wall separates a garage, patio, porch, or other unconditioned space from the conditioned space of the house, slab insulation shall also be installed at this interface to provide a thermal break between the conditioned and unconditioned slab. Where specific details cannot meet this requirement, partners shall provide the detail to EPA to request an exemption prior to the home's certification. EPA will compile exempted details and work with industry to develop feasible details for use in future revisions to the program. A list of currently exempted details is available at: energystar.gov/slabeledge.
17. Mass walls utilized as the thermal mass component of a passive solar design (e.g., a Trombe wall) are exempt from this Item. To be eligible for this exemption, the passive solar design shall be comprised of the following five components: an aperture or collector, an absorber, thermal mass, a distribution system, and a control system. For more information, see: energy.gov/sites/prod/files/guide_to_passive_solar_home_design.pdf.



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Mass walls that are not part of a passive solar design (e.g., CMU block or log home enclosure) shall either utilize the strategies outlined in Item 3.4 or the pathway in the assembly with the least thermal resistance, as determined using a method consistent with the 2013 ASHRAE Handbook of Fundamentals, shall provide $\geq 50\%$ of the applicable assembly resistance, defined as the reciprocal of the mass wall equivalent U-factor in the 2009 IECC Table 402.1.3. Documentation identifying the pathway with the least thermal resistance and its resistance value shall be collected by the Rater and any Builder Verified or Rater Verified box under Item 3.4 shall be checked.

18. Up to 10% of the total exterior wall surface area is exempted from the reduced thermal bridging requirements to accommodate intentional designed details (e.g., architectural details such as thermal fins, wing walls, or masonry fireplaces; structural details, such as steel columns). It shall be apparent to the Rater that the exempted areas are intentional designed details or the exempted area shall be documented in a plan provided by the builder, architect, or engineer. The Rater need not evaluate the necessity of the designed detail to certify the home.
19. If used, insulated siding shall be attached directly over a water-resistive barrier and sheathing. In addition, it shall provide the required R-value as demonstrated through either testing in accordance with ASTM C 1363 or by attaining the required R-value at its minimum thickness. Insulated sheathing rated for water protection can be used as a water resistant barrier if all seams are taped and sealed. If non-insulated structural sheathing is used at corners, the advanced framing details listed in Item 3.4.3 shall be met for those wall sections.
20. Steel framing shall meet the reduced thermal bridging requirements by complying with Item 3.4.1 of the Checklist.
21. Double-wall framing is defined as any framing method that ensures a continuous layer of insulation covering the studs to at least the R-value required in Item 3.4.1 of the Checklist, such as offset double-stud walls, aligned double-stud walls with continuous insulation between the adjacent stud faces, or single-stud walls with 2x2 or 2x3 cross-framing. In all cases, insulation shall fill the entire wall cavity from the interior to exterior sheathing except at windows, doors and other penetrations.
22. All advanced framing details shall be met except where the builder, architect, or engineer provides a framing plan that encompasses the details in question, indicating that structural members are required at these locations and including the rationale for these members (e.g., full-depth solid framing is required at wall corners or interior / exterior wall intersections for shear strength, a full-depth solid header is required above a window to transfer load to jacks studs, additional jack studs are required to support transferred loads, additional cripple studs are required to maintain on-center spacing, or stud spacing must be reduced to support multiple stories in a multifamily building). The Rater shall retain a copy of the detail and rationale for their records, but need not evaluate the rationale to certify the home.
23. All exterior corners shall be constructed to allow access for the installation of $\geq R-6$ insulation that extends to the exterior wall sheathing. Examples of compliance options include standard-density insulation with alternative framing techniques, such as using three studs per corner, or high-density insulation (e.g., spray foam) with standard framing techniques.
24. Compliance options include continuous rigid insulation sheathing, SIP headers, other prefabricated insulated headers, single-member or two-member headers with insulation either in between or on one side, or an equivalent assembly. R-value requirement refers to manufacturer's nominal insulation value.
25. Insulation shall run behind interior / exterior wall intersections using ladder blocking, full length 2x6 or 1x6 furring behind the first partition stud, drywall clips, or other equivalent alternative.
26. In Climate Zones 6 - 8, a minimum stud spacing of 16 in. o.c. is permitted to be used with 2x6 framing if $\geq R-20.0$ wall cavity insulation is achieved. However, all 2x6 framing with stud spacing of 16 in. o.c. in Climate Zones 6 - 8 shall have $\geq R-20.0$ wall cavity insulation installed regardless of any framing plan or alternative equivalent total UA calculation.
27. Existing sill plates (e.g., in a home undergoing a gut rehabilitation) on the interior side of structural masonry or monolithic walls are exempt from this Item. In addition, other existing sill plates resting atop concrete or masonry and adjacent to conditioned space are permitted, in lieu of using a gasket, to be sealed with caulk, foam, or equivalent material at both the interior seam between the sill plate and the subfloor and the seam between the top of the sill plate and the sheathing.
28. In Climate Zones 1 through 3, a continuous stucco cladding system adjacent to sill and bottom plates is permitted to be used in lieu of sealing plates to foundation or sub-floor with caulk, foam, or equivalent material.
29. In Climate Zones 1 through 3, a continuous stucco cladding system sealed to windows and doors is permitted to be used in lieu of sealing rough openings with caulk or foam.
30. Examples of durable covers include, but are not limited to, pre-fabricated covers with integral insulation, rigid foam adhered to cover with adhesive, or batt insulation mechanically fastened to the cover (e.g., using bolts, metal wire, or metal strapping).
31. This Checklist is designed to meet the requirements of ASHRAE 62.2-2010 / 2013 / 2016, and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems, (e.g., those caused by a lack of maintenance by occupants). Therefore, this Checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
32. Path A – HVAC Grading shall not be used until an Effective Date has been defined by RESNET for ANSI / RESNET / ACCA Std. 310. Path A – HVAC Grading shall then use ANSI / RESNET / ACCA Std. 310 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the Effective Date and Transition Period End Date defined by RESNET. RESNET interpretations of Standard 310 shall also be followed. For Path A, all unitary HVAC Systems including air conditioners and heat pumps up to 65 kBtuh shall comply with 5a.1 through 5a.3 for the home to be certified.
33. If the non-invasive procedure in ANSI / RESNET / ACCA Std. 310 is not permitted to be used during the final inspection of a home (i.e., due to the equipment type or to outdoor air temperatures that do not meet the requirements of the non-invasive method), then the home is permitted to be certified with a default refrigerant charge designation of Grade III. Note that in these circumstances, the weigh-in method procedure in ANSI / RESNET / ACCA Std. 310 may still be used to pursue a Grade I designation.
34. If installed equipment does not match the National HVAC Design Report, then prior to certification the Rater shall obtain written approval from the designer (e.g., email, updated National HVAC Design Report) confirming that the installed equipment meets the requirements of the National HVAC Design Report. In addition, if "N/A" was selected for Item 1.2 of the National Rater Design Review Checklist, then the Rater shall verify that all installed equipment is an exempted type per Footnote 9 of that Checklist or, if not an exempted type, shall re-review the National Rater Design Review Checklist to ensure compliance with all requirements (e.g., contractor credential, full completion of HVAC Design Report, HVAC design tolerances).



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In cases where the condenser unit is installed after the time of inspection by the Rater, the HVAC manufacturer and model numbers on installed equipment can be documented through the use of photographs provided by the HVAC Contractor after installation is complete.

35. The Rater shall measure and record the external static pressure in the return-side and supply-side of the system using the contractor-provided test locations. However, at this time, the Rater need not assess whether these values are within a specific range to certify the home.
36. Kinks are to be avoided and are caused when ducts are bent across sharp corners such as framing members. Sharp bends are to be avoided and occur when the radius of the turn in the duct is less than one duct diameter. Compression is to be avoided and occurs when flexible ducts in unconditioned space are installed in cavities smaller than the outer duct diameter and ducts in conditioned space are installed in cavities smaller than inner duct diameter. Ducts shall not include coils or loops except to the extent needed for acoustical control.
37. Item 6.2 does not apply to ventilation ducts, exhaust ducts, or non-ducted systems. For an HVAC system with a multi-speed fan, the highest design fan speed shall be used when verifying this requirement. When verifying this requirement, doors separating bedrooms from the main body of the house (e.g., a door between a bedroom and a hallway) shall be closed and doors to rooms that can only be entered from the bedroom (e.g., a closet, a bathroom) shall be open. As an alternative to the ± 3 Pa limit, a Rater-measured pressure differential ≥ -5 Pa and $\leq +5$ Pa is permitted to be used for bedrooms with a design airflow ≥ 150 CFM. The Rater-measured pressure shall be rounded to the nearest whole number to assess compliance.
38. Item 6.3 does not apply to ducts that are a part of local mechanical exhaust and exhaust-only whole-house ventilation systems. EPA recommends, but does not require, that all metal ductwork not encompassed by Section 6 (e.g., exhaust ducts, duct boots, ducts in conditioned space) also be insulated and that insulation be sealed to duct boots to prevent condensation.
39. Items 6.4 and 6.5 only apply to heating, cooling, and balanced ventilation ducts. Duct leakage shall be determined and documented by a Rater using ANSI / RESNET / ICC Std. 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the Effective Date and Transition Period End Date defined by RESNET. RESNET interpretations of Standard 380 shall also be followed. Leakage limits shall be assessed on a per-system, rather than per-home, basis. For balanced ventilation ducts that are not connected to space heating or cooling systems, a Rater is permitted to visually verify, in lieu of duct leakage testing, that all seams and connections are sealed with mastic or metal tape and all duct boots are sealed to floor, wall, or ceiling using caulk, foam, or mastic tape.
40. For a duct system with three or more returns, the total Rater-measured duct leakage is permitted to be the greater of ≤ 6 CFM25 per 100 sq. ft. of CFA or ≤ 60 CFM25 at 'rough-in' or the greater of ≤ 12 CFM25 per 100 sq. ft. of CFA or ≤ 120 CFM25 at 'final'.
41. Note that compliance with Item 6.4.1 or 6.4.2 in conjunction with Section 4a of the National Rater Design Review Checklist automatically achieves Grade I total duct leakage per ANSI / RESNET / ACCA Std. 310.
42. Cabinets (e.g., kitchen, bath, multimedia) or ducts that connect duct boots to toe-kick registers are not required to be in place during the 'rough-in' test.
43. Registers atop carpets are permitted to be removed and the face of the duct boot temporarily sealed during testing. In such cases, the Rater shall visually verify that the boot has been durably sealed to the subfloor (e.g., using duct mastic or caulk) to prevent leakage during normal operation.
44. Testing of duct leakage to the outdoors can be waived in accordance with the 2nd or 3rd alternative of ANSI / RESNET / ICC Std. 301, Table 4.2.2 (1), footnote (w). Alternatively, testing of duct leakage to outdoors can be waived in accordance with Section 5.5.2 of ANSI / RESNET / ICC Std. 380 if total duct leakage, at rough-in or final, is ≤ 4 CFM25 per 100 sq. ft. of conditioned floor area or 40 CFM25, whichever is larger. Guidance to assist partners with these alternatives, including modeling inputs, is available at <http://www.energystar.gov/newhomesguidance>.
45. The whole-house ventilation air flow and local exhaust air flows shall be determined and documented by a Rater using ANSI / RESNET / ICC Std. 380 including all Addenda and Normative Appendices, with new versions and Addenda implemented according to the Effective Date and Transition Period End Date defined by RESNET. RESNET interpretations of Standard 380 shall also be followed.
46. For an attached dwelling unit, excluding units in dwellings (i.e., duplex) and townhomes, the override control is not required to be readily accessible to the occupant. However, in such cases, EPA recommends but does not require that the control be readily accessible to others (e.g., building maintenance staff) in lieu of the occupant.
47. Whole-house mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.3 of the National HVAC Design Report. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
48. Bathroom fans with a rated flow rate ≥ 500 CFM are exempted from the requirement to be ENERGY STAR certified.
49. Ventilation air inlets that are only visible via rooftop access are exempted from Item 7.7 and the Rater shall mark "n/a". The outlet and inlet of balanced ventilation systems shall meet these spacing requirements unless manufacturer instructions indicate that a smaller distance may be used. However, if this occurs the manufacturer's instructions shall be collected for documentation purposes.
50. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the occupant.
51. Known contamination sources include, but are not limited to, stacks, vents, exhausts, and vehicles.
52. Continuous bathroom local mechanical exhaust fans shall be rated for sound at no less than the airflow rate in Item 8.2. Intermittent bathroom and both intermittent and continuous kitchen local mechanical exhaust fans are recommended, but not required, to be rated for sound at no less than the airflow rate in Items 8.1 and 8.2. Per ASHRAE 62.2-2010, an exhaust system is one or more fans that remove air from the building, causing outdoor air to enter by ventilation inlets or normal leakage paths through the building envelope (e.g., bath exhaust fans, range hoods, clothes dryers). Per ASHRAE 62.2-2010, a bathroom is any room containing a bathtub, shower, spa, or similar source of moisture.
53. An intermittent mechanical exhaust system, where provided, shall be designed to operate as needed by the occupant. Control devices shall not impede occupant control in intermittent systems.



National Rater Field Checklist

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54. Kitchen volume shall be determined by drawing the smallest possible rectangle on the floor plan that encompasses all cabinets, pantries, islands, peninsulas, ranges / ovens, and the kitchen exhaust fan, and multiplying by the average ceiling height for this area. In addition, the continuous kitchen exhaust rate shall be ≥ 25 CFM, per 2009 IRC Table M1507.3, regardless of the rate calculated using the kitchen volume. Cabinet volume shall be included in the kitchen volume.
55. Homes shall meet this Item. Alternatively, the prescriptive duct sizing requirements in Table 5.3 of ASHRAE 62.2-2010 / 2013 / 2016 are permitted to be used for kitchen exhaust fans based upon the rated airflow of the fan at 0.25 IWC. If the rated airflow is unknown, ≥ 6 in. smooth duct shall be used, with a rectangular to round duct transition as needed. Guidance to assist partners with these alternatives is available at <http://www.energystar.gov/newhomesguidance>. As an alternative to Item 8.1, homes are permitted to use a continuous kitchen exhaust rate of 25 CFM per 2009 IRC Table M1507.3, if they are either a) PHIUS+ or PHI certified, or b) provide both whole-house ventilation and local mechanical kitchen exhaust using a balanced system, and have a Rater-verified whole-building infiltration rate ≤ 0.05 CFM50 per sq. ft. of Enclosure Area, and a Rater-verified dwelling unit compartmentalization rate ≤ 0.30 CFM50 per sq. ft. of Enclosure Area if multiple dwelling units are present in the building. 'Enclosure Area' is defined as the area of the surfaces that bound the volume being pressurized / depressurized during the test.
56. All intermittent kitchen exhaust fans must be capable of exhausting at least 100 CFM. In addition, if the fan is not part of a vented range hood or appliance-range hood combination (i.e., if the fan is not integrated with the range), then it must also be capable of exhausting ≥ 5 ACH, based on the kitchen volume.
57. Based upon ASHRAE 62.2-2010, ducted mechanical systems are those that supply air to an occupiable space with a total amount of supply ductwork exceeding 10 ft. in length and through a thermal conditioning component, except for evaporative coolers. Systems that do not meet this definition are exempt from this requirement. While filters are recommended for mini-split systems, HRV's and ERV's, these systems, ducted or not, typically do not have MERV-rated filters available for use and are, therefore, also exempted under this version of the requirements. HVAC filters located in the attic shall be considered accessible to the occupant if either 1) drop-down stairs provide access to attic and a permanently installed walkway has been provided between the attic access location and the filter or 2) the filter location enables arm-length access from a portable ladder without the need to step into the attic and the ceiling height where access is provided is ≤ 12 ft.
58. Sealing mechanisms comparable to a gasket are also permitted to be used. The filter media box (i.e., the component in the HVAC system that houses the filter) may be either site-fabricated by the installer or pre-fabricated by the manufacturer to meet this requirement. These requirements only apply when the filter is installed in a filter media box located in the HVAC system, not when the filter is installed flush with the return grill.
59. The pressure boundary is the primary enclosure boundary separating indoor and outdoor air. For example, a volume that has more leakage to outside than to conditioned space would be outside the pressure boundary.
60. Per the 2009 International Mechanical Code, a direct-vent appliance is one that is constructed and installed so that all air for combustion is derived from the outdoor atmosphere and all flue gases are discharged to the outside atmosphere; a mechanical draft system is a venting system designed to remove flue or vent gases by mechanical means consisting of an induced draft portion under non-positive static pressure or a forced draft portion under positive static pressure; and a natural draft system is a venting system designed to remove flue or vent gases under nonpositive static vent pressure entirely by natural draft.
61. This item only applies to furnaces, boilers, and water heaters located within the home's pressure boundary. Naturally drafted equipment is allowed within the home's pressure boundary in Climate Zones 1-3 if the Rater has followed Section 802 of RESNET's Standards, encompassing ANSI / ACCA 12 QH-2014, Appendix A, Sections A3 (Carbon Monoxide Test) and A4 (Depressurization Test for the Combustion Appliance Zone), and verified that the equipment meets the limits defined within.
62. This item only applies to fireplaces located within the home's pressure boundary. Naturally drafted fireplaces are allowed within the home's pressure boundary if the Rater has verified that the total net rated exhaust flow of the two largest exhaust fans (excluding summer cooling fans) is ≤ 15 CFM per 100 sq. ft. of occupiable space when at full capacity. If the net exhaust flow exceeds the allowable limit, it shall be reduced or compensating outdoor airflow provided. Per ASHRAE 62.2-2010, the term "net rated exhaust flow" is defined as flow through an exhaust fan minus the compensating outdoor airflow through any supply fan that is interlocked to the exhaust fan. Per ASHRAE 62.2-2010, the term "occupiable space" is defined as any enclosed space inside the pressure boundary and intended for human activities, including, but not limited to, all habitable spaces, toilets, closets, halls, storage and utility areas, and laundry areas. See Footnote 47 for the definition of "habitable spaces".
63. The minimum volume of combustion air required for safe operation by the manufacturer and / or code shall be met or exceeded. Also, in accordance with the National Fuel Gas Code, ANSI Z223.1 / NFPA54, unvented room heaters shall not be installed in bathrooms or bedrooms.



National HVAC Design Report ¹

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HVAC Designer Responsibilities:

- Complete one National HVAC Design Report for each system design for a house plan, created for either the specific plan configuration (i.e., elevation, option, orientation, & county) of the home to be certified or **for a plan that is intended to be built with different configurations** (i.e., **different elevations, options, and/or orientations**). Visit www.energystar.gov/newhomeshvacdesign and see Footnote 2 for more information. ²
- **Obtain efficiency features** (e.g., window performance, insulation levels, and infiltration rate) **from the builder or Rater.** ³
- Provide the completed National HVAC Design Report to the builder or credentialed HVAC contractor and to the Rater.

1. Design Overview

1.1 Designer name: _____ Designer company: _____ Date: _____

1.2 Select which party you are providing these design services to: Builder or Credentialed HVAC contractor

1.3 Name of company you are providing these design services to (if different than Item 1.1): _____

1.4 Area that system serves: Whole-house Upper-level Lower-level Other _____

1.5 Is cooling system for a temporary occupant load? ⁴ Yes No

1.6 House plan: _____ Check box to indicate whether the system design is site-specific or part of a group: ²

Site-specific design. Option(s) & elevation(s) modeled: _____

Group design. Group #: _____ out of _____ total groups for this house plan. Configuration modeled: _____

2. Whole-House Mechanical Ventilation Design ^{5, 6}

Designer Verified

Airflow:

2.1 Ventilation airflow design rate & run-time meet the **requirements of ASHRAE 62.2-2010, 2013, or 2016.** ⁷

2.2 Ventilation airflow rate **required by 62.2 for a continuous system:** _____ CFM -

2.3 Design for this system: Vent. airflow rate: _____ CFM Run-time per cycle: _____ minutes Cycle time: _____ minutes -

System Type & Controls:

2.4 Specified system type: Supply Exhaust Balanced -

2.5 Specified control location: _____ (e.g., Master bath, utility room) -

2.6 Specified controls allow the system to operate automatically, without occupant intervention.

2.7 Specified controls include a readily-accessible ventilation override and a label has also been specified if its function is not obvious (e.g., a label is required for a standalone wall switch, but not for a switch that's on the ventilation equipment).

2.8 No outdoor air intakes designed to connect to the return side of the HVAC system, unless specified controls operate intermittently and automatically based on a timer and restrict intake when not in use (e.g., motorized damper). ⁸

Sound: 2.9 The fan of the specified system is rated ≤ 3 sones if intermittent and ≤ 1 sone if continuous, or exempted. ⁹

Efficiency:

2.10 If system utilizes the HVAC fan, then the specified fan type in Item 4.7 is ECM / ICM, or the specified controls will reduce the standalone ventilation run-time by accounting for hours when the HVAC system is heating or cooling.

2.11 If bathroom fans are specified as part of the system, then they are **ENERGY STAR certified.** ¹⁰

Air Inlet Location: (Complete this section if system has a specified air inlet location; otherwise check "N/A"). ¹¹ N/A

2.12 Inlet pulls ventilation air directly from outdoors and not from attic, crawlspace, garage, or adjacent dwelling unit.

2.13 Inlet is ≥ 2 ft. above grade or roof deck; ≥ 10 ft. of stretched-string distance from known contamination sources (e.g., stack, vent, exhaust, vehicles) not exiting the roof, and ≥ 3 ft. from known sources exiting the roof.

3. Room-by-Room Heating & Cooling Loads

3.1 Room-by-room loads calculated using: Unabridged ACCA Manual J v8 2013 ASHRAE Fundamentals Other per AHJ ¹² -

3.2 Indoor design temperatures used in loads are 70°F for heating and 75°F for cooling.

3.3 Outdoor design temperatures used in loads: (See Footnote 13 **and energystar.gov/hvacdesigntemps**) ¹³ -

County & State, or US Territory, selected: _____ Cooling season: _____°F Heating season: _____°F

3.4 Number of occupants used in loads: ¹⁴ _____ -

3.5 **Conditioned floor area** used in loads: ¹⁵ _____ Sq. Ft. -

3.6 **Window area used** in loads: ¹⁶ _____ Sq. Ft. -

3.7 **Predominant window SHGC** used in loads: ¹⁷ _____ -

3.8 Infiltration rate used in loads: ¹⁸ Summer: _____ Winter: _____ -

3.9 Mechanical ventilation rate used in loads: _____ CFM -

Loads At Design Conditions (kBtuh)		N	NE	E	SE	S	SW	W	NW	-
Cooling	3.10 Sensible heat gain (By orientation ¹⁹):									-
	3.11 Latent heat gain (Not by orientation):									-
	3.12 Total heat gain (By orientation ¹⁹):									-
	3.13 Maximum – minimum total heat gain (Item 3.12) across orientations = _____ kBtuh Variation is ≤ 6 kBtuh. ^{19, 20}									<input type="checkbox"/>
Heating	3.14 Total heat loss (Not by orientation):									-



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4. Heating & Cooling Equipment Selection						Designer Verified
4.1 Equipment selected per ACCA Manual S (see Footnote 21 & 22). ^{21, 22}						<input type="checkbox"/>
Air Conditioner / Heat Pump (Complete if air conditioner or heat pump will be installed; otherwise check "N/A")						<input type="checkbox"/> N/A
4.2 Equipment type: <input type="checkbox"/> Cooling-only air conditioner or <input type="checkbox"/> Cooling & heating heat pump						-
4.3 Condenser manufacturer & model: _____						-
4.4 Evaporator / fan coil manufacturer & model: _____						-
4.5 AHRI reference #: ²³ _____						-
4.6 AHRI listed efficiency: _____ / _____ EER / SEER Air-source heat pump: _____ HSPF Ground-source heat pump: _____ COP						-
4.7 Evaporator fan type: <input type="checkbox"/> PSC <input type="checkbox"/> ECM / ICM <input type="checkbox"/> Other: _____						-
4.8 Compressor type: <input type="checkbox"/> Single-speed <input type="checkbox"/> Two-speed <input type="checkbox"/> Variable-speed						-
4.9 Latent capacity at design conditions, from OEM expanded performance data: _____ kBtuh						-
4.10 Sensible capacity at design conditions, from OEM expanded performance data: _____ kBtuh						-
4.11 Total capacity at design conditions, from OEM expanded performance data: _____ kBtuh						-
4.12 Air-source heat pump capacity: At 17°F: _____ kBtuh At 47°F: _____ kBtuh <input type="checkbox"/> N/A						-
4.13 Cooling sizing % = Total capacity (Item 4.11) divided by maximum total heat gain (Item 3.12): _____ %						-
4.14 Complete this Item if Condition B Climate will be used to select sizing limit in Item 4.15. Otherwise, check "N/A". ²⁴ <input type="checkbox"/> N/A						-
4.14.1 Load sensible heat ratio = Max. sensible heat gain (Item 3.10) / Max. total heat gain (Item 3.12) = _____ %						-
4.14.2 HDD / CDD ratio (Visit energystar.gov/hvacdesigntemps to determine this value for the design location) = _____						-
4.15 Check box of applicable cooling sizing limit from chart below: ^{21, 22}						-
Equipment Type (Per Item 4.2) & Climate Condition (Per Item 4.14)		Compressor Type (Per Item 4.8)				
		Single-Speed	Two-Speed	Variable-Speed		
For Cooling-Only Equipment or For Cooling Mode of Heat Pump in Condition A Climate		<input type="checkbox"/> Recommended: 90 – 115% Allowed: 90 – 130%	<input type="checkbox"/> Recommended: 90 – 120% Allowed: 90 – 140%	<input type="checkbox"/> Recommended: 90 – 130% Allowed: 90 – 160%		
For Cooling Mode of Heat Pump in Condition B Climate		<input type="checkbox"/> 90% - 100%, plus 15 kBtuh	<input type="checkbox"/> 90% - 100%, plus 15 kBtuh	<input type="checkbox"/> 90% - 100%, plus 15 kBtuh		
4.16 Cooling sizing % (4.13) is within cooling sizing limit (4.15).						<input type="checkbox"/>
Furnace (Complete if furnace will be installed; otherwise check "N/A").						<input type="checkbox"/> N/A
4.17 Furnace manufacturer & model: _____						-
4.18 Listed efficiency: _____ AFUE						-
4.19 Total capacity: _____ kBtuh						-
4.20 Heating sizing % = Total capacity (Item 4.19) divided by total heat loss (Item 3.14): _____ %						-
4.21 Check box of applicable heating sizing limit from chart below:						-
When Used for Heating Only			When Paired With Cooling			
<input type="checkbox"/> 100 – 140%			<input type="checkbox"/> Recommended: 100 – 140% Allowed: 100 – 400%			
4.22 Heating sizing % (4.20) is within heating sizing limit (4.21).						<input type="checkbox"/>
5. Duct Design (Complete if heating or cooling equipment will be installed with ducts; otherwise check "N/A").						<input type="checkbox"/> N/A
5.1 Duct system designed for the equipment selected in Section 4, per ACCA Manual D.						<input type="checkbox"/>
5.2 Design HVAC fan airflow: ²⁵ Cooling mode _____ CFM Heating mode _____ CFM						-
5.3 Design HVAC fan speed setting (e.g., low, medium, high): ²⁶ Cooling mode _____ Heating mode _____						-
5.4 Design total external static pressure (corresponding to the mode with the higher airflow in Item 5.2): ²⁷ _____ IWC						-
5.5 Room-by-room design airflows documented below (which must sum to the mode with the higher airflow in Item 5.2): ^{28, 29}						-
Room Name	Design Airflow (CFM)	Room Name	Design Airflow (CFM)	Room Name	Design Airflow (CFM)	
1		12		23		
2		13		24		
3		14		25		
4		15		26		
5		16		27		
6		17		28		
7		18		29		
8		19		30		
9		20		31		
10		21		32		
11		22		Total for all rooms		



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Footnotes

1. This report is designed to meet ASHRAE 62.2-2010 / 2013 / 2016 and ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems (e.g., those caused by a lack of maintenance or occupant behavior). Therefore, system designs documented through the use of this report are not a guarantee of proper ventilation, indoor air quality, or HVAC performance.

This report applies to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtuh with forced-air distribution systems (i.e., ducts) and to furnaces up to 225 kBtuh with forced-air distribution systems (i.e., ducts). For all other permutations of equipment (e.g., boilers, mini-split / multi-split systems) and distribution systems, Section 1 and 2 are required and Sections 3 through 5 are recommended, but not required.

2. The report shall represent a single system design for a house plan. Check the box for "site-specific design" if the design was created for the specific plan configuration (i.e., elevation, option, orientation, and county) of the home to be certified. Check the box for "group design" if the design was created for a plan that is intended to be built with potentially different configurations (i.e., different elevations, options, and/or orientations). Regardless of the box checked, the system design as documented on this National HVAC Design Report must fall within the following tolerances for the home to be certified:
 - Item 3.3: The outdoor design temperature used in loads are within the limits defined at energystar.gov/hvacdesigntemps.
 - Item 3.4: The number of occupants used in loads is within ± 2 of the home to be certified.
 - Item 3.5: The conditioned floor area used in loads is between 100 sq. ft. smaller and 300 sq. ft. larger than the home to be certified.
 - Item 3.6: The window area used in loads is between 15 sq. ft. smaller and 60 sq. ft. larger than the home to be certified, or, for homes to be certified with >500 sq. ft. of window area, between 3% smaller and 12% larger.
 - Item 3.7: The predominant window SHGC is within 0.1 of the predominant value in the home to be certified.
 - Items 3.10 - 3.12: The sensible, latent, & total heat gain are documented for the orientation of the home to be certified.
 - Item 3.13: The variation in total heat gain across orientations is ≤ 6 kBtuh.
 - Item 4.16: The cooling sizing % is within the cooling sizing limit selected.

Provide the National HVAC Design Report to the party you are providing these design services to (i.e., a builder or credentialed HVAC contractor) and to the Rater. The report is only required to be provided once per system design, even if multiple homes are built using this design (e.g., in a production environment where the same plan is built multiple times, only one report is required). As long as a report has been provided that falls within these tolerances for the home to be certified, no additional work is required. However, if no report falls within these tolerances or if any aspect of the system design changes, then an additional report will need to be generated prior to certification.

Visit energystar.gov/newhomeshvacdesign for a tool to assist with group designs and for more information.

3. The term "Rater" refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, or an equivalent designation as determined by a Verification Oversight Organization such as RESNET; and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/newhomestraining.
4. Check "Yes" if this system is to handle temporary occupant loads. Such a system may be required to accommodate a significant number of guests on a regular or sporadic basis and shall be handled by a supplemental cooling system (e.g., a small, single-package unit or split-coil unit) or by a system that can shift capacity from zone to zone (e.g., a variable volume system).
5. The system shall have at least one supply or exhaust fan with associated ducts and controls. Local exhaust fans are allowed to be part of a whole-house ventilation system. Designers may provide supplemental documentation as needed to document the system design.
6. In "Warm-Humid" climates as defined by 2009 IECC Figure 301.1 (i.e., CZ 1 and portions of CZ 2 and 3A below the white line), it is recommended, but not required, that equipment be specified with sufficient latent capacity to maintain indoor relative humidity at $\leq 60\%$.
7. Airflow design rates and run-times shall be determined using ASHRAE 62.2-2010 or later. Designers are permitted, but not required, to use published addenda and/or the 2013 or 2016 version of the standard to assess compliance.
8. In addition, consult manufacturer requirements to ensure return air temperature requirements are met.
9. Whole-house mechanical ventilation fans shall be rated for sound at no less than the airflow rate in Item 2.3. Fans exempted from this requirement include HVAC air handler fans, remote-mounted fans, and intermittent fans rated ≥ 400 CFM. To be considered for this exemption, a remote-mounted fan must be mounted outside the habitable spaces, bathrooms, toilets, and hallways and there shall be ≥ 4 ft. ductwork between the fan and intake grill. Per ASHRAE 62.2-2010, habitable spaces are intended for continual human occupancy; such space generally includes areas used for living, sleeping, dining, and cooking but does not generally include bathrooms, toilets, hallways, storage areas, closets, or utility rooms.
10. Bathroom fans with a rated flow rate ≥ 500 CFM are exempted from the requirement to be ENERGY STAR certified.
11. Without proper maintenance, ventilation air inlet screens often become filled with debris. Therefore, EPA recommends, but does not require, that these ventilation air inlets be located so as to facilitate access and regular service by the occupant.
12. Select "2013 ASHRAE Fundamentals" if using Chapter 17 of the 2013 ASHRAE Handbook of Fundamentals. Select "Other per AHJ" if the Authority Having Jurisdiction where the home will be certified mandates the use of a load calculation methodology other than Unabridged ACCA Manual J v8 or 2013 ASHRAE Fundamentals.
13. Visit energystar.gov/hvacdesigntemps for the maximum cooling season design temperature and minimum heating season design temperature permitted for ENERGY STAR certified homes. For "County & State, or US Territory, selected", select the County and State or US Territory (i.e., Guam, Northern Mariana Islands, Puerto Rico, or US Virgin Islands), where the home is to be certified. The same design report is permitted to be used in other counties, as long as the design temperature limits in those other counties meet or exceed the cooling and heating season temperature limits for the county selected. For example, if Fauquier County, VA, is used for the load calculations, with a 1% cooling temperature limit of 93 F, then the same report could be used in Fairfax County (which has a higher limit of 94 F) but not in Arlington County (which has a lower limit of 92 F). If a jurisdiction-specified design temperature is used that exceeds the limit in the ENERGY STAR Certified Homes Design Temperature Limit Reference Guide, designers must submit a [Design Temperature Exception Request](#).



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14. To determine the number of occupants among all HVAC systems in the home, calculate the number of bedrooms, as defined below, and add one. This number of occupants must be within ± 2 of the home to be certified, unless Item 1.5 indicates that the system is a cooling system for temporary occupant loads.
- A bedroom is defined by ANSI / RESNET / ICC Standard 301-2014 as a room or space 70 sq. ft. or greater size, with egress window and closet, used or intended to be used for sleeping. A “den”, “library”, or “home office” with a closet, egress window, and 70 sq. ft. or greater size or other similar rooms shall count as a bedroom, but living rooms and foyers shall not.
- An egress window, as defined in 2009 IRC section R310, shall refer to any operable window that provides for a means of escape and access for rescue in the event of an emergency. The egress window definition has been summarized for convenience. The egress window shall:
- have a sill height of not more than 44 inches above the floor; AND
 - have a minimum net clear opening of 5.7 sq. ft.; AND
 - have a minimum net clear opening height of 24 in.; AND
 - have a minimum net clear opening width of 20 in.; AND
 - be operational from the inside of the room without the use of keys, tools or special knowledge.
15. The difference between the Conditioned Floor Area (CFA) used in the design and the actual home to be certified must fall within the tolerance specified in Footnote 2, as verified by a Rater. Be advised, the Rater will calculate CFA using the definition in ANSI / RESNET / ICC Standard 301-2019, which defines this value, in part, as the floor area of the Conditioned Space Volume within a building or Dwelling Unit, not including the floor area of attics, crawlspaces, and basements below air sealed and insulated floors. See <https://codes.iccsafe.org/content/chapter/16185/> for the complete definition.
16. The difference between the window area used in the design and the actual home to be certified must fall within the tolerance specified in Footnote 2, as verified by a Rater. Be advised, the Rater will calculate window area using the on-site inspection protocol provided in Normative Appendix B of ANSI / RESNET / ICC Standard 301-2019, which instructs the Rater to measure the width and height of the rough opening for the window and round to the nearest inch, and then to use these measurements to calculate window area, rounding to the nearest tenth of a square foot. See <https://codes.iccsafe.org/content/chapter/16191/> for the complete protocol.
17. “Predominant” is defined as the SHGC value used in the greatest amount of window area in the home.
18. Infiltration rate shall reflect the value used in the confirmed or projected ERI rating for home to be certified. Alternatively, use “Average” or “Semi-loose” values for the cooling season infiltration rate and “Semi-tight” or “Average” values for the heating season infiltration rate, as defined by ACCA Manual J, Eighth Edition, Version Two.
19. Orientation represents the direction that the front door of the house is facing. The designer is only required to document the loads for the orientation(s) that the house might be built in. For example, if a house plan will only be built one time in a specific orientation (e.g., a site-specific design), then the designer only needs to document the loads for this one orientation.
20. Determine the orientation with the largest and smallest Total Heat Gain. Verify that the difference in Total Heat Gain between the orientation with the largest and smallest value is ≤ 6 kBtuh. If not, then assign the orientations into one or more groups until the difference is ≤ 6 kBtuh and then complete a separate National HVAC Design Report for each group.
21. Equipment shall be selected using the maximum total heat gain in Item 3.12 and the total heat loss in Item 3.14 per ACCA Manual S, Second Edition, except that cooling ranges above ACCA Manual S limits are temporarily allowed, per Item 4.15.
22. As an alternative for low-load spaces, a system match-up including a single-speed compressor with a total capacity ≤ 20 kBtuh is permitted to be used in spaces with a total cooling load ≤ 15 kBtuh. A system match-up including a two-speed or variable-speed compressor with a total capacity ≤ 25 kBtuh is permitted to be used in spaces with a total cooling load ≤ 18 kBtuh.
23. If an AHRI Reference # is not available, OEM-provided documentation shall be attached with the rated efficiency of the specific combination of indoor and outdoor components of the air conditioner or heat pump, along with confirmation that the two components are designed to be used together.
24. Per ACCA Manual S, Second Edition, if the load sensible heat ratio is $\geq 95\%$ and the HDD/CDD ratio is ≥ 2.0 , then the Climate is Condition B, otherwise it is Condition A.
25. Design HVAC fan airflow is the design airflow for the blower in CFM, as determined using the manufacturer’s expanded performance data.
26. Design HVAC fan speed setting is the fan speed setting on the control board (e.g., low, medium, high) that corresponds with the Design HVAC fan airflow.
27. Design total external static pressure is the pressure corresponding to the Design HVAC fan airflow, inclusive of external components (e.g., evaporator coil, whole-house humidifier, or \geq MERV 6 filter).
28. Designers may provide supplemental documentation with room-by-room and total design airflows in lieu of completing Item 5.5. Sample supplemental documentation can be found at <http://www.energystar.gov/newhomeshvacdesign>.
29. Orientation-specific room-by-room design airflows are recommended, but not required, to distribute airflow proportional to load, thereby improving comfort and efficiency.



National HVAC Commissioning Checklist ^{1, 2} ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 10)

HVAC Commissioning Contractor Responsibilities:

- The **commissioning contractor must be credentialed by an HVAC oversight organization** to complete this checklist. One checklist must be completed and signed by the commissioning contractor for each HVAC system that is commissioned.
- The completed checklist for each commissioned system, along with the corresponding National HVAC Design Report, shall be retained by the contractor for a minimum of three years for quality assurance purposes. Furthermore, the contractor shall provide the completed checklist to the builder, the Rater ³ responsible for certifying the home, and the HVAC oversight organization upon request.
- Visit www.energystar.gov/newhomeshvac for information about the credential requirement and this checklist.

1. Commissioning Overview

1.1 Contractor name _____ Contractor company _____ Date _____

1.2 Organization that your company is credentialed with: ACCA Advanced Energy NYSERDA

1.3 Builder client name: _____

1.4 Home address: _____ City: _____ State: _____ Zip code: _____

1.5 National HVAC Design Report corresponding to this system has been collected from designer or builder. Contractor-verified

1.6 Area that system serves, per Item 1.4 of National HVAC Design Report: Whole-house Upper-level Lower-level Other _____

1.7 House plan, per Item 1.6 of National HVAC Design Report: _____ Site-specific design Group design #: _____

2. Refrigerant Charge - Run system for 15 minutes before testing. If outdoor ambient temperature at the condenser is $\leq 55^{\circ}\text{F}$ or, if known, below the manufacturer-recommended minimum operating temperature for the cooling cycle, then the system shall include a TXV, the outdoor temperature shall be recorded in Item 2.1, and the contractor shall check "N/A" in this Section. ⁴

	Contractor Verified	N/A
2.1 Outdoor ambient temperature at condenser: _____ $^{\circ}\text{F}$ DB	-	-
2.2 Return-side air temperature inside duct near evaporator, during cooling mode: _____ $^{\circ}\text{F}$ WB	-	<input type="checkbox"/>
2.3 Liquid line pressure: _____ psig	-	<input type="checkbox"/>
2.4 Liquid line temperature: _____ $^{\circ}\text{F}$ DB	-	<input type="checkbox"/>
2.5 Suction line pressure: _____ psig	-	<input type="checkbox"/>
2.6 Suction line temperature: _____ $^{\circ}\text{F}$ DB	-	<input type="checkbox"/>

For System with Thermal Expansion Valve (TXV):

2.7 Condenser saturation temperature: _____ $^{\circ}\text{F}$ DB (Using Item 2.3)	-	<input type="checkbox"/>
2.8 Subcooling value: _____ $^{\circ}\text{F}$ DB (Item 2.7 - Item 2.4)	-	<input type="checkbox"/>
2.9 OEM subcooling goal: _____ $^{\circ}\text{F}$ DB	-	<input type="checkbox"/>
2.10 Subcooling deviation: _____ $^{\circ}\text{F}$ DB (Item 2.8 – Item 2.9)	-	<input type="checkbox"/>

For System with Fixed Orifice:

2.11 Evaporator saturation temperature: _____ $^{\circ}\text{F}$ DB (Using Item 2.5)	-	<input type="checkbox"/>
2.12 Superheat value: _____ $^{\circ}\text{F}$ DB (Item 2.6 – Item 2.11)	-	<input type="checkbox"/>
2.13 OEM superheat goal: _____ $^{\circ}\text{F}$ DB (Using superheat tables and Items 2.1 & 2.2)	-	<input type="checkbox"/>
2.14 Superheat deviation: _____ $^{\circ}\text{F}$ DB (Item 2.12 – Item 2.13)	-	<input type="checkbox"/>

2.15 Item 2.10 is $\pm 3^{\circ}\text{F}$ or Item 2.14 is $\pm 5^{\circ}\text{F}$

2.16 An OEM test procedure (e.g., as defined for a ground-source heat pump) has been used in place of the sub-cooling or super-heat process and documentation has been attached that defines this procedure.

3. Indoor HVAC Fan Airflow

3.1 The mode with the higher design HVAC fan airflow used, per Item 5.2 of National HVAC Design Report: <input type="checkbox"/> Heating <input type="checkbox"/> Cooling	<input type="checkbox"/>	-
3.2 Static pressure test holes have been created, and test hole locations are well-marked and accessible. Test hole location for return external static pressure: <input type="checkbox"/> Plenum <input type="checkbox"/> Cabinet <input type="checkbox"/> Transition <input type="checkbox"/> Other: _____ Test hole location for supply external static pressure: <input type="checkbox"/> Plenum <input type="checkbox"/> Cabinet <input type="checkbox"/> Transition <input type="checkbox"/> Other: _____	<input type="checkbox"/>	-
3.3 Measured return external static pressure (Enter value only, without negative sign): _____ IWC	-	-
3.4 Measured supply external static pressure (Enter value only, without positive sign): _____ IWC	-	-
3.5 Measured total external static pressure = Value-only from Item 3.3 + Value-only from Item 3.4 = _____ IWC	-	-
3.6 Measured (Item 3.5) - Design (Item 5.4 on National HVAC Design Report) total external static pressure = _____ IWC	-	-
3.7 Measured HVAC fan airflow, using Item 3.5 and fan speed setting: _____ CFM	-	-
3.8 Measured HVAC fan airflow (Item 3.7) is $\pm 15\%$ of design HVAC fan airflow (Item 5.2 on National HVAC Design Report).	-	-

for LEED, may be pursued for points

4. Air Balancing of Supply Registers & Return Grilles (Recommended, **but not Required**) ⁵

4.1 Balancing report attached with room-by-room design airflows from Item 5.5 on National HVAC Design Report, and contractor-measured airflow using ANSI / ACCA 5 QI-2015 protocol.	<input type="checkbox"/>	<input type="checkbox"/>
4.2 Room-by-room airflows verified by contractor to be within the greater of $\pm 20\%$ or 25 CFM of design airflow.	<input type="checkbox"/>	<input type="checkbox"/>



National HVAC Commissioning Checklist^{1, 2}

ENERGY STAR Certified Homes, Version 3 / 3.1 (Rev. 10)

Footnotes

1. This Checklist is designed to align with the requirements of ANSI / ACCA's 5 QI-2015 protocol, thereby improving the performance of HVAC equipment in new homes when compared to homes built to minimum code. However, these features alone cannot prevent all ventilation, indoor air quality, and HVAC problems (e.g., those caused by a lack of maintenance or occupant behavior). Therefore, this Checklist is not a guarantee of proper ventilation, indoor air quality, or HVAC performance.
This Checklist applies to split air conditioners, unitary air conditioners, air-source heat pumps, and water-source (i.e., geothermal) heat pumps up to 65 kBtuh with forced-air distribution systems (i.e., ducts) and to furnaces up to 225 kBtuh with forced-air distribution systems (i.e., ducts). All other permutations of equipment (e.g., boilers, mini-split / multi-split systems) and distribution systems are exempt.
2. For a home certified in the State of ID, MT, OR, or WA, the following alternatives and exemptions apply:
 - a. For a home with an air-source heat pump up to 65 kBtuh with a forced-air distribution system (i.e., ducts), the contractor is permitted to complete the 2011 PTCS[®] Commissioned Heat Pump Certificate and Startup Form in lieu of this Checklist.
 - b. For a home with a split air conditioner or unitary air conditioner up to 65 kBtuh with a forced-air distribution system (i.e., ducts), the contractor is permitted to complete the Northwest Central AC Commissioning & Startup Form in lieu of this Checklist.
 - c. For a home in a location with < 600 CDD, the completion of this Checklist is recommended, but not required.
3. The term 'Rater' refers to the person(s) completing the third-party verification required for certification. The person(s) shall: a) be a Certified Rater, Approved Inspector, or an equivalent designation as determined by a Verification Oversight Organization such as RESNET; and, b) have attended and successfully completed an EPA-recognized training class. See www.energystar.gov/newhomestraining.
4. Either factory-installed or field-installed TXV's may be used. For field-installed TXV's, ensure that sensing bulbs are insulated and tightly clamped to the vapor line with good linear thermal contact at the recommended orientation, usually 4 or 8 o'clock.
5. Air balancing of supply registers and return grilles is highly recommended to improve the performance of the HVAC system and comfort of the occupants, but is not required at this time for certification. When air balancing is completed, balancing dampers or proper duct sizing shall be used instead of looped or coiled ductwork to limit flow to diffusers. When balancing dampers are used, they shall be located at the trunk to limit noise unless the trunk will not be accessible when the balancing process is conducted. In such cases, Opposable Blade Dampers (OBD) or dampers located in the duct boot are permitted to be used.

Home Address: _____ City: _____ State: _____ Zip Code: _____					
1. Water-Managed Site and Foundation					
1.1	Patio slabs, porch slabs, walks, and driveways sloped ≥ 0.25 in. per ft. away from home to edge of surface or 10 ft., whichever is less. ³	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.2	Back-fill has been tamped and final grade sloped ≥ 0.5 in. per ft. away from home for ≥ 10 ft. See Footnote for alternatives. ³	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.3	Capillary break beneath all slabs (e.g., slab on grade, basement slab) except crawlspace slabs using either: ≥ 6 mil polyethylene sheeting, lapped 6-12 in., or ≥ 1 in. extruded polystyrene insulation with taped joints. ^{4, 5, 6}	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4	Capillary break at all crawlspace floors using ≥ 6 mil polyethylene sheeting, lapped 6-12 in., & installed using one of the following opt's: ^{4, 5, 6}				
1.4.1	Placed beneath a concrete slab; OR,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4.2	Lapped up each wall or pier and fastened with furring strips or equivalent; OR,	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.4.3	Secured in the ground at the perimeter using stakes.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.5	Exterior surface of below-grade walls of basements & unvented crawlspaces finished as follows: a) For poured concrete, masonry, & insulated concrete forms, finish with damp-proofing coating. ⁷ b) For wood framed walls, finish with polyethylene and adhesive or other equivalent waterproofing.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.6	Class 1 vapor retarder not installed on interior side of air permeable insulation in ext. below-grade walls. ⁸	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.7	Sump pump covers mechanically attached with full gasket seal or equivalent.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
1.8	Drain tile installed at the exterior side of footings of basement and crawlspace walls, with the top of the drain tile pipe below the bottom of the concrete slab or crawlspace floor. Drain tile surrounded with ≥ 6 in. of $\frac{1}{2}$ to $\frac{3}{4}$ in. washed or clean gravel and with gravel layer fully wrapped with fabric cloth. Drain tile level or sloped to discharge to outside grade (daylight) or to a sump pump. ⁹	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Water-Managed Wall Assembly					
2.1	Flashing at bottom of exterior walls with weep holes included for masonry veneer and weep screed for stucco cladding systems, or equivalent drainage system. ¹⁰	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.2	Fully sealed continuous drainage plane behind exterior cladding that laps over flashing in Item 2.1 and fully sealed at all penetrations. Additional bond-break drainage plane layer provided behind all stucco and non-structural masonry cladding wall assemblies. ^{10, 11}	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2.3	Window and door openings fully flashed. ¹²	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Water-Managed Roof Assembly					
3.1	Step and kick-out flashing at all roof-wall intersections, extending ≥ 4 " on wall surface above roof deck and integrated shingle-style with drainage plane above; boot / collar flashing at all roof penetrations. ¹³	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.2	For homes that don't have a slab-on-grade foundation and do have expansive or collapsible soils, gutters & downspouts provided that empty to lateral piping that discharges water on sloping final grade ≥ 5 ft. from foundation, or to underground catchment system not connected to the foundation drain system that discharges water ≥ 10 ft. from foundation. See Footnote for alternatives & exemptions. ^{4, 14}	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.3	Self-sealing bituminous membrane or equivalent at all valleys & roof deck penetrations. ⁴	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.4	In 2009 IECC Climate Zones 5 & higher, self-sealing bituminous membrane or equivalent over sheathing at eaves from the edge of the roof line to > 2 ft. up roof deck from the interior plane of the exterior wall. ⁴	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Water-Managed Building Materials					
4.1	Wall-to-wall carpet not installed within 2.5 ft. of toilets, tubs, and showers.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.2	Cement board or equivalent moisture-resistant backing material installed on all walls behind tub and shower enclosures composed of tile or panel assemblies with caulked joints. Paper-faced backerboard shall not be used. ¹⁵	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.3	In Warm-Humid climates, Class 1 vapor retarders not installed on the interior side of air permeable insulation in above-grade walls, except at shower and tub walls. ⁸	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.4	Building materials with visible signs of water damage or mold not installed or allowed to remain. ¹⁶	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4.5	Framing members & insulation products having high moisture content not enclosed (e.g., with drywall) ¹⁷	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Builder Employee: _____ Builder Signature: _____ Date: _____					
Builder has completed Builder Checklist in its entirety, except for items that are checked in the Rater Verified column (if any) ² Rater Signature: _____ Date: _____					

Notes:

- The specifications in this Checklist are designed to help improve moisture control in new homes compared with homes built to minimum code. However, these features alone cannot prevent all moisture problems. For example, leaky pipes or overflowing sinks or baths can lead to moisture issues and negatively impact the performance of this Checklist's specified features.

2. Upon completion, the builder shall return the Checklist to the Rater for review. Alternatively, at the discretion of the builder and Rater, the Rater may verify any item on this Checklist. When this occurs, the Rater shall check the box of the verified items in the Rater Verified column. The Rater is only responsible for ensuring that the builder has completed the Builder Checklist in its entirety and for verifying the items that are checked in the Rater Verified column (if any). The Rater is not responsible for assessing the accuracy of the field verifications for items in this Checklist that are not checked in the Rater Verified column. Instead, it is the builder's exclusive responsibility to ensure the design and installation comply with the Checklist.
3. Swales or drains designed to carry water from foundation are permitted to be provided as an alternative to the slope requirements for any home, and shall be provided for a home where setbacks limit space to less than 10 ft. Also, tamping of back-fill is not required if either: proper drainage can be achieved using non-settling compact soils, as determined by a certified hydrologist, soil scientist, or engineer; OR, the builder has scheduled a site visit to provide in-fill and final grading after settling has occurred (e.g., after the first rainy season).
4. Not required in Dry (B) climates as shown in 2009 IECC Figure 301.1 and Table 301.1.
5. Not required for raised pier foundations with no walls. To earn the ENERGY STAR, EPA recommends, but does not require, that radon-resistant features be included in homes built in EPA Radon Zones 1, 2 & 3. For more information, see www.epa.gov/indoorairplus.
6. For an existing slab (e.g., in a home undergoing a gut rehabilitation), in lieu of a capillary break beneath the slab, a continuous and sealed Class I or Class II Vapor Retarder (per Footnote 8) is permitted to be installed on top of the entire slab. In such cases, up to 10% of the slab surface is permitted to be exempted from this requirement (e.g., for sill plates). In addition, for existing slabs in occupiable space, the Vapor Retarder shall be, or shall be protected by, a durable floor surface. If Class I Vapor Retarders are installed, they shall not be installed on the interior side of air permeable insulation or materials prone to moisture damage.
7. Interior surface of existing below-grade wall (e.g., in a home undergoing a gut rehab.) listed in Item 1.5a is permitted to be finished by:
 - Installing a continuous and sealed drainage plane, capillary break, Class I Vapor Retarder (per Footnote 8) and air barrier that terminates into a foundation drainage system as specified in Item 1.8; OR
 - If a drain tile is not required as specified in Footnote 9, adhering a capillary break and Class I Vapor Retarder (per Footnote 6) directly to the wall with the edges taped/sealed to make it continuous.

Note that no alternative compliance option is provided for existing below-grade wood-framed walls in Item 1.5b.

8. The 2009 IRC defines Class I vapor retarders as a material or assembly with a rating of ≤ 0.1 perm, as defined using the desiccant method with Procedure A of ASTM E 96. The following materials are typically rated at ≤ 0.1 perm and therefore shall not be used on the interior side of air permeable insulation in above-grade exterior walls in warm-humid climates or below-grade exterior walls in any climate: rubber membranes, polyethylene film, glass, aluminum foil, sheet metal, foil-faced insulating sheathings, and foil-faced non-insulating sheathings. These materials can be used on the interior side of walls if air permeable insulation is not present (e.g., foil-faced rigid foam board adjacent to a below-grade concrete foundation wall is permitted).

Note that this list is not comprehensive and other materials with a perm rating ≤ 0.1 also shall not be used. Also, if manufacturer specifications for a specific product indicate a perm rating above 0.1, then the material may be used, even if it is in this list. Also note that open-cell and closed-cell foam generally have perm ratings above this limit and may be used unless manufacturer specifications indicate a perm rating ≤ 0.1 . Several exemptions to these requirements apply:

- Class I vapor retarders, such as ceramic tile, may be used at shower and tub walls;
 - Class I vapor retarders, such as mirrors, may be used if mounted with clips or other spacers that allow air to circulate behind them.
9. Alternatively, either a drain tile that is pre-wrapped with a fabric filter or a Composite Foundation Drainage System (CFDS) that has been evaluated by ICC-ES per AC 243 are permitted to be used to meet this Item. Note that the CFDS must include a soil strip drain or another ICC-ES evaluated perimeter drainage system to be eligible for use. In an existing home (e.g. in a home undergoing a gut rehab.) a drain tile installed only on the interior side of the footings is permitted. Additionally, a drain tile is not required when a certified hydrologist, soil scientist, or engineer has determined that a crawlspace foundation, or an existing basement foundation (e.g., in a home undergoing a gut rehab.), is installed in Group I Soils (i.e. well-drained ground or sand-gravel mixture soils), as defined by 2009 IRC Table R405.1.
 10. These Items not required for existing structural masonry walls (e.g., in a home undergoing a gut rehabilitation). Note this exemption does not extend to existing wall assemblies with masonry veneers.
 11. Any of the following systems may be used: a monolithic weather-resistant barrier (i.e., house wrap) shingled at horizontal joints and sealed or taped at all joints; weather resistant sheathings (e.g., faced rigid insulation) fully taped at all "butt" joints; lapped shingle-style building paper or felts; or other water-resistive barrier recognized by ICC-ES or other accredited agency.
 12. Apply pan flashing over the rough sill framing, inclusive of the corners of the sill framing; side flashing that extends over pan flashing; and top flashing that extends over side flashing or equivalent details for structural masonry walls.
 13. Intersecting wall siding shall terminate 1 in. above the roof or higher, per manufacturer's recommendations. Continuous flashing shall be installed in place of step flashing for metal and rubber membrane roofs.
 14. The assessment of whether the soil is expansive or collapsible shall be completed by a certified hydrologist, soil scientist, or engineer. As an alternative, a roof design is permitted to be used that deposits rainwater to a grade-level rock bed with a waterproof liner and a lateral drain pipe that meets discharge requirements per Item 3.2. As another alternative, a rainwater harvesting system is permitted to be used that drains overflow to meet discharge requirements per Item 3.2.
 15. In addition to cement board, materials that have been evaluated by ICC-ES per AC 115 may also be used to meet this requirement. Monolithic tub and shower enclosures (e.g., fiberglass with no seams) are exempt from this backing material requirement unless required by the manufacturer. Paper-faced backerboard may only be used behind monolithic enclosures or waterproof membranes that have been evaluated by ICC-ES per AC 115, and then only if it meets ASTM mold-resistant standards ASTM D3273 or ASTM D6329.
 16. If mold is present, effort should be made to remove all visible signs of mold (e.g., by damp wipe with water and detergent). If removal methods are not effective, then the material shall be replaced. However, stains that remain after damp wipe are acceptable. Lumber with "sap stain fungi" is exempt from this Item as long as the lumber is structurally intact.
 17. For wet-applied insulation, follow manufacturer's drying recommendations. EPA recommends that lumber moisture content be $\leq 18\%$.

LEED BD+C: Homes and Multifamily Lowrise v4 - LEED v4

Seasons Grove Scorecard (ID: 100056789)

Project Address **100056789, Seasons Grove, 1050 Lamplighter Drive Grove City, OH**



Note: The information on this tab is READ-ONLY. To edit this information, see the Credit Category tabs.

Total		Certification Level:	Not Certified	Verified	19
	Integrative Process	Preliminary Y	2 of 2	M 0	Verified 0
IPc	Integrative Process		2 of 2	0	
	Location and Transportation	Preliminary Y	7 of 15	M 0	Verified 0
LTP	Floodplain Avoidance		Required		Not Verified
LTC	LEED for Neighborhood Development		0 of 15	0	
LTC	Site Selection		2 of 8	0	
LTC	Compact Development		3 of 3	0	
LTC	Community Resources		2 of 2	0	
LTC	Access to Transit		0 of 2	0	
	Sustainable Sites	Preliminary Y	3 of 7	M 0.5	Verified 0
SSp	Construction Activity Pollution Prevention		Required		Not Verified
SSp	No Invasive Plants		Required		Not Verified
SSc	Heat Island Reduction		0 of 2	0	
SSc	Rainwater Management		1 of 3	0	
SSc	Nontoxic Pest Control		2 of 2	0.5	
	Water Efficiency	Preliminary Y	4 of 12	M 1	Verified 0
WEp	Water Metering		Required		Not Verified
WEc	Total Water Use		0 of 12	0	
WEc	Indoor Water Use		4 of 6	0	
WEc	Outdoor Water Use		0 of 4	1	
	Energy and Atmosphere	Preliminary Y	19.5 of 38	M 1	Verified 19
EAp	Minimum Energy Performance		Required		Not Verified
EAp	Energy Metering		Required		Not Verified
EAp	Education of the Homeowner, Tenant or Building Manager		Required		Not Verified
EAc	Annual Energy Use		19.5 of 29	0	19
EAc	Efficient Hot Water Distribution System		0 of 5	0	
EAc	Advanced Utility Tracking		0 of 2	0	
EAc	Active Solar-Ready Design		0 of 1	0	
EAc	HVAC Start-Up Credentialing		0 of 1	1	



Materials and Resources		Preliminary	Y	4 of 10	M	3	Verified	0
MRp	Certified Tropical Wood			Required				Not Verified
MRp	Durability Management			Required				Not Verified
MRc	Durability Management Verification			1 of 1		0		
MRc	Environmentally Preferable Products			1.5 of 4		1		
MRc	Construction Waste Management			0 of 3		2		
MRc	Material-Efficient Framing			1.5 of 2		0		



Indoor Environmental Quality		Preliminary	Y	9 of 16	M	0.5	Verified	0
EQp	Ventilation			Required				Not Verified
EQp	Combustion Venting			Required				Not Verified
EQp	Garage Pollutant Protection			Required				Not Verified
EQp	Radon-Resistant Construction			Required				Not Verified
EQp	Air Filtering			Required				Not Verified
EQp	Environmental Tobacco Smoke			Required				Not Verified
EQp	Compartmentalization			Required				Not Verified
EQc	Enhanced Ventilation			1 of 3		0		
EQc	Contaminant Control			1 of 2		0		
EQc	Balancing of Heating and Cooling Distribution Systems			2 of 3		0		
EQc	Enhanced Compartmentalization			0 of 1		0		
EQc	Enhanced Combustion Venting			2 of 2		0		
EQc	Enhanced Garage Pollutant Protection			2 of 2		0		
EQc	Low-Emitting Products			1 of 3		0.5		



Innovation		Preliminary	Y	3 of 6	M	1.5	Verified	0
INp	Preliminary Rating			Required				Not Verified
INc	Innovation			3 of 5		0.5		
INc	LEED Accredited Professional			0 of 1		1		



Regional Priority		Preliminary	Y	3 of 4	M	1	Verified	0
RPC	Regional Priority			3 of 4		1		

Point Floors

The project earned at least 8 points total in Location and Transportation and Energy and Atmosphere	<input type="text" value="Yes"/>
The project earned at least 3 points in Water Efficiency	<input type="text" value="No"/>
The project earned at least 3 points in Indoor Environmental Quality	<input type="text" value="No"/>

Total		Preliminary	Y	54.5 of 110	M	8.5	Verified	19
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Certification Thresholds Certified: 40-49, Silver: 50-59, Gold: 60-79, Platinum: 80-110

Integrative Process

Preliminary Y 2 Maybe 0 Verified 0

IP Credit Integrative Process

Up to 2 points

Preliminary Y M Verified

Exemplary Performance: Achieve all three options

Option 1. Integrative Project Team (1 point)

Y M V

Team members, in addition to the builder and verification team, include capabilities in at least three of the following skill sets: architecture or residential building design; mechanical or energy engineering; building science or performance testing; green building or sustainable design; and civil engineering, landscape architecture, habitat restoration, or land-use planning.

All team members referenced above were involved in at least three of the following phases of the design and construction process: conceptual or schematic design; LEED planning; preliminary design; energy and envelope systems analysis or design; design development; and construction.

Meetings were conducted with the project team at least monthly to review project status, introduce new team members to project goals, discuss problems, formulate solutions, review responsibilities, and identify next steps.

AND/OR

Option 2. Design Charrette (1 point)

Y M V

A full-day workshop (or two half-day workshops) was conducted with the project team, as defined in Option 1, no later than the design development phase.

Date(s)
 Duration

AND/OR

Option 3. Trades Training (1 point)

Y M V

At least eight hours of training on the green aspects of the project and how the trades can contribute to achieving each LEED for Homes prerequisite and attempted credit was conducted before construction but after trades have been hired for the project.

Date(s)
 Duration
 Trainer

Location and Transportation

Preliminary Y 7 Maybe 0 Verified 0

LT Prerequisite Floodplain Avoidance

Required

Select one of the following:

Verified

- The project is not built on land within a flood hazard area.
- The project is built on land within a flood hazard area and in accordance with flood provisions.
- The project is built on land within a flood hazard area and is a previously developed building and hardscape.

LT Credit LEED for Neighborhood Development

15 points

Preliminary Y M Verified

- Name of LEED for Neighborhood Development project
- LEED ND project ID number
- Rating system and version
- LEED ND certification date

LT Credit Site Selection

Up to 8 points

Preliminary Y M Verified

Exemplary Performance: Earn all 9 points

Option 1. Sensitive Land Protection (3-4 points) Y M V

Path 1. Previously Developed (4 points) Y M V

- Total buildable land area (acre or sq ft)
- Previously developed buildable land area (acre or sq ft)
- Percentage of lot previously developed (%)

OR

Path 2. Avoidance of Sensitive Land (3 points) Y M V

All new buildings, hardscapes, roads, or parking areas of the project are located on land that meets the following criteria:

- Does not consist of prime farmland, unique farmland, or farmland of statewide or local importance.
- Was not public parkland prior to acquisition.
- Is not in a flood hazard area shown on a legally adopted flood hazard map or otherwise legally designated by the local jurisdiction or state.
- Is not on land specifically identified as habitat for species listed in the U.S. Endangered Species Act; the state's endangered species act; NatureServe GH, G1, or G2 lists; or those listed under local equivalent standards (for projects outside the U.S.) that are not covered by NatureServe data.
- Is not on land within 50 ft (15 m) of wetlands or within the setback distance from wetlands prescribed by local, state or national regulations, whichever is more stringent.
- Is not on land within 100 ft (30 m) of water bodies, including seas, lakes, rivers, streams and tributaries.

AND/OR

Option 2. Infill Development (2 points)

Y M V

Percent of land within a 1/2 mile (800 meters) from the project boundary that is previously developed

Alternatively, for projects within city limits of towns with populations less than 20,000

Percent of land adjacent to the project boundary that is previously developed

AND/OR

Option 3. Open Space (1 point)

Y M V

Select one of the following:

Built within 1/2 mile (800 meters) of open space that is at least 3/4 acres (0.3 hectares)

Create publicly available open space on the project site

AND/OR

Option 4. Street Network (1 point)

Y M V

Qualifying intersection density (intersections per square mile)

AND/OR

Option 5. Bicycle Network and Storage (1 point)

Y M V

Bicycle Network

Select one of the following. The project has a functional entry and/or bicycle storage within 200 yd (180 m) of a bicycle network that connects to:

At least 10 uses

A school or employment center

A bus rapid transit stops, rail stations, and/or ferry terminals

Bicycle Storage for Multifamily Buildings

Number of building occupants

Number of residential units

Number of short-term spaces provided

Number of short-term spaces required

Number of long-term spaces provided

Number of long-term spaces required

Bicycle Storage for Single Family Homes

The project is a single family home with garage.

LT Credit Compact Development

Up to 3 points

Exemplary Performance for Single and Multifamily Lowrise Only: 35 DU/acre (86.5 DU/hectare)

Preliminary Y M Verified

Total project boundary area (acre)

Buildable land area (acre)

Number of dwelling units

DU/acre of buildable land

LT Credit Community Resources

Up to 2 points

Exemplary Performance: 16 uses for 1/2 point, 20 uses for 1 point.

Preliminary Y M Verified

Number of community resources within a 1/2 mile (800 meters) walking distance

LT Credit Access to Transit

Up to 2 points

Exemplary Performance: For multiple transit types, 720 weekday trips and 432 weekend trips; For commuter rail or ferry, 120 weekday trips.

For projects with multiple transit types

Number of weekday trips
 Number weekend day trips

For projects with commuter rail or ferry service only

Number of weekday trips

Preliminary Y M **Verified**

Sustainable Sites

Preliminary Y 3 Maybe 0.5 Verified 0

SS Prerequisite Construction Activity Pollution Prevention

Required

Verified

Confirm all of the following measures were implemented on the project, as applicable:

- Stockpiled and protected disturbed topsoil from erosion.
- Controlled the path and velocity of runoff with silt fencing or comparable measures.
- Protected on-site storm sewer inlets, streams, and lakes with straw bales, silt fencing, silt sacks, rock filters, or comparable measures.
- Provided swales to divert surface water from hillsides.
- Used tiers, erosion blankets, compost blankets, filter socks, berms, or comparable measures to stabilize soils in any area with a slope of 15% (6.6:1) or more that was disturbed during construction.
- Prevented air pollution from dust and particulate matter.

For construction sites larger than 1 acre

Select one of the following:

- The project team created an implemented an Erosion and Sedimentation Control (ESC) plan that conforms to the requirements of the 2012 U.S. Environmental Protection Agency Construction General Permit (CGP).
- The project team created an implemented an Erosion and Sedimentation Control (ESC) plan that conforms to local standards and codes, which are as or more stringent than the 2012 EPA Construction General Permit (CGP).

SS Prerequisite No Invasive Plants

Required

Verified

- No invasive plant species have been introduced into the landscape.

SS Credit Heat Island Reduction

Up to 2 points

Option 1. Shading and Option 2. Nonabsorptive Materials (1-2 points)

Preliminary Y M Verified

Hardscapes

- Area of shaded hardscapes (sq ft)
- Area of unshaded paving materials with an initial SR value of at least 0.33 (sq ft)
- Area of unshaded vegetation in open pavers (sq ft)
- Remaining hardscape area (not earning credit) (sq ft)
- Total hardscape area (driveways, walkways, patios, etc.) (sq ft)

Roof

- Area of ENERGY STAR qualified roof (sq ft)
The ENERGY STAR roofing program had a sunset date effective June 1, 2022. Single family projects can use the LEED v4.1 Single Family pathway for 'High-Reflectance Roof. Use roofing materials that have an aged SRI equal to or greater than the values in Table 1. See the rating system for Table 1.' LEED v4 Multifamily projects can pursue the LEED v4.1 Multifamily credit substitution approach as outlined in the LEED v4.1 Guide.
- Area of vegetated roof (sq ft)
- Remaining roof area (not earning credit) (sq ft)
- Total roof area (sq ft)
- Percentage of area with shading or nonabsorptive material (%)

SS Credit Rainwater Management

Up to 3 points

Preliminary Y M Verified

Exemplary Performance: For Case 1, manage 100% of all stormwater on-site.

Case 1. Low Impact Development (1-3 points)

Y M V

Site Characteristics

Total lot area (sq ft)

Roof

<input type="text"/>	Vegetated roof area (sq ft)
<input type="text"/>	Roof area directed to a qualifying infiltration feature (sq ft)
<input type="text" value="27211.00"/>	Remaining roof area (not earning credit) (sq ft)
<input type="text" value="27,211"/>	Total roof area (sq ft)

Non-roof Site Area

Softscape

Total landscape softscape area (sq ft)

Hardscape

<input type="text"/>	Permeable paving (sq ft)
<input type="text"/>	Qualifying open pavers (sq ft)
<input type="text"/>	Hardscapes directed to qualifying infiltration features (sq ft)
<input type="text" value="55818.00"/>	Remaining hardscape area (not earning credit) (sq ft)
<input type="text" value="55,818"/>	Total hardscape area (driveways, walkways, patios, etc.) (sq ft)

Qualifying area, as a percentage of total lot area

Qualifying area, as percentage of total lot area (%)

Reduction of total impermeable area

<input type="text" value="83,029"/>	Total impermeable area of the project (sq ft)
<input type="text" value="#N/A"/>	Reference home size (sq ft)
<input type="text" value="0.0%"/>	Impermeable area as a percentage of reference home size

OR

Case 2. NPDES Projects (2-3 points)

Y M V

Percentile rainfall event

SS Credit Nontoxic Pest Control

Up to 2 points

Exemplary Performance: Projects that achieve 2 points can earn another ½ point for each additional strategy, up to a total of 1 point.

Preliminary Y M Verified

Select all of the following that have been included in the project.

- Install a steel mesh barrier termite control system. (1 point)
- Install a physical termite barrier system (e.g., basaltic rock) approved by code. (1 point)
- For below-grade walls, use solid concrete foundation walls, masonry walls with a course of solid block bond beam, or concrete-filled block. (0.5 point)
- Install post-tension slabs. (0.5 point)
- Treat all cellulosic structural material (e.g., wood framing) with a registered pesticide containing borates, following the manufacturer's directions for preconstruction treatment. (0.5 point)
- Use noncellulosic material for all structural elements. (0.5 point)
- Install ports or openings for all plumbing elements that penetrate the slab, to allow access for inspection and treatment of pest infestations. (0.5 point)
- Install a registered termite bait system and provide for ongoing maintenance as required by the manufacturer. (0.5 point)
- Design a minimum 6-inch (150 millimeters) inspection space between the surface of the planned landscape grade and nonmasonry siding. (0.5 point)
- Seal all external cracks, joints, penetrations, edges, and entry points with appropriate caulking. Install rodent- and corrosion-proof screens (e.g., copper or stainless steel mesh) on all openings greater than ¼ inch (6 millimeters), except where code prohibits their installation. (0.5 point)
- Design discharge points for rain gutters, air-conditioning condensation lines, steam vent lines, or any other moisture source such that discharge is at least 24 inches (600 millimeters) from the foundation. (0.5 point)
- Design landscape features to provide a minimum 18-inch (450 millimeters) space between the exterior wall and any plantings. (0.5 point)

For multifamily projects

- Develop an integrated pest management policy. The policy must include guidance for residents on pesticide use, housekeeping and prompt reporting of pest problems and incorporate policy in the Homeowner Education Manual. (Required)

Water Efficiency

Preliminary Y 4 Maybe 1 Verified 0

WE Prerequisite Water Metering

Required Verified

OR
Case 2. Multifamily V

- A water meter or submeter is installed for each unit.
- True A water meter or submeter is installed for the whole building.

WE Credit Total Water Use

Up to 12 points
Exemplary Performance: 70% reduction of indoor and outdoor water consumption

Preliminary Y M Verified

0.00% Total reduction of indoor and outdoor water consumption as calculated in the [Water Reduction Calculator](#) (%)

For single family projects
 The water pressure does not exceed 60 psi (415 kPa). There are no detectable water leaks. Any installed water softeners are demand initiated.

For multifamily projects
 There are no detectable water leaks. Any installed water softeners are demand initiated.

WE Credit Indoor Water Use

Up to 6 points Preliminary Y 4 M 0 Verified 0

OR
Case 2. Multifamily and Midrise Y 4 M V

True There are no detectable water leaks.

Note: No additional credit is awarded if the fixtures and fittings in non-unit spaces are more efficient than those of in-unit spaces.
 Meet any of the following for in-unit spaces and non-unit spaces:

Lavatory Faucet (1-2 points)
 True All installed lavatory faucets and/or faucet aerators are WaterSense labeled.
 1.00 Average rated flow volume across all lavatory faucets (gpm)

Showerheads (1-2 points)
 True All installed showerhead fixtures and fittings are WaterSense labeled.
 1.50 Average rated flow volume per shower compartment (gpm)

Toilets (1 point)
 All installed toilet fixtures and fittings are WaterSense labeled.
 Average rated flush volume across all toilets (gpf)

Clothes Washers (1 point)
 All clothes washers are ENERGY STAR qualified or performance equivalent

WE Credit Outdoor Water Use

Up to 4 points

Preliminary Y **M** **1** **Verified**

<60	Turf grass area as a percentage of total landscape softscape area (%)
	Native or adapted plant area as a percentage of total landscape softscape area (%)

Energy and Atmosphere

Preliminary Y 19.5 Maybe 1 Verified 19

EA Prerequisite Minimum Energy Performance

Required

Verified

1. ENERGY STAR for Homes version 3

ENERGY STAR version 3 checklists are complete

HERS index rating

ENERGY STAR HERS index target

OR

ENERGY STAR Builder Option Package has been followed and all requirements met.

2. ENERGY STAR Qualified Appliances

Select at least one of the following:

ENERGY STAR refrigerator is installed.

ENERGY STAR dishwasher is installed.

ENERGY STAR clothes washer is installed.

3. Duct Runs

All duct runs are fully ducted.

EA Prerequisite Energy Metering

Required

Verified

OR

Case 2. Multifamily

V

Electric submeters are installed in each residential unit.

A whole-building gas meter or submeter for each residential unit is installed.

EA Prerequisite Education of Homeowner, Tenant, or Building Manager

Required

Verified

An operations and maintenance manual, binder, or CD has been/will be provided to all individuals or organizations responsible for the maintenance of the home.

A minimum one-hour walkthrough of the home with the occupants has been conducted.

EA Credit Annual Energy Use

Up to 29 points

Preliminary Y M Verified

Exemplary Performance: For Option 1, 100% reduction; For Option 2, -10 HERS index rating.

Projects may choose to pursue either Option 1 or Option 2 based on the option that produces the most points.

Y M V

Option 1. LEED Energy Budget (1-29 points)

LEED Energy Budget (MMBtu/year)

Annual energy consumption (MMBtu/year)

Percent reduction below LEED Energy Budget (%)

Total Points

Other major energy users not included in the energy rating (if any):

Heated driveway

Spa

Private pool

Heated garage

Other (describe in detail)

OR
Option 2. HERS Index with Home Size Adjuster (0.5-29 points) Y M V

63	HERS index rating
2.00	Number of bedrooms
1100.00	Conditioned floor area of the house (sq ft)
1,600	ENERGY STAR for Homes, version 3, reference home floor area (sq ft)
7	HSA points
12	Points for achieving HERS index rating
19	Total (HSA points + Points for achieving HERS index rating)

EA Credit Efficient Hot Water Distribution System

Up to 5 points **Preliminary** Y M **Verified**

Option 1. Efficient Hot Water Distribution (2 points) Y M V

Note: Projects using heat traces that serve a single unit or house are awarded only half credit.

For projects using circulating systems (required for both Path 1 AND Path 2 below)

- Circulating pump does not operate continuously, is on a timer, or is on a water temperature sensor.
- Circulating pump is demand activated by a momentary contact switch, motion sensor, flow switch, door switch or voice command.
- After the pump starts, the controls allow the pump to operate until the water temperature in the return pipe rises not more than 10°F (6 °C) above the initial temperature of the water in the pipe. Controls limit the water temperature to a maximum of 105°F (40 °C). Controls limit pump operation to not more than 5 minutes per activation in the event that both means of shutting off the pump have failed.
- Circulating hot water systems have with an automatic or readily accessible manual switch to turn off the hot water circulating pump when not in use.

For projects using heat-traced piping systems

- Piping is insulated.

Path 1. Maximum Allowable Pipe Length (2 points) Y M V

<input type="text"/>	Pipe or tube length installed (ft)
<input type="text"/>	Nominal pipe size (in)
<input type="text"/>	Maximum pipe or tube length allowed for water heaters, boilers with no circulation loop or heat traced pipe or in multifamily buildings a central circulation loop or heat traced pipe (ft)
<input type="text"/>	Maximum pipe or tube length allowed for circulation loop or heat traced pipe serving a single unit or house (ft)

OR
Path 2. Maximum Allowable Pipe Volume (2 points) Y M V

<input type="text"/>	Volume of hot or tempered water from source to termination (oz)
----------------------	---

OR
Option 2. Performance Test (3 points) Y M V

Note: Projects using heat traces that serve a single unit or house are awarded only half credit.

For projects using circulating systems (required for both Case 1 AND Case 2 below)

(Select one) Circulating pump does not operate continuously, is on a timer, or is on a water temperature sensor.

(Select one) Circulating pump is demand activated by a momentary contact switch, motion sensor, flow switch, door switch or voice command.

(Select one) After the pump starts, the controls allow the pump to operate until the water temperature in the return pipe rises not more than 10°F (6 °C) above the initial temperature of the water in the pipe. Controls limit the water temperature to a maximum of 105°F (40 °C). Controls limit pump operation to not more than 5 minutes per activation in the event that both means of shutting off the pump have failed.

(Select one) Circulating hot water systems have with an automatic or readily accessible manual switch to turn off the hot water circulating pump when not in use.

For projects using heat-traced piping systems

(Select one) Piping is insulated.

Case 1. Hot water source is a water heater or boiler with no circulation loop or heat traced pipe; or in multifamily buildings a central circulation loop or heat traced pipe.

Y M V

(Select one) Meets WaterSense Labeled New Homes requirements

OR

Tested volume of water stored in piping (gal)

OR
Case 2. Hot water source is a circulation loop or heat traced pipe serving a single unit or house

Y M V

Tested volume of water stored in piping (gal)

AND/OR

Option 3. Pipe Insulation (2 points)

Y M V

Insulation R-value

EA Credit Advanced Utility Tracking

Up to 2 points Preliminary Y M Verified
 Exemplary Performance: Meter separate energy usage information for at least four end uses.

Case 1. Single Family Y M V

Option 1. Electric and Water (1 point)

Y M V

Select one of the following:

(Select one) A permanent energy-monitoring system that records at intervals of one hour or less has been installed.

(Select one) The house has an automatic in-ground irrigation system and landscaped irrigated area larger than 1,000 sq ft (93 sq m) and has installed a submeter to monitor all irrigation system components.

AND/OR

Option 2. Third-Party Utility Reporting (1 point)

Y M V

(Select one) The homeowner has shared all applicable utility data with USGBC via a USGBC-approved third-party.

Case 2. Multifamily Y M V

Option 1. Electric and Water (1 point)

Y M V

Select one of the following:

(Select one) A permanent energy-monitoring system that records at intervals of one hour or less has been installed in each unit.

(Select one) The project has an automatic in-ground irrigation system and landscaped irrigated area larger than 1,000 sq ft (93 sq m) and has installed a submeter to monitor all irrigation system components.

AND/OR

Option 2. Third-Party Utility Reporting (1 point)

Y M V

Path 1. Whole-Building Master Meter

Y M V

(Select one) The building owner has shared all applicable utility data with USGBC via a USGBC-approved third-party.

OR

Path 2. Individual Unit Meters

Y M V

(Select one) At least 50% of unit owners or occupants have shared all applicable utility data with USGBC via a USGBC-approved third-party.

EA Credit Active Solar-Ready Design

1 point

Preliminary Y M **Verified**

Exemplary Performance: Achieve Option 1 and Option 2.

Option 1. Photovoltaic-Ready Design (1 point)

Y M V

Note: Projects that install a photovoltaic (PV) system that meets the requirements of EA Credit Renewable Energy are not eligible for this credit.

(Select one) The house meets EPA's solar photovoltaic specifications for a renewable energy-ready home.

AND/OR

Option 2. Solar Direct Hot Water-Ready Design (1 point)

Y M V

Note: Projects that install a solar direct hot water (DHW) system that meets the requirements of EA Credit Efficient Domestic Hot Water Equipment are not eligible for this credit.

(Select one) Meets EPA's solar water heating specifications for a renewable energy-ready home.

EA Credit HVAC Start-Up Credentialing

1 point

Preliminary Y M **Verified**

Name of technician

Company of technician

Technician commissioning all heating, cooling, and ventilation systems has the following credential

The south-facing glazing area is at least 50% greater than the sum of the glazing area on the east- and west-facing walls.

Materials and Resources

Preliminary Y 4 Maybe 3 Verified 0

MR Prerequisite Certified Tropical Wood

Required

Verified

True All wood in the building is nontropical, reused or reclaimed, or certified by the Forest Stewardship Council, or USGBC-approved equivalent.

MR Prerequisite Durability Management

Required

Verified

True ENERGY STAR for Homes, version 3, water management system checklist is collected from builder.

Confirm all of the following have been implemented on the project:

True Nonpaper-faced backer board, or a product or coating over wallboard that meets standard ASTM D 3273 standard, was installed on the area above bathtub, spa or shower, and in areas behind fiberglass enclosures where wallboard is installed.

True Water-resistant flooring was installed in the kitchen, bathroom(s), laundry room, spa area(s). No carpet was installed in these areas.

True Water-resistant flooring was installed in entryways within 3 feet of exterior door(s).

True A drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for all tank water heaters in or over living space.

True A braided washer hose, drain and drain pan, drain pan and automatic water shut-off or flow restrictors, or floor drain with floor sloped to drain was installed for clothes washer in or over living space.

True Conventional clothes dryers exhaust directly to outdoors.

MR Credit Durability Management Verification

1 point

Preliminary Y 1 M Verified

True Each measure in the ENERGY STAR for Homes, version 3, water management system builder checklist was verified by the verification team.

MR Credit Environmentally Preferable Products

Up to 4 points

Preliminary Y 1.5 M 1 Verified 0

Exemplary Performance: For Option 2, achieve a minimum of 4 points to earn another 2 points for purchasing products that meet the requirements.

Option 1. Local Production

Preliminary Y 0.5 M Verified

Select which the following were extracted, processed, and manufactured within 100 miles (160 km) of the project site:

- 100.00 Percentage of locally produced framing (%) (0.5 point)
- Percentage of locally produced aggregate for concrete and foundation (%) (0.5 point)
- Percentage of locally produced drywall and interior sheathing (%) (0.5 point)

AND/OR

Option 2. Environmentally Preferable Products

Preliminary Y M Verified

Select the criteria met by at least 90% of the component:

No Floor Covering (2 points)	
Floor Covering (1 point)	
Insulation (1 point)	Maybe
Sheathing (1 point)	
Framing (1 point)	
Drywall (1 point)	For synthetic, 95% recycled content (pre-, post-, or combination)
Concrete (1 point)	
Roofing (1 point)	
Siding (1 point)	

Select criteria met for at least 3 of the following additional components by at least 90% of the component (1 point):

Doors	
Cabinets	
Counters	
Interior Trim	
Decking/Patio	
Windows	

MR Credit Construction Waste Management

Up to 3 points

Exemplary Performance: For renovation projects, track and divert at least 50% of demolition waste.

Preliminary Y M Verified

<input type="text"/>	LEED Reference Home Baseline Waste (lbs)
<input type="text"/>	Total Construction Waste (including recycled waste) (lbs)
<input type="text"/>	Recycled Waste (lbs)
0.00	Project Construction Waste (lbs)
<input type="text"/>	Percent reduction below baseline (%)

MR Credit Material-Efficient Framing

Up to 2 points

Exemplary Performance: Achieve a minimum of 2 points to earn up to 1/2 point for each additional requirement met.

Preliminary Y M Verified

Select one of the following for at least 90% of each component: (1 point)

- No more than one horizontal 2x top plate on walls by aligning studs with joists and roof rafters was installed.
- Window and door headers were placed in the rim joist.
- Raised (directly beneath the top plate), single-ply headers not more than 2 inches nominal thickness in a 2x4 wall or 4 inches nominal thickness in a 2x6 wall, were installed.
- Structural insulated panels (SIPs) were installed for walls.

Select at least 2 of the following for at least 90% of each component: (0.5 point)

- Headers were sized for actual loads.
- Ladder blocking or drywall clips were used.
- Two-stud corners or California corners were used.

Select all that apply for at least 90% of each component: (0.5 point each)

- Interior wall studs were spaced greater than 16 inches (400 mm) o.c.
- Floor joists were spaced greater than 16 inches (400 mm) o.c.
- Roof rafters were spaced greater than 16 inches (400 mm) o.c.

Indoor Environmental Quality

Preliminary Y 9 Maybe 0.5 Verified 0

EQ Prerequisite Ventilation

Required Verified

OR
Case 2. Multifamily V

Local Exhaust

Confirm all of the following have been implemented on the project:

- Local exhaust systems meeting the requirements of ASHRAE Standard 62.2–2010, Sections 5 and 7 or local equivalent, whichever is more stringent, were installed in all bathrooms (including half-baths) and the kitchen.
- Local exhaust systems exhaust air directly to the outdoors.
- All bathroom exhaust fans are ENERGY STAR-labeled or an HRV or ERV is used.
- For exhaust hood systems capable of exhausting in excess of 400 cubic feet per minute (188 liters per second), makeup air is provided at a rate approximately equal to the exhaust air rate. Makeup air systems have a means of closure and can be automatically controlled to start and operate simultaneously with the exhaust system.

Whole Unit Mechanical Ventilation

The project meets ASHRAE Standard 62.2-2010 Sections 4 and 7 or local equivalent, whichever is more stringent.

Non-Unit Spaces

- The project meets the minimum requirements of ASHRAE Standard 62.1-2010 Sections 4 -7 or local equivalent, whichever is more stringent.
- The project is located in a nonattainment area for PM2.5. The project has installed MERV 11 or higher filters.
- The project is located in a nonattainment area for ozone.

EQ Prerequisite Combustion Venting

Required Verified

- The project has earned the EPA Indoor airPLUS label
- OR
- No unvented combustion appliances were installed (ovens and ranges excluded).
- A carbon monoxide (CO) monitor is installed on each floor, hard-wired with a battery backup.

For projects with fireplaces or woodstoves installed

- Provide doors that close or a solid glass enclosure.
- Closed-combustion, power-vented or passes BPI or RESNET combustion safety protocols

For projects where space and water heating equipment involving combustion are installed

Select one of the following:

- Equipment is installed with closed combustion (i.e. sealed supply air and exhaust ducting)
- Equipment is installed with power-vented exhaust
- Equipment is located in a detached utility building or open-air facility

EQ Prerequisite Garage Pollutant Protection

Required

Verified

The project has earned the EPA Indoor airPLUS label
OR

True All air-handling equipment and ductwork is placed outside the fire-rated envelope of the garage.
 True Shared surfaces between the garage and conditioned spaces are tightly sealed.

Conditioned Spaces Above Garage

N/A All penetrations and all connecting floor and ceiling joist bays are sealed.

Conditioned Spaces Next to Garage

N/A All doors are weather-stripped.

N/A Carbon monoxide detectors are installed in rooms that share a door with the garage.

N/A All penetrations and all cracks at the base of the walls are sealed.

EQ Prerequisite Radon-Resistant Construction

Required

Verified

Exemplary Performance: For projects in radon zones 2 and 3, install a qualifying passive radon ventilation system.

EPA Indoor airPLUS label

V

The project has earned the EPA Indoor airPLUS label

OR

Case 1. New Construction

V

1 EPA radon zone

For projects in EPA radon zone 1

True There is a capillary break per the Indoor airPLUS specifications.
 True An electrical outlet has been provided near vent piping in the attic to facilitate future fan installation.
 True A gas-tight vertical vent pipe extending up through the conditioned spaces and terminating above the roof opening has been installed.

OR

The house is elevated by at least 2 feet (600 millimeters) with open air space between building and ground or there is a garage under the building.

OR

Case 2. Renovation of Existing Building

V

EPA radon zone

For renovation projects in EPA radon zone 1 with no slab work being performed

Radon test results (pCi/L)
 If results are greater than 4 pCi/L, an active ventilation system has been installed.

EQ Prerequisite Air Filtering

Required

Verified

- The project has earned the EPA Indoor airPLUS label
- OR
- MERV rating of filters on recirculating space conditioning systems
- MERV rating of filters on mechanically supplied outdoor air systems with 10 ft (3 m) or more of ductwork

EQ Prerequisite Environmental Tobacco Smoke

Required

Verified

- For multifamily projects*
- Smoking is prohibited in all common areas of the building.
 - Smoking is prohibited outside the project building(s) except in designated smoking areas located at least 25 ft (7.5 m) from all entries, outdoor air intakes, and operable windows.
 - Signage communicating the smoking policy has been installed.

EQ Prerequisite Compartmentalization

Required

Verified

- For multifamily and attached single-family projects*
- Each residential unit has sealed penetrations through walls, ceilings, and floors and vertical chases adjacent to units.
 - All doors in the residential units leading to common hallways have weather-stripping.
 - All exterior doors and operable windows have weather-stripping.
 - Blower door test results (cfm50)
 - Envelope enclosure area (sq ft)
 - Leakage per area of enclosure (cfm50/sq ft)

EQ Credit Enhanced Ventilation

Up to 3 points

Preliminary Y M Verified

Option 1. Enhanced Local Exhaust (1 point)

Y M V

Bathroom exhaust fan control type in every bathroom with a shower, bathtub, or spa

AND/OR

Option 2. Enhanced Whole-House Ventilation (2 points)

Y M V

A balanced whole-house ventilation system was designed and installed that meets ASHRAE 62.2-2010 sections 4 and 7 in each home or unit.

The system does not exceed ASHRAE 62.2-2010 requirements by more than 10%.

EQ Credit Contaminant Control

Up to 2 points

Preliminary Y M Verified

Exemplary Performance: Achieve a minimum of 2 1/2 points to earn another 1/2 point.

Option 1. Walk-off Mats (0.5 point)

Y M V

For all primary entryways, a permanent walk-off mat that is at least 4 feet (1.2 meters) long and allows access for cleaning has been installed.

For multifamily projects

For exterior entryways in common areas, permanent systems that are at least 10 feet (3 meters) long have been installed.

AND/OR

Option 2. Shoe Removal and Storage (0.5 point)

Y M V

A shoe removal and storage space is near the primary entryway.

No conventional carpet is installed in shoe removal and storage area.

AND/OR

Option 3. Preoccupancy Flush (0.5 point)

Y M V

The project has earned the EPA Indoor airPLUS label

OR

At installation, all permanent ducts and vents were sealed to minimize contamination from construction.

After construction ends and before occupancy

Any dust and debris was removed from ducts.

The home was flushed out for 48 hours, with all windows open, a fan run continuously or all HVAC fans and exhaust fans.

AND/OR

Option 4. Air Testing (1 point)

Y M V

The building was tested for indoor air contaminants and maximum concentrations were not exceeded.

EQ Credit Balancing of Heating and Cooling Distribution Systems

Up to 3 points

Preliminary Y M Verified

Case 1. Forced-Air Systems

Y M V

Option 1. Multiple Zones (1 point)

Y M V

A system with at least two space-conditioning zones with independent thermostatic controls has been installed.

OR

The project is a single family home less than 800 sq ft (74 sq m) or a multifamily building whose average unit size is less than 1,200 sq ft (110 sq m).

AND/OR

Option 2. Supply Air-Flow Testing (1 point)

Y M V

The supply air-flow rates are within +/- 20% (or +/- 25 cfm or 11 lps) of calculated values from ACCA Manual J.

AND/OR

Option 3. Pressure Balancing (1 point)

Y M V

The pressure differential between bedroom and rest of the house is less than 3 Pa.

OR

Case 2. Radiative Systems

Y M V

Option 1. Multiple Zones (1 point)

Y M V

A system with at least two zones with independent thermostatic controls has been installed
 Each zone has a separate loop and pump controlled automatically by a thermostat control.

OR

The project is a single family home less than 800 sq ft (74 sq m) or a multifamily building whose average unit size is less than 1,200 sq ft (110 sq m).

AND/OR

Option 2. Room-by-Room Controls (2 points)

Y M V

Room-by-room thermostatic controls are installed.

EQ Credit Enhanced Compartmentalization

1 point

Preliminary Y M **Verified**

Leakage per area of enclosure (cfm50/sq ft)

EQ Credit Enhanced Combustion Venting

Up to 2 points

Preliminary Y M **Verified**

Option 1. No Fireplace or Woodstove (2 points)

Y M V

No fireplaces or woodstoves have been installed.

OR

Option 2. Enhanced Combustion Venting Measures (1 point)

Y M V

The project has earned the EPA Indoor airPLUS label

OR

EPA qualified wood- or pellet-burning fireplaces with either power or direct venting have been installed.
 A natural gas, propane, or alcohol stove approved by a safety testing facility and has power or direct venting has been installed.
 A natural gas, propane, or alcohol stove has a permanently fixed glass front or gasketed door and an electronic pilot.

EQ Credit Enhanced Garage Pollutant Protection

Up to 2 points Preliminary Y M Verified

Case 1. Single Family Y M V

Option 1. Exhaust Fan in Garage (1 point) Y M V

The project has earned the EPA Indoor airPLUS label
OR

Meet all of the following:

- An exhaust fan is installed in the garage and is rated at least 75 cfm (35 lps).
- The exhaust fan meets Energy Star cfm/w performance requirements.
- The exhaust fan vents directly to the outdoors.
- The exhaust fan has an automatic timer control linked to an occupant sensor, a light switch, a garage door opening-closing mechanism, or a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm, or equivalent.
- The exhaust fan has an automatic timer set to provide at least three air changes each time the fan is turned on.

OR

Option 2. No Garage, or Detached Garage, or Carport (2 points) Y M V

Select one of the following:

- No garage has been constructed.
- A detached garage has been constructed.
- A carport has been constructed.

OR
Case 2. Multifamily Y M V

Option 1. Exhaust Fan in Multicar Garage (1 point) Y M V

Meet all of the following:

- All of the requirements in ASHRAE 62.1-2010 for garage ventilation have been met.
- The garage has sufficient exhaust to create negative pressure with respect to adjacent spaces with the doors to the garage closed.
- Self-closing doors have been installed. Deck-to-deck partitions or a hard lid ceiling have been installed.
- The exhaust fan either runs continuously or is on a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm.

OR

Option 2. Exhaust Fan in Small Garage (1 point) Y M V

Meet all of the following:

- An exhaust fan that meets ENERGY STAR minimum efficacy levels (cfm/W) has been installed.
- Installed direct-exhaust fans are 100 cfm (47 lps) or greater.
- Installed ducted exhaust fans are 130 cfm (61 lps) or greater.
- The exhaust fan either runs continuously or has an automatic timer control linked to an occupant sensor, a light switch, a garage door opening-closing mechanism, or a carbon monoxide sensor that turns on the fan when ambient CO levels reach 35 ppm, or equivalent.
- The exhaust fan has an automatic timer set to provide at least three air changes each time the fan is turned on.

OR

Option 3. No Garage, or Detached Garage (2 points) Y M V

- No garage has been constructed.
- A detached garage has been constructed.

EQ Credit Low-Emitting Products

Up to 3 points

Preliminary Y 1 M 0.5 Verified

Select all that apply. At least 90% of a component must meet the requirement:

True Site-applied interior paints and coatings have been tested and meet the requirements of CA Section 01350. (0.5 point)

True Flooring has been tested and meets the requirements of CA Section 01350. (0.5 point)

Maybe Insulation has been tested and meets the requirements of CA Section 01350. (0.5 point)

Site-applied adhesives and sealants have been tested and meet the requirements of CA Section 01350. (0.5 point)

Composite wood products have been tested and meet the California Air Resources Board requirements for ultra-low-emitting formaldehyde (ULEF) resins or no-added formaldehyde based resins. (1 point)

Innovation

Preliminary Y 3 Maybe 1.5 Verified 0

IN Prerequisite Preliminary Rating

Required

Verified

True Preliminary rating and meeting are complete.

IN Credit Innovation

To achieve all five innovation points, a project team must achieve at least one pilot credit, at least one innovation credit and no more than two exemplary performance
Up to 5 points

Preliminary Y M Verified

Option 1. Innovation (1 point)

Y M V

Describe the intent of the proposed innovation credit.

AND/OR

Option 2. Pilot (1 point)

Y M V

Pilot credit name

AND/OR

Option 3. Additional Strategies (0.5-3 points)

Y M V

Exemplary Performance: 1-2 points

Strategy
Credit name

IN Credit LEED Accredited Professional

1 point

Preliminary Y M Verified

Name of credential holder

Regional Priority

Preliminary Y 3 Maybe 1 Verified 0

RP Credit Regional Priority

Up to 4 points

Preliminary Y M Verified

Regional priority credits may be found on www.usgbc.org/rpc.

Regional Priority Credit Name	Required Threshold
EA HVAC Start-up Credentialing	1 -MAYBE
LT Site Selection	4
SS Heat Island Reduction	2
EA Building Orientation for Passive Solar	1
EA Annual Energy Use	13 - YES
MR Durability Managaement Verification	1 - YES
SS Rainwater Management	2
Total Water Use (threshold: 5) OR Indoor Water Use (threshold: 3)	3 - YES

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. Basic specification: Perform work of this Section according to ACI 301-16, "Specifications for Structural Concrete", except as specifically modified herein.
- B. Work included: All cast-in-place concrete work shown on the Drawings and required by these Specifications. Allow for the installation of cast-in items furnished under other Sections. Install anchor bolts for structural steel. Provide and install grout under steel column base plates and beam bearing areas. Provide and install dowels for masonry walls.
- C. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other Sections and all Drawings for related work such as concrete pads, piers, curbs, and bases required for equipment of all trades. Coordinate dimensions and details of equipment being supplied, prior to placing concrete. Cooperate with other trades who will provide and install items of work (sleeves, piping, conduit, inserts, etc.) to be cast in the concrete. Place no concrete until all such items are in place.

1.3 QUALITY ASSURANCE

- A. Reference standards:
 - 1. ACI 301, Specifications for Structural Concrete
 - 2. ACI 318, Building Code Requirements for Structural Concrete.
 - 3. ACI 117, Specification for Tolerances for Concrete Construction and Materials
 - 4. ACI 347R, Guide to Formwork for Concrete.
 - 5. ACI 302.1R, Guide to Concrete Floor and Slab Construction.
 - 6. "Placing Reinforcing Bars", CRSI & WCRSI Recommended Practices.
 - 7. ACI 439.5R, Comprehensive Guide for the Specification, Manufacture and Construction Use of Welded Wire Reinforcement.
 - 8. ACI 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
 - 9. ACI 305.1, Specification for Hot Weather Concreting.

10. ACI 306R, Guide to Cold Weather Concreting.
11. ACI Field Reference Manual, SP-15.

1.4 SUBMITTALS

- A. Submit a mix design for each type of concrete mix required in accordance with ACI 301, Section 1.5.
 1. Acceptable methods of determining concrete proportions shall be in accordance with one of the following methods per ACI 301, Section 4:
 - a. Establish based on previous field strength test data with standard deviation calculations.
 - b. Establish based on trial mixtures with tested strength data relative to each mix design.In either case, provide accurate test data within allowable time periods indicated in ACI 301. Incorrect or missing data will cause for rejection of submittals.
- B. Submit Placing Drawings for all reinforcing. Indicate strength, size, and details of all bar reinforcing, and style and specification of all welded wire fabric. Details must indicate clear cover used to determine chair heights.
- C. Submit shop drawings for all formwork and shoring. Formwork design shall follow the guidelines of ACI 347 and ACI 347.2R. Shop drawings shall indicate sequence of form removal and reshoring for each type of construction. Include minimum concrete strengths for each reshored level at time of form stripping and concrete placement. Provide calculations sealed by a professional engineer registered in the applicable state of project location.
- D. Submit test data for aggregates proposed for use, indicating source and compliance with specification requirements.
 1. Submit blended aggregate mix gradation data for review in all mixes which utilize blended aggregates.
- E. Submit product literature for admixtures and curing compounds proposed for use.
- F. Submit product literature on all proprietary materials including joint systems, waterstops, hooked anchorage systems, sealers, and patching compounds.
- G. Sustainability Submittal Requirements: Refer to Section 01 81 13 for submittal requirements.
 1. Submit product data and documentation that indicates fly-ash and ground granulated blast furnace slag materials having post-consumer and pre-consumer recycled content that conforms to the requirements to obtain LEED credits.
 2. Submit product data and documentation that indicates reinforcing steel materials have post-consumer and pre-consumer recycled content that conforms to the requirements to obtain LEED credits.

- a. Provide steel reinforcing and welded wire fabric products that have a post-consumer recycled content plus one-half of pre-consumer recycled content of not less than 60 percent
3. Submit product data and documentation that identifies material costs for each type of material provided and includes location of extraction and manufacture of materials that conforms to the requirements to obtain the LEED credits.
 - a. All cement materials and aggregate shall be extracted, processed, and manufactured within a radius of 500 miles from the project site.
 - b. Fly Ash and GGBF Slag materials shall be extracted, processed, and manufactured within a radius of 500 miles from the project site
 - c. Steel for reinforcing shall be extracted, processed, and manufactured/fabricated within a radius of 500 miles from the project site.
 - d. All aggregate materials shall be extracted, processed, and manufactured within a radius of 100 miles from the project site.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cement: Portland Cement, ASTM C150, Type I or Type II or ASTM C1157, Type LH or GU. All cement to be from the same mill.
- B. Supplementary Cementitious Materials
 1. Fly Ash: ASTM C618, Type C or F
 2. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989, Grade 100 or 120
 3. Silica Fume, Microsilica: ASTM C1240
- C. Water: Potable.
- D. Aggregates:
 1. Normal weight aggregates: conform to ASTM C33, (4.2.1.2).
 2. Light weight aggregates, fine and coarse: conform to ASTM C330, (7.2.1).
 3. Coarse aggregate:
 - a. Topping slabs on precast concrete deck and fill on stair pans: Gradation #8.
 - b. All other classes: Gradation #57.
 - c. A blended aggregate mix may be used at the Contractor/Suppliers' discretion.
 4. For architecturally exposed concrete, use a single source of uniform quality throughout the work.
- E. Admixtures, where required or permitted per ACI 301, Section 4:
 1. Water-Reducing: ASTM C494, Type A or D.
 2. Mid-Range Water-Reducing admixture: ASTM C494, Type A.
 3. Air-entraining: ASTM C260 (4.2.1.4).

4. High-Range Water-Reducing admixture (Superplasticizer): ASTM C494, Type F or G.
 5. Non-Chloride, Non-Corrosive accelerator: ASTM C494, Type C or E.
 6. Fly Ash: ASTM C618, Type C or F.
 7. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989.
 8. Calcium Chloride and admixtures containing more than 0.06% chloride ions are NOT permitted.
 9. Use of admixtures other than those listed will be permitted only when approved prior to bid.
- F. Reinforcing:
1. Deformed bars - Uncoated: ASTM A615 or A706. Minimum yield strength to be 60 ksi.
 2. Deformed bars – Epoxy Coated. ASTM A615, A616, A617, or A706. Minimum yield strength to be 60 ksi. Epoxy coated in accordance with the requirements of ASTM A775 or A934.
 3. Welded Wire Fabric:
 - a. Plain welded wire reinforcement: ASTM A1064. Provide in sheet form for all uses other than slabs-on-grade. Minimum yield strength is to be 65 ksi.
 - b. Lap sheets a minimum distance of cross wire spacing plus two inches.
 4. Smooth joint dowel bars: ASTM A36, plain steel bars, cut true to length with square ends.
 5. Reinforcing support accessories:
 - a. Provide reinforcement accessories, consisting of bar supports, spacers, hangers, chairs, ties, and similar items as required for spacing, assembling, and supporting reinforcement in place. Conform with CRSI RB4.1 and Manual of Standard Practice and the following requirements:
 - b. For footings, grade beams, and slabs on grade, provide supports with precast concrete or mortar bases or plates or horizontal runners where wetted base materials will not support chair legs.
 - c. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms or are in close proximity to finish surfaces, provide supports with legs which are galvanized, plastic-protected, or stainless steel.
 6. Structural synthetic fiber reinforcement: Structural fibers shall be a coarse monofilament or self-fibrillation, polypropylene / polyethylene blend in accordance with ASTM C1116, Paragraph 4.1.3, Type III. Structural fibers shall have a minimum tensile strength of 73 to 80 ksi, have a minimum length of 1-1/2 inches, thickness of 0.015 inches, and a width of 0.045 inches.
- G. Premolded expansion joint filler: ASTM D1751.
- H. Curing and Sealing Compound (VOC Compliant, 350 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 0.40 kg/m² when applied at 300 ft²/gal. Manufacturers' certification is

required. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile resilient flooring, vinylbacked carpet, wood, terrazzo, epoxy or urethane overlays or adhesives, or other coating or finishing products. Subject to project requirements, provide one from the following manufacturers:

1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. W.R. Meadows

I. Curing Compound (Strippable): The compound shall conform to ASTM C309 and is to be used on slabs that are to receive subsequent applied finishes and where noted on the drawings. Install in strict accordance with the manufacturer's recommendations and supervision. Verify compound is compatible with the applied finish prior to placement. Subject to project requirements, provide one from the following manufacturers:

1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. W.R. Meadows

J. Penetrating Sealer for Elevated Parking Decks: Meets or exceeds performance requirements of NCHRP 244 and have minimum 40% silane content. Subject to project requirements, provide one from the following manufacturers:

1. Euclid Chemical Company.
2. Kaufman Company.
3. Sika Corporation.

K. Grout for masonry core fill: ASTM C476, coarse type.

L. Grout under steel base plates and bearing plates: Non-shrinking, non-metallic, with minimum 28-day strength of 5,000 psi, when mixed to a fluid consistency. Subject to project requirements, provide one from the following manufacturers:

1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. Kaufman Company.

M. Vapor Retarder:

1. Conform to ASTM E1745 "Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs", Class A.
2. Vapor retarders are required under all slabs on grade which are to receive moisture-sensitive floor covering, and in humidity-controlled areas. Vapor retarders are not required under industrial slabs on grade nor under those in non-humidity-controlled areas.
3. Vapor retarder shall be installed in accordance with ASTM E1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs. The vapor retarder/barrier shall be a minimum of 10 mils thick and placed directly on the granular fill, below the concrete floor slab. Lap joints a minimum of 6 inches and seal with manufacturer's recommended tape or adhesive.

- N. Granular fill below slabs on grade: Provide as recommended in project specific soils report. If soils report is not provided for project, use 6" deep of compacted ODOT 304 or approved equivalent AASHTO dense graded base course. Provide ASTM D448 size #57 stone under slabs-on-grade where radon evacuation is anticipated.
- O. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints. Provide either premolded polyvinylchloride or swellable type.
 - 1. Premolded, flexible, polyvinylchloride, with center bulb. CRD C572
 - 2. Rubber and Swellable Clay CRD C513
- P. Structural Bonding Compound: Epoxy adhesive, 100% solids, two-component material suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
 - 1. Euclid Chemical Company.
 - 2. Kaufman Company.
 - 3. Sika Corporation.
- Q. Patching Compound, Epoxy Type: 100% solids, suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
 - 1. Euclid Chemical Company.
 - 2. Sika Corporation.
 - 3. W.R. Meadows
- R. Patching Compound, Cementitious Type: Subject to project requirements, provide one from the following manufacturers:
 - 1. Euclid Chemical Company.
 - 2. Sika Corporation.
 - 3. W.R. Meadows
- S. Curing sheets for wet curing – the following materials are approved:
 - 1. Sisalcraft Sk-10 (C171).
 - 2. Burlap
 - 3. Filter Fabric (8-ounce minimum)
 - 4. Visqueen plastic, 8 mils minimum.
 - 5. Bur-lene curing blankets.

2.2 MIXES

- A. The following mixes of concrete are required:

Mix Usage	f _c at 28 days	Exposure Class	Maximum Water Cementitious Ratio	Air Content
Lean Concrete, & Mud Slabs	1,500 PSI	F0	---	---
Footings & Interior Column Piers	3,500 PSI	F1	0.55	optional
Interior Slabs on Grade	3,500 PSI	F0	0.50	optional
Structural Slabs, Beams & Columns	5,000 PSI	F0, F1, F2, C0, C1	0.42	(F0) --- (F1, F2) 5%-7%
Exterior Foundation Stem Walls & Exterior Column Piers	4,500 PSI	F2, C1	0.45	5%-7%
Exterior Site Concrete	5,000 PSI	F3, C2	0.40	5%-7%

Concrete Mix Notes:

- 1) Exposure class requirements are achieved through the F'c, w/cm, and air content requirements provided to ensure adequate durability conforms to Freeze/Thaw exposures (F) or Corrosive exposures (C).
- 2) For all slab mixes, provide a minimum cementitious content of 520 lbs.
- 3) Slump: Maximum 5" for all members. If a superplasticizer is used, initial slump to be 3", increased to 8" maximum after addition (at the job site) of the superplasticizer.
- 4) Fly ash is permitted in all mixes but shall not exceed 25% of cement weight indicated above and can be included in the water-to-cementitious ratio.
- 5) Ground granulated blast-furnace slag is permitted in all mixes but shall not exceed 35% of the cement weight indicated above and can be included in the water-to-cementitious ratio.
- 6) Silica fume (microsilica) is permitted in all mixes but shall not exceed 10% of the cement weight indicated above and can be included in the water-to-cementitious ratio.
- 7) Total supplemental cementitious material shall not exceed 35% of the total cement weight.
- 8) Mixes to be pumped are to be so identified on the mix design submittal. All pumped mixes are to have a mid-range or high-range water reducer.
- 9) Concrete for slabs on grade must include a mid-range or high-range plasticizer.
- 10) All admixtures (other than superplasticizer) are to be added at the batch plant. Superplasticizers, designed for addition to the mix at the plant, may be added at the batch plant with verification from the Engineer of Record and verification that the water-to-cement ratio has not been exceeded.
- 11) Maximum water-soluble chloride ion content in Non-Prestressed concrete shall not be more than the ACI limits set forth for defined corrosion classes. For all other concrete, the maximum water-soluble chloride ion content shall not be more than 0.06 percent (by weight) of the weight of cement as determined by ASTM C1218.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Verify that excavations are free of water and ice, are of the required dimensions, and have been approved by the Soils Engineer, prior to placing concrete.

- B. Determine field conditions by actual measurement.
- C. Notify Architect not less than 24 hours in advance of placing concrete. Place concrete only when Construction Manager is present, unless this requirement is specifically waived.

3.2 FORMWORK AND REINFORCING

- A. All formwork shall follow the guidelines of ACI 347R resulting in final formed surfaces within the tolerances of ACI 117.
- B. Footings may be cast against earth cuts when soil conditions permit.
- C. Removal of forms and shoring:
 - 1. Remove no forms within 24 hours after placement.
 - 2. Shoring is to remain in place until concrete reaches its design strength. Windsor Penetrometer is to be used to verify in-place strength if forms are removed prior to 28 days after casting concrete.
- D. Reinforcing:
 - 1. Welding of reinforcing is prohibited, except where shown.
 - 2. Use plastic-tipped or stainless-steel bar supports for surfaces exposed to view in finished structure.

3.3 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install all embeds shown on contract documents, including but not limited to: headed stud embeds, anchor bolts, brick ledge inserts, and dovetail anchor slots.
 - 2. Install sleeves for mechanical, electrical, and plumbing penetrations.
 - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
- B. Aluminum conduit shall not be installed in concrete.

3.4 DELIVERY AND PLACEMENT

- A. Preparation before placement:
 - 1. Remove all debris from forms and deck. Clean steel deck of grease, oil, and other substances that would reduce bond to concrete.
 - 2. Standing water shall be removed from place of deposit before concrete is placed.

3. Do not use additives or salts to remove ice. Non-chloride deicers may be used.
 4. In cold weather, comply with ACI 306R; maintain temperature of forms and reinforcing within a range of 55 - 90 degrees F.
 5. In hot weather, comply with ACI 305.1.
 6. Prior to placing topping slabs on Precast Concrete Hollow Core Planks, thoroughly dampen the precast surface but do not leave standing water. Immediately before placing topping, re-dampen the surface and broom on a coat of thin neat cement grout. Apply grout only to small enough areas so that it will not begin to set or dry before placement of the topping slab.
 - a. In lieu of neat cement grout, a manufactured bonding agent may be used. The bonding agent must be integrally colored to show the extent of application. Apply by brush or spray, at recommended rates, in accordance with the manufacturer's directions.
- B. Delivery is to conform to ASTM C94.
1. Delivery tickets to contain the following, in addition to the information required by C94:
 2. Reading of revolution counter at first addition of water.
 3. Type and brand of cement and supplementary cementitious materials.
 4. Cementitious content.
 5. Total water content by producer.
 6. Maximum size of aggregate.
 7. Secure Architect's written approval if non-agitating type equipment is to be used for transportation.
 8. ASTM C94 requires discharge within 1-1/2 hours or 300 revolutions; whichever comes first, after the introduction of water to cement and aggregates, or the introduction of cement to the aggregates. Architect may require an earlier discharge during hot weather, or when high-early strength cement is being used.
- C. Water addition at the site will not be permitted, except when the approved mix design has been formulated to allow for on-site addition of water. Water may only be added by personnel authorized by the Architect/Engineer and Concrete Producer.
- D. Conveying: Keep delivery carts and buggies on runways; do not allow them to bear on reinforcing or uncured concrete.
- E. Placement.
1. Place within 6 feet of final position. Spreading with vibrators is prohibited.
 2. In walls and columns, deposit concrete in uniform horizontal layers, with a maximum depth of 4 feet (18 inches for architectural concrete).
 3. Maximum free fall without chutes or elephant trunks to be 5 feet (3 feet for architectural concrete).
 4. Place concrete continuously to a designed joint such that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of cold joints or planes of weakness.
 5. Concrete shall be consolidated per guidelines in ACI 309.2R.

- F. Records: Keep a complete log of pours, including date, location, quantity, weather, and identification of test cylinders for each pour.

3.5 JOINTING

- A. Interior slabs on grade:
 - 1. Locate control (contraction) joints as shown on the Drawings. In the absence of information on Drawings, locate at openings, walls, columns, grid lines, and inside corners. The maximum spacing of contraction (control) joints, for reinforced and unreinforced slabs, is to be 6 times the square root of the slab thickness (i.e. for a 4-inch slab the maximum spacing is 12 feet). Cut joints $\frac{1}{4}$ times the slab thickness. The Soff-Cut Saw shall be used immediately after final finishing. A conventional saw shall be used as soon as possible without dislodging aggregate. Schedule slab pours and saw-cutting operations such that sawing is completed prior to onset of shrinkage cracking.
 - 2. Provide isolation joints at columns ($\frac{1}{2}$ inch thick) and at walls ($\frac{1}{8}$ inch thick). Where isolation joint will be exposed to view, set top of joint filler below top of slab a distance equal to the filler thickness, to receive sealant. Where not exposed to view, set top of filler flush with top of slab.
- B. Exterior slabs on grade: Locate joints as shown on Drawings. In the absence of information on Drawings, provide the following (for sidewalks only):
 - 1. Expansion joints: Full depth, with $\frac{1}{2}$ inch joint filler, where slabs abut vertical surfaces at intersections of sidewalks, at abrupt changes in width, and at a spacing not exceeding 30 feet.
 - 2. Control joints: Tooled, 1 inch deep, 4'-0" to 6'-0" on center between expansion joints.
- C. Above-grade, Below-grade and foundation walls: Locate contraction joints at maximum spacings of 60'-0" on center, except as approved otherwise. Provide horizontal reinforcing separation, doweling of adjacent placements, and v-grooves each face per details on Structural Drawings. Construction joints in walls shall be submitted to EOR for review and approval.

3.6 FINISHES

- A. Schedule of finishes on flatwork per ACI 301, section 5 is as follows:
 - 1. Typical interior floor areas to receive carpet, resilient floor covering, or to remain exposed - troweled finish.
 - 2. Interior floor areas to receive terrazzo, quarry tile, or ceramic tile - floated finish.
 - 3. Exterior slabs - broom finish.
 - 4. Areas indicated on Drawings:
 - a. Exposed aggregate.
 - b. Non-slip.

- c. Liquid sealer/densifier – per manufacturer’s instructions, under direction of manufacturer’s representative. Use on all interior trowel finished slabs subject to small-wheeled vehicular traffic.
 - d. Hardener - per manufacturer's instructions, under direction of manufacturer's representative.
- B. Surfaces of floor slabs shall be finished to the following tolerances, per ACI 117:
 - 1. Minimum flatness of F(f) 30, and a minimum levelness of F(l) 20, are required for typical slabs on grade. Preceding values are average values to be obtained over a given area. Minimum local values (one-half bay) of F(f) 25 and F(l) 17 shall be obtained.
- C. Determination of the flatness and levelness of a concrete slab shall be made on the day following placement of the first concrete pour. Tests shall be made in accordance with ASTM E115. After it is established that proper procedures are being utilized to obtain the desired results, flatness/levelness test shall be performed only as directed by the Owner.
- D. Any bay not conforming to the above flatness and levelness requirements is subject to: repair, or removal; replacement; and retesting; at no expense to the Owner.
- E. "F Numbers" shall be submitted to the Owner and Architect immediately after they are determined by the testing laboratory.

3.7 CURING AND PROTECTION

- A. Curing:
 - 1. Interior slab areas that will receive non-moisture sensitive terrazzo, ceramic tile, quarry tile, or a liquid sealer/densifier, are to be moist-cured for a minimum of 7 days, without the use of a curing compound.
 - 2. Interior slab on grade areas which will receive moisture sensitive floor coverings are to be cured with plastic sheeting, conforming to ASTM C171, for 7 days. Edges and joints are to be sealed. Rewetting of the slab at any time during construction should be avoided.
 - 3. All other slab areas which will receive non-moisture sensitive floor coverings may be either moist-cured or receive an application of curing compound, except that when concrete above grade is placed in the open, and the air temperature exceeds 60 °F, the concrete is to be moist-cured for the first 24 hours.
 - 4. Whichever curing method is used, it is to commence immediately after placement. Do not allow curing to be delayed overnight.
 - 5. Prevent excessive moisture loss from formed surfaces. If forms are removed before 7 days have elapsed, cure the formed surfaces by moist-curing or application of curing compound for the remainder of the curing period.
- B. Protection:

1. When air temperature during placement is less than 40 °F, or will be within 24 hours, temperature of concrete as placed is to be between 50 °F and 90 °F (55 °F and 90 °F for sections less than 12 inches thick) and a non-chloride accelerator shall be used. Maintain concrete temperature within these limits for the full curing period of 7 days.
2. When air temperature during placement is greater than 80 degrees, a water-reducing retarder shall be used. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

3.8 CLEANING AND REPAIR

- A. Repair any slabs that do not meet the finish requirements. The Architect will determine whether grinding, filling of cracks, or patching and leveling procedures are required.
- B. For slabs that are dusting, or showing other signs of improper curing, any corrective measures attempted will be subject to prior approval of the Architect and will be performed at Contractor's expense. These may include additional applications of sealer/densifier, or grinding, or covering with specified repair topping.
- C. Immediately prior to final acceptance, remove from all interior and exterior surfaces that are exposed to view, any stain-producing elements, such as pyrites, nail, wire, reinforcing steel, and form ties.
- D. Remove all stains completely. Use of weak acids or patented cleaners is acceptable, but surface is to be completely neutralized after use.
- E. All repairs shall conform to ACI 301, Section 5.3.7 except that the specified bonding com- pounds, cementitious, or epoxy repair materials must be used. Repair procedures must be submitted and reviewed by the Engineer of Record.
- F. As-cast formed finishes shall be comply with the following:
 1. Concrete surfaces not exposed to view (Surface Tolerance Class D per ACI 117)
 - a. Patch voids larger than 1-1/2" wide or 1/2" deep.
 - b. Remove projections larger than 1".
 2. Concrete surfaces exposed to view (Surface Tolerance Class C per ACI 117)
 - a. Patch voids larger than 3/4" wide or 1/2" deep.
 - b. Remove projections larger than 1/2".
 - c. Patch tie holes.
- G. Failure of concrete topping to bond to substrate (as evidence by a hollow sound when tapped), or disintegration or other failure of topping to perform as a floor

finish, will be considered failure of materials and workmanship. Repair or replace toppings in areas of such failures, as directed.

3.9 ACCEPTANCE

- A. Concrete work with serious honeycombing, form misalignment, or other deviation from Contract requirements is subject to rejection per ACI 301, Section 1.
- B. When observations or tests indicate that the Contract requirements have not been met, the Contractor is to bear the costs of any additional testing and analysis to determine acceptability and also the cost of removal and replacement, if such is required per ACI 301, Section 1.

3.10 FIELD QUALITY CONTROL

- A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the jurisdiction.
- B. All tests and inspection shall be per ACI 301, Section 1.6

END OF SECTION 03 30 00

SECTION 03 35 30

CONCRETE CLEANING AND SEALING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Cleaning - Existing and New Concrete Slabs: Clean cured concrete surfaces. All exposed slabs including slabs with applied cure and seal compounds.
 - 1. Clean surfaces without stripping sealing compounds unless hardening-densifying type is to be applied.
- B. Cure and Sealing - Fresh Construction Slabs: See Section 03 30 00 for cure and seal compound. If not specified in 03 30 00, apply cure and seal compound specified herein.
- C. Test and ensure all concrete surface preparations and subsequent compound applications are compatible.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Cast in Place Concrete: Section 03 30 00.

1.03 REFERENCES

- A. ACI 515.1R - Guide to the Use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete.

1.04 SUBMITTALS

- A. Product Data: For each type of product. Include construction details, material descriptions, chemical composition, physical properties, test data, and mixing, surface preparation, and application instructions.
- B. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

1.05 QUALITY ASSURANCE

- A. Manufacturer: Certify in writing that proposed materials meet or exceed specifications and are appropriate for intended use.

- B. Test Sample: Identify an area approximately 36" x 36" where a test cleaning and sealing can be performed and sealer application can be applied. Obtain Architect's approval of test area prior to start of test. Clean area and apply sealer using materials and methods proposed for the project. Repeat sample applications until approval by Architect. After sample's acceptance by the Architect, sample will be regarded as the minimum standard of workmanship/finish acceptable for the project.

1.06 PROJECT CONDITIONS

- A. Do not apply materials when temperature is expected to be below 40° F within 48 hours or when rain is imminent.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean, dry area in accordance with manufacturer's instructions.
- C. Keep product from freezing.
- D. Avoid direct contact with this product as it may cause mild-to-moderate irritation of the eyes and/or skin.
- E. Protect materials during handling and application to prevent damage or contamination.
- F. Use product full strength from the container.
- G. Dispose of material according to all local, state and federal regulations.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

- A. Source Limitations: Obtain each color, grade, finish, type, and variety of product from single source with resources to provide products of consistent quality in appearance and physical properties. Verify compatibility of cleaner and sealer products.
- B. General: Provide materials that comply with Project Sustainable Design Requirements and Low Emitting Material goals.

2.02 CONCRETE CLEANING MATERIAL

- A. Description: Pre-mixed, non-acidic pre-packaged degreaser/stripper. Product to be

effective in removing existing curing and sealing compounds

- B. Manufacturer and Product: Citrex by L & M CHEMICAL or Ultrite Degreaser by W. R. MEADOWS. Products by CHEM MASTERS, DAYTON SUPERIOR; MASTER BUILDERS SOLUTIONS; SURE BUILDING CHEMICALS; H & C PRODUCTS or CONPROCO are acceptable providing they meet the requirements specified.
- C. Properties
 - 1. Appearance: Clear.
 - 2. pH: 10.9.
 - 3. Biodegradable: 100% after dilution.

2.03 CURE AND SEAL MATERIAL – FRESH AND EXISTING CONCRETE

- A. Description: Spray on - clear, film forming, one component, transparent, acrylic copolymer cure and sealer that locks in moisture, and cures concrete. 2-coat application.
- B. Primer: Type as recommended by sealer manufacturer.
- C. Properties
 - 1. VOC Content: Less than 170 g/L.
 - 2. Solids: 30%.
 - 3. ASTM C 1315, Type 1, Class A
- D. Manufacturer and Product: Dress and Seal WB 30 by LATTICRETE - L & M CHEMICAL or equal products by CHEMMASTERS, DAYTON SUPERIOR; MASTER BUILDERS SOLUTIONS; SURE BUILDING CHEMICALS; W. R. MEADOWS or CONPROCO.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive concrete degreaser. Notify architect if surfaces are not acceptable. Do not begin application until unacceptable conditions have been corrected.
- B. Do not apply the sealer products until all surfaces are porous. Test for adhesion.

3.02 SURFACE PREPARATION

- A. Protect adjacent surfaces not designated to receive concrete degreaser.
- B. Follow ACI Guide 515.1R (Section 3.4.2) for severe oil and grease stains.
- C. Clean surfaces of residual flooring adhesive, curing, previous sealers or

compounds, if present, and other foreign deposits using warm water, scraping, adhesive removing chemicals or similar methods.

- D. New Sealers to Cured Concrete: Remove all previous surface sealers and film forming curing compounds. Ensure surfaces are clean and free of all contaminants, and any film forming curing compounds or sealers.

3.03 APPLICATION

A. Cleaner

1. Conform to manufacturer's requirements and recommendations. Apply in number of applications as required.
2. Finish cleaned surface to match test sample area.

B. Sealer:

1. Verify that slab surfaces have been cleaned and prepared in accordance with sealer manufacturer requirements.
2. Conform to manufacturer's requirements and recommendations. Provide two coats. Apply first coat at approximately 300 square feet per gallon; second coat at approximately 400 square feet per gallon.
3. Do not thin material.

3.04 CLEANUP

- A. Dispose of material according to local, state, and federal regulations.
- B. Clean all tools and equipment with water.

END OF SECTION

SECTION 03 54 13

GYPSUM UNDERLAYMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Section includes gypsum-cement-based, self-leveling underlayment for application below interior floor coverings.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated
- B. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.
- C. Qualification Data: For qualified Installer.
- B. Special Environmental Requirements: Submit the following in accordance with Section 01 81 13:
 - 1. Products shall comply with the 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."
 - 2. Laboratory Test Reports: For liquid floor treatments, indicating compliance with requirements for low-emitting materials.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
- B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.
- C. Fire-Resistance Ratings: Provide gypsum-cement underlayment systems identical to those of assemblies tested for fire resistance per ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- D. Sound Transmission Characteristics: Where indicated, provide gypsum-cement underlayment systems identical to those of assemblies tested for STC and IIC ratings per ASTM E90 and ASTM E492 by a qualified testing agency.
- E. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Underlayment: Gypsum-cement-based, self-leveling product that can be applied in minimum uniform thickness of 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Thickness 3/4"
- B. Cement Binder: Gypsum or blended gypsum cement as defined by ASTM C219.
- C. Compressive Strength: Not less than 3000 psi at 28 days when tested according to ASTM C 109.
- D. Retain subparagraph below if required. Some manufacturers recommend additives for applications over cutback adhesive or wood and metal substrates.
- E. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.
- F. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.
 - 1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required
- G. Water: Potable and at a temperature of not more than 70 deg F.
- H. Reinforcement: For underlayment applied to wood substrates, provide galvanized metal lath or other corrosion-resistant reinforcement recommended in writing by underlayment manufacturer.
- I. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.

2.02 ACCESSORIES

- A. Sound Mat: **1/8"** thick entangled polymeric filament mat.
 - 1. Basis of Design: Manufacturer and Product: MAXXON Acousti-Mat I.

2. Other Acceptable Manufacturers: Sound Mats manufactured by USG CORPORATION or DURACOUSTICS will be considered if materials meet the requirements of the Basis of Design and the performance is an acceptable match as approved by the Architect.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance.
- B. Proceed with application only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
- B. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
- C. Fill substrate voids to prevent underlayment from leaking.
- D. Wood Substrates: Mechanically fasten loose boards and panels to eliminate substrate movement and squeaks. Sand to remove coatings that might impair underlayment bond and remove sanding dust.
- E. Install underlayment reinforcement recommended in writing by manufacturer.
- F. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.
- G. Sound Control Mat: Install sound control materials according to manufacturer's written instructions.
- H. Do not install mechanical fasteners that penetrate through the sound control materials.

3.03 INSTALLATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 2. Coordinate application of components to provide optimum underlayment-

to-substrate and intercoat adhesion.

3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
 - C. Apply underlayment to produce uniform, level surface in thicknesses indicated.
 1. Apply a final layer without aggregate to product surface.
 2. Feather edges to match adjacent floor elevations.
 - D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 - E. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
 - F. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

END OF SECTION

SECTION 04 00 00

MASONRY

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide the following:

1. Face brick.
2. Concrete masonry units.
 - a. Standard
 - b. Fire-rated
3. Masonry lintels and setting of steel angles furnished under Section 05 50 00.
4. Setting bearing plates supported and embedded with masonry furnished under Section 05 50 00.
5. Provide masonry fill concrete and reinforcing steel where indicated on drawings. See Section 03 30 00.
6. Wall reinforcing and accessories.
7. Built-in collars, sleeves, inserts, anchors, ties, sockets, bolts, blocking, miscellaneous metal work, etc., in contact with, supported on or enclosed by masonry. When these items are furnished by others, they shall include information for setting.
8. Through-wall flashing.
9. Includes grouting solid all hollow metal door frames in masonry.
10. Mortar and grout.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Cast Stone: Section 04 72 00.

1.03 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.04 SUBMITTALS

- A. Product Data: For each different masonry unit, accessory and other manufactured products specified.
- B. Shop Drawings: Show fabrication and installation details for the following:
 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete

- Reinforcement". Show elevations of reinforced walls.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples: Provide samples of items specified herein to be used in the work.
- D. Submit certification that fire resistant concrete units conform to the requirements specified herein for Fire Resistant Concrete Block.
- E. Brick Cleaner
1. Applicator Qualifications: Submit qualifications of applicator.
 - a. Certification stating applicator is experienced in the application of the specified products.
 - b. List of recently completed masonry cleaning projects, including project name and location, names of owner and Architect, description of cleaning products used and substrates, applicable local environmental regulations, and application procedures.
 2. Environmental Regulations: Submit description for testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes and cleaning effluents. Describe any hazardous materials to be cleaned from substrates. Submit applicable local environmental regulations.
 3. Protection: Submit description for protecting surrounding areas, landscaping, building occupants, pedestrians, vehicles, and nonmasonry surfaces during the work from contact with masonry cleaners, stain removers, residues, rinse water, fumes, wastes, and cleaning effluents.
 4. Surface Preparation: Submit description for surface preparation of substrates to be completed before application of masonry cleaners and stain removers.
 5. Application: Submit description for application procedures of masonry cleaners.
- F. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated.
1. Each type of masonry unit required.
 - a. Include size-variation data for brick, verifying that actual range of sizes falls within specified tolerances.
 - b. Include test results, measurements, and calculations establishing net-area compressive strength of masonry units.
 2. Mortar complying with property requirements of ASTM C270.
 3. Grout mixes complying with compressive strength requirements of ASTM C476. Include description of type and proportions of grout ingredients.
- G. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Each type of masonry unit required.
 - a. Include test data, measurements, and calculations establishing net-area compressive strength of masonry units.
 2. Each combination of masonry unit type and mortar type. Include statement of net-area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 3. Each material and grade indicated for reinforcing bars.
 4. Each type and size of joint reinforcement.
 5. Each type and size of anchor, tie, and metal accessory.
- H. Cold-Weather Procedures: Detailed description of methods, materials and equipment to be used to comply with cold-weather requirements.
- I. Special Environmental Requirements: Submit the following in accordance with Section 01 81 13:

1.05 QUALITY ASSURANCE

- A. Supervisor: A supervisory journeyman mason shall be appointed for the project and shall be present at all times masonry work is being performed and:
1. have a minimum of 5 years experience on masonry projects of this type and size.
 2. be thoroughly familiar with the design requirements, types of materials being installed, referenced standards and other requirements.
- B. Use only skilled journeyman masons for cutting and placing of masonry; no allowance shall be made for lack of skill on the part of the workmen.
- C. Consult other trades and make provisions that shall permit the installation of their work in a manner to avoid cutting and patching. Build-in work under other sections, as necessary, and as the work progresses.
- D. Unit Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602, 2013 Edition "Specifications for Masonry Structures". Maintain one copy of the standard in project field office at all times during construction. Contractor's supervisory personnel shall be thoroughly familiar with the material as it applies to this Project.
- E. Concrete Unit Masonry Construction: Comply with the National Concrete Masonry Association (NCMA) "TEK Bulletins", and other requirements specified.
1. NCMA TEK Bulletin 3-02A "Grouting for Concrete Masonry Walls".
 2. NCMA TEK Bulletin 8-02A "Removal of Stains from Concrete Masonry Walls".
 4. NCMA TEK Bulletin 10-01A "Crack Control in Concrete Masonry Walls".
 5. NCMA TEK Bulletin 10-02C "Control Joints for Concrete Masonry Walls".
 6. NCMA TEK Bulletin 14-2 "Reinforced Concrete Masonry".
 7. NCMA TEK Bulletin 19-04A "Flashing Concrete Masonry".

8. NCMA TEK Bulletin 19-05A "Use of Flashing in Concrete Masonry Walls".

F. Brick Industry Association (BIA)

1. BIA Technical Notes No. 8 and 8B: Mortar for Brickwork.
2. BIA Technical Notes No. 20: Cleaning Brick Masonry.
3. BIA Technical Notes No. 28B: Brick Veneer.

G. Sample Panels

1. Construct where approved by Architect.
2. Panel shall be at least 6 feet long by 6 feet high and shall show full color range, joint detail, reinforcement, through-wall flashing and drips, cavity drainage material, weeps and all other details of construction that will be used in the completed work. Include at least one 90° corner.
 - a. Include brick masonry, split face concrete masonry and cast stone; see Section 04 72 00
 - b. Clean sample panel using the same methods and materials that will be utilized for cleaning the building masonry.
3. Construct additional panels as required by Architect if original panel construction is not acceptable.
4. Do not start masonry construction until the sample panel is approved by the Architect.
5. Retain acceptable sample as reference standard for the project.
6. Demolish and remove panel from site after acceptance of work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Store cement and lime materials and masonry units off the ground, under cover and protected from weather damage. If units become wet, do not install until they are dry. Do not use cementitious materials that have become damp.
- C. Stockpile and store aggregates to prevent contamination from foreign materials, in locations where grading and other required characteristics can be maintained.
- D. Use care in handling units to avoid chipping and breakage.
- E. Locate storage areas where they will not be disturbed or damaged by construction operations.
- F. Protect finished floor areas from damage.

1.07 COLD WEATHER CONSTRUCTION

- A. Comply with recommended practices for cold weather construction of the International Masonry Industry All-Weather Council and requirements contained in ACI 530.1/ASCE 6/TMS 602.
- B. Do not build on frozen or snow covered work. Remove and replace masonry work

damaged by frost or freezing.

C. Requirements During Construction: Provide the following minimum requirements for the air temperatures listed:

1. Above 40° F: Normal masonry procedures.
2. 40° F to 32° F: Heat mixing water to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Do not heat mortar to greater than 120° F.
3. Below 32° F to 25° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F.
4. Below 25° F to 20° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F. Maintain masonry above freezing using auxiliary heat. Provide enclosure when wind is in excess of 15 mph.
5. Below 20° F: Heat sufficient mortar ingredients to produce mortar temperatures between 40° F and 120° F. Produce consecutive batches of mortar with the same temperatures falling within this range. Maintain mortar temperatures after mixing above 40° F. Do not heat mortar to greater than 120° F. Maintain masonry above freezing using enclosure and auxiliary heat.

D. Protection Requirements for Completed Masonry (and masonry not being worked on): Provide the following minimum requirements for the mean daily air temperatures listed:

1. Above 40° F: Normal masonry procedures.
2. 40° F to 32° F: Protect from rain or snow for 24 hours with weather-resistive membrane.
3. Below 32° F to 20° F: Completely cover with weather-resistive membrane and maintain above freezing for 24 hours.
4. Below 20° F: Provide weather-resistant enclosure and auxiliary heat to maintain above freezing for 24 hours.

E. Requirements During Grouting Operations (Vertically Reinforced Walls): Provide the following minimum requirements for the air temperatures listed:

1. Above 32° F: Normal masonry procedures. Cover at end of work day with weather-resistive membrane.
2. 32° F to 20° F: Heat grout materials to 90° F so grout has in-place temperature of 70° F at end of work day. Cover at end of work day with weather-resistive membrane and 1/2" thick insulating blanket.

3. Below 20° F: Heat grout materials to 90° F so grout has in-place temperature of 70° F at end of work day. Cover at end of work day with weather-resistive membrane and 1" thick insulating blanket or maintain heated enclosure to 40° F for a period of 48 hours.
 - a. Grout Containing Type III Cement: Maintain 40° F temperature for 24 hours.

1.08 HOT WEATHER CONSTRUCTION

- A. Protect masonry construction from direct exposure to wind and sun when erected in an ambient air temperature of 90° F., or greater in shade with relative humidity less than 50%. Provide artificial shade and wind breaks and use cooled materials as required. Provide artificial shade, wind breaks, use cooled materials and other procedures outlined in BIA Tech Notes #1.

1.09 PROJECT CONDITIONS

- A. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
 1. Brace unsupported and newly laid masonry walls. Maintain bracing in place until building structure provides permanent bracing.
- B. 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 become in contact with such masonry.
 1. Protect base of walls from rain-splashed mud and from mortar splatter by coverings spread 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 on completed masonry.

PART 2 PRODUCTS

2.01 CLAY MASONRY UNITS

- A. Face Brick
 1. Reference: Select exterior building brick conforming to ASTM C216, Grade SW.
 2. Size and Color: Modular - Standard size and of a color range and texture selected by the Architect.
 3. Manufacturer/Color
 - a. Brick: BELDEN Modular Glacier White Vel
 - b. Other Manufacturers: Brick by other manufacturers may be used providing the above requirements are met or exceeded. Color and

- texture must be equal as approved by the Architect prior to bid.
4. Special Shapes: Provide solids, shelf angle bricks and other special shapes as indicated or required so as no brick cores are exposed to view. Color and texture to match face brick or accent brick as applicable.

2.02 CONCRETE MASONRY UNITS

A. General

1. Curing: Cure for at least 7 days and units must be at least 28 days old when used in the work.
2. Corners (Interior Walls): Provide bullnose edges at all outside corners unless otherwise indicated or directed.
3. Integral Water Repellents: Use in units exposed to weather. Amount as recommended by water repellent manufacturer as approved by concrete block manufacturer.
 - a. Type: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
 - b. Products/Manufacturers: Subject to compliance with requirements, provide W. R. GRACE Dry-Block; MASTER BUILDERS' INC. Rheomix-Rheopel; ACME-HARDESTY CO. Acme-Shield; KRETE INDUSTRIES KreteControl 202 Internal Water Repellent; EUCLID CHEMICAL Hydrapel System.

B. Hollow Load Bearing, Solid Load Bearing (75%) and Fire Resistant Concrete Masonry Units

1. Type: Hollow, load bearing, standard modular size and shapes, thoroughly cured and dried.
2. References: ASTM C90.
3. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi.
4. Weight Classification: Normal weight, unless otherwise indicated.
5. Linear Shrinkage: Not to exceed 0.065 percent, ASTM C426.
6. Aggregate: ASTM C33 normal weight aggregates. Cinder aggregates not permitted.
7. Fire Resistant
 - a. Rating: Design for fire ratings indicated on drawings.
 - b. Manufacturer
 - 1) Listed in the Building Materials List published by the Underwriters' Laboratories, Inc.
 - 2) In lieu of above, provide a report from a nationally recognized testing agency stating that the units are equivalent in fire rating to those furnished by the producers

as listed above.

- c. Location: Where indicated.

2.03 MORTAR

A. Materials

1. Portland Cement: ASTM C150, 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 or selected.
2. Masonry Cement: ASTM C91, provide non-staining type for stonework.
3. Hydrated Lime: ASTM C207, Type S.
4. Aggregate: ASTM C144, clean masonry sand, not over 10% to pass No. 100 sieve for general use.
5. Water: Clean, fresh and free of deleterious amounts of acids, alkalis and foreign organic matter.
6. Water Repellent Admixture: W. R. GRACE Dry-Block, RHEOMIX - Rheopel Mortar Admixture; MASTER BUILDERS, INC., KRETE INDUSTRIES KreteGuard 390. Manufacturer must submit certification that water repellent admixture meets or exceeds requirements specified herein.
 - a. Conformance: ASTM E514.
 - b. Type: Integral polymeric water-repellents (IPWR).
7. Color Additive: Inorganic pigments as required to produce colored mortar as selected by Architect. SGS Colors by SOLOMON GRIND CHEM SERVICE; DAVIS COLORS or equal.
 - a. Resistant to alkali, light and weather
 - b. Unaffected by cement and free of water soluble salts.
8. Cold Weather Additive: Non-chloride, non-corrosive, accelerating admixture complying with ASTM C494, Type C or ASTM C1384 and recommended by the manufacturer for use in masonry mortar of composition indicated.

B. Proprietary Mortar Cement: Conform to ASTM C91, containing hydrated lime.

1. Certification: Submit certified laboratory data substantiating conformance with structural requirements for mortars as specified; and that no adverse chemical reaction will occur with the specified masonry accessories and reinforcing. Certification must be received and approved by Architect prior to mortar use.
2. Suitable products are acceptable from the following manufacturers:
 - a. MIAMI
 - b. LEHIGH HANSON
 - c. ESSROC MATERIALS, INC. (Brixment)
 - d. QUIKRETE

C. Mixes - Unit Masonry

1. Provide water repellent admixture in all mortar used for exterior CMU

masonry work. Add to mix in accordance with manufacturer's recommendations.

2. Type M Mortar
 - a. Use: Provide for CMU work below grade or in contact with earth.
 - b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 2,500 psi.
 - c. Color: Natural color.
3. Type S Mortar
 - a. Use: Provide for all CMU work, except that indicated to receive Type M and glass block work.
 - b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 1,800 psi.
4. Type N Mortar
 - a. Use: Provide for brick veneer and cast stone.
 - b. Proportions: ASTM C270 proportions by volume. Minimum average compressive strength at 28 days of 750 psi.
 - c. Colors: As selected by Architect.

- D. Cast Stone Pointing Mortar: One part non-staining masonry cement, one part hydrated lime, and four parts damp, loose sand. Add coloring pigment as required to match mortar color selected by Architect.

2.04 GROUT

A. Masonry Grout - Mix

1. Fine Grout for Reinforced Masonry: Mix with mechanical mixer with sufficient water to the desired consistency in accordance with ASTM C476 Proportion Specifications.
 - a. Portland Cement: 1 part
 - b. Hydrated Lime: 0 to 1/10 part
 - c. Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials
2. Coarse Grout for Reinforced Masonry: Mix with mechanical mixer with sufficient water to the desired consistency in accordance with ASTM C476 Proportion Specifications.
 - a. Portland Cement: 1 part
 - b. Hydrated Lime: 0 to 1/10 part
 - c. Fine Aggregate: 2-1/4 to 3 times the sum of the volumes of the cementitious materials.
 - d. Coarse Aggregate: 1 to 2 times the sum of the volumes of the cementitious materials.
3. Hand Mixing: Not acceptable.

2.05 REINFORCING

- A. Manufacturers: DUR-O-WALL; HECKMANN BUILDING PRODUCTS; HOHMANN & BARNARD; MASONRY REINFORCING CORPORATION OF AMERICA (WIREBOND). Where products are specified referencing a particular manufacturer,

equal products from the manufacturers listed are acceptable providing the product meets the requirements indicated.

1. Where a manufacturer is listed below for a specific product, it is to establish a level of quality. Similar products of equal quality from the above listed manufacturers are acceptable.

B. Horizontal Joint Reinforcement

1. General
 - a. Type: Ladder type, standard weight, galvanized.
 - b. Width: Approximately 2 in. less than nominal wall thickness.
 - c. Spacing: Continuous along horizontal joint, spaced 16 inches on center vertically, unless otherwise indicated.
2. Longitudinal Wire
 - a. Single Wythe Walls: 2 wires.
 - b. Multi-wythe Walls:
 - 1) Each wythe less than 6 inches wide: 1 wire.
 - 2) Each wythe 6 inches and wider: 2 wires.
3. Stacked Bond: A single wire of joint reinforcement to be placed in the horizontal joint every 16" vertically up the wall to create strength to the veneer. Comply with requirements in ACI 503/ASCE 5TMS 402.

C. Metal "Z" Ties: 3/16" galvanized steel "Z" shaped wire ties, 2" narrower than wall width. For use in block wythes at control joints.

D. Adjustable Veneer Anchor

1. Wood Stud Back-Up: Screw on anchor plate fabricated 14 gage hot dipped galvanized steel. 1 ¼" x 6" long. 315D from HECKMANN or similar products.
 - a. Ties: Triangular tie, fabricated from 3/16" diameter galvanized cold drawn steel wire. Provide ties long enough to engage the anchor and be embedded not less than 2" into the bed joint of the masonry veneer. HECKMANN 316 Series.
2. Concrete Masonry Back-Up (Tie and Anchor): Ladder type reinforcing with double eye ties welded at each cross wire 15" o.c. to extend into cavity of the two wythe wall. A two pronged hook tie shall be inserted into the eye holes creating a positive connection to restrain compression and tension. Lox All Adjustable Eye Wire HOHMANN & BARNARD.

F. Wire Mesh: Wire Mesh: 1/4" mesh of galvanized steel wire (min. 16 gage) or galvanized metal lath, cut into strips 1-1/2" narrower than wall width where used. For use at intersection of masonry walls.

G. Reinforcing Steel - Bond Beam and Wall Reinforcement: Uncoated steel reinforcing bars; ASTM A615/A; ASTM A616, including Supplement 1; or ASTM A617/A, Grade 60.

- H. Partition Top Anchors: 12 gage galvanized steel plate with 7/16-inch diameter holes. HOHMANN & BARNARD PTA 422 or equal.

2.07 MISCELLANEOUS ITEMS

- A. Through-Wall Flashing: Provide one of the following types:

- 1. Copper Composite

- a. Characteristics:

- 1) Type: Copper core with polymer fabric laminated to copper face on both sides with non-asphalt adhesive.
 - 2) Copper: ASTM B370, CDA Alloy 110
 - 3) Weight: 5 oz
 - 4) Fabric: polymer fabric; laminated both faces of copper core.

- b. Mastic/sealant: One part 100% solids, solvent-free formulated silyl-terminated polyether (STPE), ASTM C920, Type S, Grade NS, Class 50.

- c. Termination Strip: Provide type recommended by flashing manufacturer.

- d. Manufacturers/Products

- 1) YORK MANUFACTURING, INC.; Multi-Flash
 - 2) STS COATINGS, INC.; Gorilla Flash GF-500
 - 3) WIRE-BOND, INC.; Copper Seal
 - 4) ADVANCED BUILDING PRODUCT; Copper Sealtite

- 2. Rubber Sheet

- a. Material: Self-adhesive, cold-applied sheet consisting of 32 mil rubberized asphalt bonded to 8 mil polyethylene film. Provide with release film.

- b. Mastic: Rubberized asphalt-based mastic.

- c. Surface Primer (Conditioner): Type as recommended by manufacturer.

- d. Manufacturer: Perm-A-Barrier by W. R. GRACE, Sando-Seal by SANDELL MANUFACTURING COMPANY, IPCO Wall Flashing; ILLINOIS PRODUCTS CORPORATION, CCW 705 TWF; CARLISLE COATINGS AND WATERPROOFING, POLYGUARD 400 TWF, ADVANCED BUILDING PRODUCTS Strip -N -Flash.

- B. Sheet Metal Drip Edge: Fabricated from 0.015" thick by minimum 3" wide stainless steel with hemmed edge. Comply with requirements specified in Section 07 62 00 - Flashing and Sheet Metal.

- 1. Product: HECKMAN BUILDING PRODUCTS, IPCO stainless steel drip edge, ILLINOIS PRODUCTS CORPORATION or HOHMANN & BARNARD, INC.

- C. Preformed Masonry Control Joint Filler

- 1. General: Extruded rubber complying with ASTM D2240, general purpose grade.

- 2. Flange: Where applicable, locate as required for the particular joint

- configuration.
3. Manufacturer: Rapid Regular Control Joint by DUR-O-WALL; HOHMANN & BARNARD, or equal.
- D. Brick Cleaning Compound: PROSOCO Sure Klean 600 Detergent; or equal commercial cleaning solution by NATIONAL CHEMSEARCH or AMERICAN CALMAL that will not harm masonry or adjacent materials and is acceptable to the masonry manufacturer. Cleaners containing muriatic acid are not acceptable.
- E. Isolation Liners: Locate between steel columns and masonry. Asphalt impregnated cellular paper, similar to WILLIAMS PRODUCTS Columns Boxboard, 1/4" single thickness or 1/2" double thickness. Use double thickness except where wall dimensions do not permit, then use single thickness.
- F. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142" steel wire, hot-dipped galvanized after fabrication.
1. D/A 811 DUR-O-WALL
 2. D/A 816 DUR-O-WALL
 3. No. 376 Rebar Positioner HECKMAN
 4. #RB Rebar Positioner HOHMANN & BARNARD
 5. #RB-Twin Rebar Positioner HOHMANN & BARNARD
 6. Double O-Ring Rebar Positioner MASONRY REINFORCING CORPORATION OF AMERICA
 7. O-Ring Rebar Positioner MASONRY REINFORCING CORPORATION OF AMERICA
- G. Adhesive Anchor Bolts
1. In hollow CMU: Adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors with 4-1/4 inch embedment. (Minimum allowable shear 900 pounds; minimum allowable tension 250 pounds/anchor.)
 2. In solid grouted CMU: Adhesive anchor systems. Use 1/2 inch diameter anchors with 4-1/4 inch embedment; (minimum allowable shear 2600 pounds; minimum allowable tension 2000 pounds/anchor).
- H. Cavity Protection Material: Minimum 1" thick, reticulated, nonabsorbent mesh, made from polyethylene strands and shaped to maintain drainage at weep holes without being clogged by mortar droppings.
1. Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Mortar Net; MORTAR NET USA, LTD.
 - b. Mortar Break; ADVANCE BUILDING PRODUCTS
 - c. Mortar Net; MASONRY REINFORCING CORPORATION OF AMERICA.

- d. Mortar Net; HOHMANN & BARNARD, INC.
- e. CavClear Masonry Mat; ARCHOVATIONS
- f. Mortar Stop; POLYTITE MANUFACTURING CORP.
- g. Mortar Grab: IPCO PRODUCTS.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine the substrates, structure, and installation conditions. Do not proceed with unit masonry work until unsatisfactory conditions are corrected.

3.02 PREPARATION

- A. Brick
 - 1. Wet brick having ASTM C67 absorption rates greater than 0.025 oz. per square inch per minute. Use wetting methods which ensure that each masonry unit is nearly saturated, but surface dry when laid. During freezing weather, comply with the recommendations of BIA.
 - 2. Except for absorbent units specified to be wetted, lay masonry units dry.
- B. Concrete Masonry Units: Lay masonry units dry. Do not wet concrete masonry units.
- C. Establish lines, levels, and coursing.
- D. Coordination: Identify items that are to be built-in to masonry wall as specified in other section of these specifications. Verify that these items are available prior to commencing masonry work in these areas. Coordinate sizes of required openings. Items include, but are not necessarily limited to:
 - 1. Access doors
 - 2. Recessed fire extinguisher cabinets
 - 3. Recessed toilet accessories

3.03 INSTALLATION - GENERAL

- A. Build walls to the full thickness shown. Build single wythe walls to the actual thickness of the masonry units, using units of nominal thickness shown or specified.
- B. Cut masonry units using motor-driven masonry saws to provide clean, sharp, unchipped edges. Cut units as required to provide pattern shown and to fit adjoining work neatly. Use full-size units without cutting wherever possible. Provide 100% solid units where webs would be exposed.
- C. Construction Tolerance: Comply with tolerances in ACI 530.1/ASCE 6/TMS 602 and the following:

1. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/4" in 20 feet, nor 1/2" maximum.
 2. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4" in 10 feet, nor 1/2" maximum.
 3. For conspicuous horizontal lines, such as exposed lintels, sills, parapets, and reveals, do not vary from level by more than 1/4" in 20 feet, nor 1/2" maximum.
 4. For exposed bed joints, do not vary from thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not vary from bed-joint thickness of adjacent courses by more than 1/8".
 5. For exposed head joints, do not vary from thickness by more than plus or minus 1/8". Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8".
- D. Openings: Form all chases and openings required for piping and other trades. After work is completed, close openings with masonry and seal around penetration.
- E. Seal all anchor penetrations and tears in the vapor barrier as a result of the work installed under this section.

3.04 ERECTION - BRICK AND CONCRETE MASONRY

A. Masonry

1. Layout walls in advance for accurate spacing of surface bond patterns, with uniform joint widths, and to properly locate returns and offsets. Avoid the use of less than half-size units at corners, jambs and other locations.
2. Lay up walls plumb and true to comply with specified tolerance. Provide courses level, accurately spaced and coordinated with other work.
3. Pattern Bond: Lay exposed masonry in running bond with vertical joint in each course centered on units in courses above and below. Bond and interlock each course of each wythe at corners. Do not use units with less than 4" of horizontal face dimensions at corners.
4. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and slabs. Maintain 3/8" joint widths, except for minor variations required to maintain bond alignment.
5. Joints
 - a. Exposed: Cut flush and finish (tool) with hardened metal tool to form a concave compressed joint. Same methods and types of tools to be used by all masons working on project.
 - b. Concealed: Cut flush and trowel point.
6. Compress and cut joints flush for masonry foundation walls.
7. Lay brick masonry units with completely filled bed and head joints. Butter ends with sufficient mortar to fill head joints and shove into place. Do not slush head joints.

- B. Horizontal Wall Reinforcement: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
1. Space reinforcement not more than 16 inches o.c.
 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
 - a. Reinforcement above is in addition to continuous reinforcement.
 4. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.
 5. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
 6. Provide additional reinforcement continuous in first joint above openings and in first joint below openings not extending to floor. Extend additional reinforcement a minimum of 4'-0" beyond opening.
- C. Brick Veneer/Metal Stud Wall Ties: Install in accordance with manufacturer's instructions. Locate one tie per every two square feet of wall surface.
- D. Cavity Wall Construction
1. Keep the air space clear and clean of all mortar droppings and other debris.
 2. Provide weeps spaced 24 inches apart.
 3. Provide cavity drainage protection or similar methods to ensure that weeps are clear of mortar droppings and drain to the building exterior.
 4. Weeps using cellular vents located in brick head joints.
- E. Door Frames: Fill all frames installed in masonry with mortar.
- F. Bearing Points: Where a lintel, bar joist or similar member bears directly on concrete masonry, fill the cores of the two blocks courses directly under the member with grout to a limit of 16 inches beyond the end of the member.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
- H. Control and Expansion Joints: Provide control joints for exterior and interior masonry construction in accordance with NCMA-TEK Bulletins 10-1A and 10-2B and BIA Technical Notes 18B.
1. Unless otherwise indicated, provide control joints in masonry walls at maximum 24 foot intervals for exterior walls, maximum 30 foot intervals for interior walls, and at intersections of walls, except corners.

- a. Exact locations as determined by the Architect if not specifically dimensioned.
- b. If drawings do not indicate all control joints based on these maximums, allow for additional joints to be determined by the Architect prior to commencement of masonry work.
- c. Locate control at steel columns.
2. Provide 3/8" wide control joints, unless otherwise indicated. For joints in exterior walls, build in control joint filler strips as masonry wall is laid up allowing 3/4" for sealant and backup on each side of wall. For interior control joints, no filler is required; rake joint approximately 3/4" deep and install sealant and backup. See Section 07 92 00, Sealants.
3. Do not carry horizontal joint reinforcement through control joint.
4. Maintain lateral support of continuous wall at control joint in concrete block backup walls by using control joint filler, tongue and groove type control joint block, or similar type approved method. In cavity walls, place metal "Z" wall ties 16" on-center vertically in brick on each side of control joint.
5. Maintain lateral support of intersecting interior masonry walls with wire mesh ties placed across joint between walls, spaced 16" on-center vertically.

I. Thru-Wall Flashing

1. Provide at the following locations:
 - a. In first course above steel supports and shelf angles.
 - b. In first course above lintels at louvers, windows and doors.
 - c. In first course above grade around entire building perimeter.
 - d. In exterior walls that project above adjacent lower roof.
 - e. Below sills of window, louver and similar type wall openings.
 - f. Below parapet wall caps.
 - g. Other through wall flashing conditions where indicated.
2. Ensure that flashings drain to exterior.
3. Prepare masonry surfaces smooth and free of projections which could puncture flashing.
4. Lay on slurry of fresh mortar and cover with mortar.
5. End Dams: Provide end dams at all locations where flashing terminates within a wall. Over openings, carry minimum 6" beyond end of steel lintel and turn up edges to form pan. All corners folded, not cut.
6. 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.
7. Top Edge Concealed Terminations: 8 inch minimum above drainage plane.
8. Seal around all penetrations with mastic before covering with mortar.
9. Joints
 - a. Install in longest lengths and with fewest joints possible but not less than 20 feet between joints.
 - b. Lap ends minimum 6 inches and seal with full bed of mastic.
10. Continue flashings around corners and other gaps in shelf angles to prevent discontinuity.
11. Continue flashing through expansion joints.

- 12. Provide weeps at all thru-wall flashing locations. Space weeps as specified hereinbefore.
- J. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material specified herein.
- K. Masonry, non-bearing walls carried to structure above: Terminate at normal joint width below surface and leave joint open for sealants.
 - 1. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Section 07 84 00, Firestopping.
- L. Stopping and Resuming Work: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.
- M. Built-in Work: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.
- N. Steel Lintels: Install steel lintels at all masonry opening, whether indicated on the drawings or not. Provide minimum bearing of 8" on each jamb, unless otherwise indicated.

3.05 MORTAR

- A. General
 - 1. Batch Size: Controlled so that all material used within two (2) hours.
 - 2. Mortar on Board
 - a. Keep well tempered with water so long as its cementing material has not started to set.
 - b. Do not retemper if initial set of cementing material has been reached, or if mortar has stiffened greatly.
 - 3. Anti-freeze Admixture: Not permitted.
 - 4. Water Repellent Admixture: Use with brick and concrete block exposed to exterior, mix as recommended by manufacturer.
- B. Mixing
 - 1. Machine mix dry in a batch mixer with care taken in adding water to mix to avoid overwetting.
 - 2. Do not retamper in mixer at any time.
 - 3. Continue mixing for a minimum of five (5) minutes after all materials are in mixer.

- C. Recharging: Completely empty and clean mixer before recharging.

3.06 PROTECTION

- A. Brace all walls while in green condition.
- B. 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 and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

3.07 REINFORCED MASONRY INSTALLATION

- A. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
 - 1. General: Clean reinforcement of loose rust, mill scale, earth, ice or other materials which will reduce bond to mortar or grout. Do not use reinforcement bars with kinks or bends not shown on drawings or final shop drawings, or bars with reduced cross-section due to excessive rusting or other causes.
- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
 - 1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Use "Fine Grout" per ASTM C 476 for filling spaces less than 4" in one or both horizontal directions.
 - 3. Use "Coarse Grout" per ASTM C 476 for filling spaces 4" to 10" in both horizontal directions.
 - 4. Use 3000 psi concrete for filling spaces 10" or larger in both horizontal directions.
- C. Bond Beams: Reinforce as indicated and fill with grout. Position reinforcement accurately at the spacing indicated. Place horizontal reinforcement as the masonry work progresses.
- D. Reinforced Concrete Masonry Walls: Install and align grout block units to provide continuous vertical voids in walls. Install reinforcing steel as work progresses. Use horizontal bars to position vertical bars. Fill grout block units cores solid with concrete fill.

1. Place concrete fill in maximum 4'-0" vertical lifts. Recess top of fill minimum 1-1/2" below top of course to form a key with the following lift. Comply with NCMA TEK Bulletins 3-2, 3-3A and 14-2 recommendations.
2. Coordinate placement of reinforcement and concrete fill with cast-in-place concrete and precast concrete work to provide continuous vertical and horizontal reinforcement full height of indicated walls.

3.08 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged. Provide new units to match adjoining units and install in fresh mortar pointed to eliminate evidence of replacement.
- B. During the tooling of joints, enlarge all voids or holes, and completely fill with mortar. Point up all joints at corners to provide a neat, uniform appearance.
- C. Cleaning - Brick Masonry: Clean all exposed brick masonry. Cleaning agents and methods subject to Architect's approval. Protect all stone. Damaged materials and work replaced at Contractor's expense.
 1. Before full-scale application, review manufacturer's product data sheets to determine the suitability of each product for the specific surfaces. Apply each masonry cleaner to test panel areas to determine dilution rates, dwell times, number of applications, compatibility, effectiveness, application procedures, effects of pressure rinsing, and desired results.
 2. Apply masonry cleaners and stain removers to test panels in accordance with manufacturer's written instructions. Allow 48 hours or until test panels are thoroughly dry before evaluating final appearance and results. Do not begin full-scale application until test panels are inspected and approved by the Architect.
 3. Test Area Requirements:
 - a. Size: Minimum 5 feet by 4 feet each.
 - b. Locations: As determined by the Architect.
 - c. Masonry Cleaners: Number of test panels as required to completely test each masonry cleaner with each type of substrate to be cleaned.
 4. Test all cleaning effluents generated by the masonry cleaning of the test panels to determine any hazardous characteristics. Comply with applicable federal, state, and local environmental regulations including testing, handling, treatment, containment, collection, transport, disposal, and discharge of hazardous wastes.
 5. Muratic acid cleaning of brick masonry not permitted. Install and protect installed brick masonry so that acid cleaning is not required at completion of the work.
- D. Cleaning – Concrete Masonry: During construction of exposed CMU, minimize mortar and grout smears on exposed surfaces. Dry brush CMU surfaces at the end of each days work and after final pointing. Remove mortar stains and dirt from exposed surfaces.

1. Cleaning Solutions: Where cleaning solutions are required, they shall be provided at no additional cost to the Owner. Cleaning solutions must be approved by Architect and spot tested prior to use.
- E. Area Cleaning: Clean floors of all mortar droppings, including floor surfaces of accessible chases.

END OF SECTION

SECTION 04 72 00

CAST STONE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Design and fabricate cast stone elements as indicated on the drawings. Work includes, but is not necessarily limited to the following:
 - 1. Caps, heads and sills.
 - 2. Non-staining setting mortar and joint sealant.
 - 3. Accessories to complete the work.

1.02 RELATED SECTIONS

- A. Mortar: Section 04 00 00.
- B. Sealant: Section 07 92 00.

1.03 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Submit for all items; include the following as applicable:
 - 1. Details and sizes of stones.
 - 2. Arrangement of joints.
 - 3. Connection details.
 - 4. Bonding.
 - 5. Inserts.
 - 6. Joints.
 - 7. Reinforcing.
- C. Samples: Submit samples representative of finished stone pieces showing full range of color and texture. Resubmit until acceptance by the Architect. Approved samples will be used in the field as a basis of quality for cast stonework submitted on the project.
- D. Qualification Data: For manufacturer.
- E. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

1.04 QUALITY ASSURANCE

- A. Acceptable Manufacturers: Minimum of five (5) years continuous production experience in cast stone work of quality and scope required on this project , and is a plant certified by the Cast Stone Institute.
- B. Installer Qualifications: Experienced mason regularly engaged for at least five (5) years in installation of cast stone elements similar to those required on this project.
- C. Comply with ASTM C1364.

1.05 JOB MOCK-UP

- A. General
 - 1. After standard samples are accepted for color and texture, submit full scale pieces meeting design requirements.
 - 2. A mock-up panel for the exterior masonry is to be built on the site, as specified in Section 04 00 00.
 - a. Submit full size samples of shapes that will be utilized in the finished work. Samples to be used in constructing the sample panel specified in Section 04 00 00.
 - 3. Mock-up to be standard quality for cast stone work when accepted by the Architect.

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery and Handling
 - 1. Transport and handle cast stone with equipment to protect units from dirt and damage.
 - 2. Do not place on ground.
 - 3. Place nonstaining resilient spacers of even thickness between each element.
 - 4. Support cast stone during shipment on expanded polystyrene or similar nonstaining shock-absorbing material.
- B. Storage
 - 1. Store to protect from contact with soil and from other damage.
 - 2. Store in same position as transported with nonstaining resilient supports located in same position as when transported.
 - 3. Store on firm, level and smooth surfaces.
 - 4. Place stored cast stone so that identification marks are discernible.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cement: White Portland Cement, ASTM C150, Type I or III containing not more

than 0.60 percent total alkali when tested according to ASTM C114. .

1. Use same brand, type and source of supply throughout.
- B. Fine Aggregate: Graded and washed manufactured limestone sand meeting ASTM C33; gradation and colors as needed to produce required cast stone textures and colors.
1. Use same type and source of supply throughout.
- C. Course Aggregate: Graded and washed crushed limestone meeting ASTM C33; gradation and colors as needed to produce required cast stone textures and colors.
1. Use same type and source of supply throughout.
- D. Color: Inorganic, natural or inorganic iron oxide pigments meeting ASTM C979 excluding the use of a cement grade of carbon black pigment.
1. Pigment manufacturer must certify that pigment is lime-proof.
 2. Amount: Not to exceed 10% by weight of cement.
 3. Manufacturer: SGS Colors by SOLOMON GRIND CHEM SERVICE; DAVIS COLORS or equal.
 4. Color: Where required, as selected by Architect.
- E. Admixtures: Use only admixtures specified or approved in writing by Architect.
1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
 2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
 3. Water Repellent Admixture: MASTERBUILDERS Rheomix 235, EUCLID CHEMICAL, SONNEBORN. Cast stone fabricator must submit certification that proposed water repellent admixture has been used in cast stone work similar to that used on this project.
 4. Air-Entraining Admixture: ASTM C260. Add to mixes for units exposed to the exterior at manufacturer's prescribed rate to result in an air content of 4 to 6 percent, except do not add to zero-slump concrete mixes.
 5. Water-Reducing Admixture: ASTM C494, Type A.
- F. Water: Potable.
- G. Mortar: Type N; see Section 04 00 00.
- H. Reinforcing
1. Bars: ASTM A615, Grade 40 or Grade 60, when required, as determined

by manufacturer, for safe handling, setting and structural stress. Provide galvanized or epoxy coated.

- a. Fiber reinforced polymer bars or fiber reinforcement is acceptable per ASTM D7957/D7957M.
2. Wire: ASTM A82 Cold-drawn steel wire, ASTM A185 or ASTM A497 welded wire fabric reinforcement, or ASTM A184 steel bar or rod mat reinforcement may be used.

2.02 MIXES

- A. Manufacturer: Responsible for mix design as required to achieve strength and surface finish desired.
- B. Compressive Strength - 28 Day: Minimum of 6500 psi per ASTM C1194.
 1. Tests: Perform in accordance with ASTM C31, ASTM C39 and ASTM C642, except that 2" cube specimens shall be used, oven dried in accordance with ASTM C97.
 2. Results: Determined by averaging three specimens per test.
 3. Divide compression test results by a factor of 0.8 when saw-cut or core drilled specimens are used.
- C. Water Absorption - Average: Maximum 6% dry weight per ASTM C1195.
- D. Air Content - ASTM C173 or C 231, for wet cast product shall be 4-8% for units exposed to freeze-thaw environments. Air entrainment is not required for VDT products.
- E. Freeze-thaw - ASTM C666 as modified by ASTM C1364: The CPWL shall be less than 5% after 300 cycles of freezing and thawing.
- F. Linear Shrinkage - ASTM C 426: Shrinkage shall not exceed 0.065%.

2.03 COLOR AND FINISH

- A. Color and Texture: Submit cast stone samples for final selection of color and texture.
 1. Color: Natural limestone.
 2. Finish: As achieved by acid etch method. Natural limestone appearance.

2.04 CAST STONE UNITS

- A. Regional Materials: Cast stone units shall be manufactured within 500 miles of Project site from aggregates that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles of Project site.

- B. Provide cast stone units complying with ASTM C1364 using either the vibrant dry tamp or wet-cast method.
 - 1. Provide units that are resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666, Procedure A, as modified by ASTM C1364.
- C. Fabricate units with sharp arrise and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
 - 1. Provide suitable washes on all exterior copings, projecting courses and pieces with exposed top surfaces.
 - 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 - 3. Provide drips on projecting elements unless otherwise indicated.
- D. Fabrication Tolerances:
 - 1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
 - 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
 - 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
 - 4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.
- E. Cure units as follows:
 - 1. Cure units in enclosed moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
 - 2. Keep units damp and continue curing to comply with one of the following:
 - a. No fewer than five days at mean daily temperature of 70 deg F or above.
 - b. No fewer than six days at mean daily temperature of 60 deg F or above.
 - c. No fewer than seven days at mean daily temperature of 50 deg F or above.
 - d. No fewer than eight days at mean daily temperature of 45 deg F or above.
- F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine surfaces to receive cast stone and do not proceed until defects detrimental to the finished work are corrected, including the moisture protection, structural supports, provisions for expansion, or any other conditions which might affect the finished work in appearance, watertightness or integrity of the complete installation.
- B. Verify all measurements and dimensions; coordinate the installation of inserts for this work; and coordinate and schedule this work with the work of other trades.
- C. Review shop drawings of items or assemblies related to the support or anchorage of cast stone work, including requirements for clearances for proper installation.

3.02 INSTALLATION

- A. Do not use cast stone with chips, cracks, voids, stains or other defects which would be visible in the finished work. The setting of any damaged or defective stone is at Contractor's risk of removal.
- B. Set cast stone work accurately, straight, level, plumb and square in accordance with Shop Drawings.
- C. Unless otherwise indicated, set stone in full mortar bed with vertical joints flushed full. Anchors and dowels shall be firmly placed and all anchor holes and dowel holes and similar holes filled completely with mortar.
 - 1. Copings, projecting belt courses, and in general, all stone areas either partially or totally horizontal: Set with unfilled vertical joints. After setting, insert back-up material or backer rod, prime stone ends and seal, all in accordance with Section 07 92 00.
 - 2. Joints Between Cast Stone and Masonry: Rake joints $\frac{3}{4}$ " deep and seal with non-staining joint sealant in accordance with Section 07 92 00. This requirement takes precedence over joint conditions indicated on drawings.
- D. Thoroughly wet stones prior to setting.
- E. At sealed or pointed joints, rake joints to a depth of $\frac{3}{4}$ ". Sponge off face of stones to remove excess mortar.

3.03 TOLERANCES

- A. Variation from Plumb: Do not exceed $\frac{1}{8}$ inch in 10 feet, $\frac{1}{4}$ inch in 20 feet, or $\frac{1}{2}$ inch maximum.
- B. Variation from Level: Do not exceed $\frac{1}{8}$ inch in 10 feet, $\frac{1}{4}$ inch in 20 feet, or $\frac{1}{2}$ inch maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than $\frac{1}{8}$ inch in 36 inches or one-fourth of nominal joint width, whichever is less.

- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.04 PATCHING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect. Repair of cast stone shall be done only by mechanics skilled in this type of repair work, with materials furnished by manufacturer and under manufacturer's direction
- B. Before pointing, clean face of cast stone with a fiber brush, soap powder and water, and thoroughly rinse with clean running water.
 - 1. Remove excess mortar from face of stone.
 - 2. No acids or prepared cleaners are permitted without the approval of cast stone manufacturer and Architect.

3.05 POINTING AND SEALING

- A. Dampen joints prior to pointing.
- B. Point stone joints to a concave surface with pointing mortar. See Section 04 00 00 for mortar.
 - 1. Pointing in freezing weather or in locations exposed to hot sun, unless properly protected, is not permitted.
- C. Seal head joints, where left open for sealing, with sealant in accordance with Section 07 92 00.

3.05 INSPECTION AND ACCEPTANCE

- A. Cast stone shall show no obvious repairs or imperfections other than normal color variations when viewed with the unaided eye at a 20 foot distance in good typical daylight illumination.
- B. Applicable Standards for Inspection and Quality Control: ACI Committee 311 Manual of Concrete Inspection and PCI MNL-117 Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

3.07 PROTECTION

- B. Protect cast stone at all times from drippings, welding spatter and damage by other trades during construction. Where necessary or directed, substantial non-staining wooden or other approved covering shall be placed to protect the work. Heavy

polyethylene film or similar type material shall be used between cast stone and wood. Maintain all protection until removed to permit final cleaning of cast stone work.

1. Protect cast stone during brick cleaning operations, unless cleaning solution has been approved for cast stone and tested in the field on actual cast stone samples.

END OF SECTION

SECTION 04 73 10

MANUFACTURED STONE VENEER

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Manufactured stone veneer and shapes, metal anchors, lath and accessories.

1.02 RELATED SECTIONS

- A. Mortar: Section 04 00 00.
- B. Sealant: Section 07 92 00.
- C. Sustainable Design Requirements: Section 01 81 13.

1.03 REFERENCES

- A. ASTM C150 - Specifications for Portland Cement.
- B. ASTM C177 - Test Method for Thermal Conductivity by Means of the Guarded Hot Plate.
- C. ASTM C270 - Specification for Mortar for Unit Masonry.
- D. Underwriters' Laboratories, UL723 - Test for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Samples: Submit samples for selection by Architect.
- C. Submit manufacturer's written installation instructions. Include instructions for each type of substrate and mounting conditions encountered on Project.
- D. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

1.05 QUALITY ASSURANCE

- A. Applicator: Approved by manufacturer with a minimum of three years experience

in the installation of manufactured veneer of the type specified.

1.06 SAMPLE PANEL

- A. Construct where approved by Architect.
- B. Panel shall be at least 4 feet long by 4 feet high and shall show full color range, joint detail, all other details of construction that will be used in the completed work. Include at least one 90 degree corner.
- C. Construct additional panels as required by Architect if original panel construction is not acceptable.
- D. Do not start simulated masonry application until the sample panel is approved by the Architect.
- E. Retain acceptable sample as reference standard for the project.
- F. Demolish and remove panel from site after completion and acceptance of simulated masonry work.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Conform to the requirements of the stone manufacturer. Ship materials in their original cartons or wrappings.
- B. Store moisture sensitive materials in protected enclosures; handle by methods which avoid exposure to moisture.

1.08 PROJECT CONDITIONS

- A. Maintain materials and surrounding air temperature at minimum 40 degrees F prior to, during, and for 48 hours after application.
- B. Protect materials from rain, moisture, and freezing temperatures prior to, during, and for 48 hours after application.
- C. Allow no construction work on opposite side of wall to which work is being applied during and for 48 hours after application.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: CREATIVE MINES Craft Trail Ledge - Graypearl.
 - 1. Other Manufacturers: Stone by other manufacturers may be used providing the color, blend and texture must be equal as approved by the Architect and Owner prior to bid.

2. Approved Manufacturers: Subject to design requirements, products by the following manufacturers are acceptable:
 - a. CORONADO PRODUCTS
 - b. ELDORADO STONE
 - c. BORAL STONE PRODUCTS
 - d. BOULDER CREEK STONE PRODUCTS

- B. Special Shapes: Provide cornerspecial shapes as indicated or required. Color and texture to match as applicable.

2.02 MATERIALS

- A. Description: Thin veneer sections comprised of noncombustible lightweight aggregates, Portland cement and natural iron oxide colorings.
- B. Bonding Mortar: Type N as specified in Section 04 00 00. Natural color.
- C. Grouting Mortar: Type N as specified in Section 04 00 00. Colors as selected by Architect.
- D. Metal Lath: ASTM C847; 3.4 pound flat diamond mesh, galvanized. Provide galvanized steel anchor plates (similar to RODENHOUSE Grip-Plate Lath and Plaster Washer) and galvanized fasteners as recommended by stone manufacturer for substrate conditions and insulation/sheathing thicknesses.
- E. Cleavage Membrane/Water Resistive Barrier: Provide type as recommended by stone manufacturer.

2.03 MANUFACTURED UNITS

- A. Physical Properties
 1. Compressive Strength: ASTM C192 and ASTM C39, 1800 psi, 5 specimen average, 1500 psi minimum for individual unit.
 2. Bond Between Stone Unit, Type S Mortar, and Backing: ASTM C 482, 50 psi
 3. Freeze-Thaw Test: ASTM C 67: Less than 3%
 4. Water Absorption: UBC Standard 15-5: 22 percent
 5. Density: ASTM C 567 (Dry density): 75 pcf
- B. Burning Characteristics
 1. Smoke Developed: 0.
 2. Fuel Contributed: 0.
 3. Flame Spread: 0.
- C. Colors: As selected by Architect.
- D. Provide all trim pieces as indicated

- E. Provide plaster ring at surface mounted fixtures and similar items. Type as recommended by stone manufacturer. Thickness to match stone.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates upon which manufactured masonry will be installed.
- B. Coordinate with responsible entity to correct unsatisfactory conditions.
- C. Commencement of work by installer is acceptance of substrate conditions.

3.02 PREPARATION

- A. Protection: Protect adjacent work from contact with mortar.
- B. Surface Preparation: Prepare substrate in accordance with manufacturer's installation instructions for the type of substrate being covered.

3.03 INSTALLATION

- A. Install system complete in accordance with manufacturer's instructions and recommendations for the types of substrates encountered and the Masonry Veneer Manufacturers Association's (MVMA) Installation Guide and Detailing Options for Compliance with ASTM C1780.
- B. Expansion and Control Joints: Locate joints in accordance with ASTM C1780.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Services: Provide the services of manufacturer's field representative during installation.

END OF SECTION

SECTION 05 12 00
STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 DESCRIPTION

- A. Work included: All labor and materials required to furnish and install structural steel work shown on the Drawings and required by these Specifications, including that shown on Mechanical or Electrical Drawings, or required in their Specification sections.
- B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.
- C. Work furnished but not installed under other Sections: Anchor rods, loose bearing and base plates, loose lintels, and connection hardware to be cast into concrete, masonry, or precast concrete.
- D. Work affected by others: Mechanical equipment support framing, equipment loads, framing around openings, and structure in any way related to mechanical requirements is shown for bidding purposes only. Responsibility for coordinating the work of this Section with these requirements is solely that of the Contractor. Contractor's review of shop drawings will be taken to indicate that this coordination has been completed.

1.3 QUALITY ASSURANCE

- A. Reference Standards:
 - 1. By the American Institute of Steel Construction (AISC):
 - a. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - b. Specification for Structural Joints Using High-Strength Bolts.
 - c. Code of Standard Practice for Steel Buildings and Bridges.
 - d. Seismic Provisions for Structural Steel Buildings.
 - 2. By the American Welding Society (ANSI/AWS):
 - a. Structural Welding Code-Steel (AWS D1.1)

- b. Symbols for Welding, Brazing, and Non-Destructive Testing (A2.4).
- B. Fabricator's qualifications:
 - 1. Minimum five years' continuous experience in the fabrication of steel for projects of similar quality and scope.
 - 2. Membership in the American Institute of Steel Construction (AISC).
 - 3. If Fabricator is not a member of AISC, in accordance with chapter M and N of the AISC manual, the following minimum shop inspections for structural steel fabrication are required:
 - a. Shop welding, high-strength bolting, and details.
 - b. Shop cut and finished surfaces.
 - c. Shop heating for straightening, cambering, and curving.
 - d. Tolerances for shop fabrication.
 - 4. These inspections and certifications are to be paid for at the Contractor's expense and are treated as an additional item in fulfillment of project Special Inspections set forth by the Jurisdiction's requirements. Inspection Agency must be qualified to perform shop inspection with knowledge and experience of steel construction. Submit Inspector qualifications for approval by Architect.
 - 5. Shop fabricated items to require special inspections under section 1704.2.5 of the Ohio Building Code, unless the fabricator is registered per section 1704.2.5.1.
- C. Welders' qualifications: Personnel and procedures are to be qualified per the requirements of the American Welding Society, as given in ANSI/AWS D1.1.

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Select or design connections per AISC standards for forces and moments provided on the Drawings.
 - 1. AISC Code of Standard Practice Connection Design Option 2 (connection selected by and experienced steel detailer utilizing standard AISC connection tables) shall be used where only shear reactions are provided and the geometry complies with the limitations of the tables in the AISC Manual of Steel Construction.
 - 2. Reactions provided are service level forces (ASD). Minimum shear reaction to be 15 kips. Shear reactions below 15 kips are not necessarily listed on the Drawings.
 - 3. Minimum bolt diameter and grade is 3/4 inch diameter A325. Connection shall extend a minimum of one half the beam's 'T' dimension.

1.5 SUBMITTALS

- A. Certification of experience: Submit, on request only, written description of personnel, projects, and equipment which document the experience and qualifications required of the Fabricator, Erector, and Welder.

- B. Shop Drawings: Provide dimensioned erection plans with appropriate sections and details including member piece details that include the following:
 - 1. Include all shop and erection details, including cuts, copes, cambers, connections, holes, threaded fastener types, sizes and lengths, washers, and weld types, sizes, and lengths.
 - 2. Include embedment layout drawings.
 - 3. Include material specifications and finishes.
 - 4. Indicate shop and field welds with symbols per ANSI/AWS A2.4

- C. Certification: Submit, on request only, the following:
 - 1. Certified copies of mill test reports with properly identified material.
 - 2. Certificates of Compliance for:
 - a. Structural steel shapes.
 - b. Shear studs.
 - c. High-Strength threaded fasteners.
 - d. Direct-tension indicators.

- D. Sustainability Submittal Requirements: Refer to Section 01 81 13 for submittal requirements.
 - 1. Submit product data and documentation that indicates materials having a post-consumer and pre-consumer recycled content that conforms to the requirements to obtain LEED credits.
 - a. All steel products shall have a minimum 90% post-consumer recycled content.
 - 2. Submit product data and documentation that identifies material cost for each type of material provided and includes location of extraction and manufacture of materials that conforms to the requirements to obtain LEED credits.
 - a. All steel products shall be extracted, processed, and manufactured/fabricated within a radius of 500 miles from the project site.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 - 1. Members to be hot-dip galvanized shall retain compliance with ASTM A6 after the galvanizing process. Non-compliance will be cause for rejection.
 - 2. Deliver anchor rods and other items to be embedded in cast-in-place concrete or masonry prior to the start of that work. Provide setting drawings, templates, or instructions required for the installation of such items.

- B. Storage:
 - 1. Store steel at the site above ground on platforms, skids, or other supports.
 - 2. Protect steel from corrosion.
 - 3. Store packaged materials in their original unbroken packages.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Structural steel wide flange, W shapes:
 - 1. $F_y = 50$ ksi, ASTM A992.
- B. Structural steel M, S, HP shapes, Channels, Angles, plates, bars, etc.:
 - 1. $F_y = 36$ ksi, ASTM A36.
 - 2. $F_y = 50$ ksi, ASTM A572.
- C. Structural steel tubing:
 - 1. Round steel pipe: $F_y = 35$ ksi, ASTM A53, Type E or S, Grade B.
 - 2. Square and Rectangular HSS: $F_y = 50$ ksi, ASTM A500, Grade C.
 - 3. Round HSS: $F_y = 46$ ksi, ASTM A500 Grade C.
- D. Anchor Rods: Provide heavy washers for anchor rods.
 - 1. Threaded and nutted: ASTM F1554, Grade 36
 - 2. Hooked anchors: ASTM A307.
- E. High-Strength Bolts: ASTM A325 or A490.
- F. Post-Installed Anchors:
 - 1. Install post-installed anchors in accordance with the Manufacturer's installation instructions.
- G. Welding Electrodes: Conform to the requirements of ANSI/AWS D1.1, using Series E70 electrodes, appropriate for the materials being welded.
- H. Shop Paint Primer:
 - 1. Primer to be compatible with finish paint.
 - 2. Interior exposure, normally dry conditions (SSPC Environmental Zone 1A) or Exterior exposure, normally dry conditions (SSPC Environmental Zone 1B): SSPC Paint 25.
- I. Galvanizing Repair Paint: High zinc-dust-content paint for re-galvanizing field welds and repairs containing not less than 93 percent zinc dust by weight: SSPC Paint 20.

2.2 FABRICATION

- A. Conform to applicable provisions of the reference standards listed in Part 1 of this Section, as modified herein.
 - 1. Connection type is to be:
 - a. Snug-tight unless noted otherwise.
 - 2. Bolted connections shall be made with High-Strength bolts (A325 or A490). Standard bolts and nuts are permitted only where specified on the Drawings.

- B. Camber: Provide camber in beams as indicated on the drawings.
- C. Finishing: Ends of members in direct contact bearing, such as columns at their bases and splices, are to be “finished”, as defined in the Code of Standard Practice.
- D. Bearing and base plates: Column base plates are to be shop attached. Beam bearing plates may be attached or loose.
- E. Holes: Drill or punch holes in members as required for passage of conduit and piping, and attachment of joists, nailers, etc. burning such holes is not permitted without prior approval of the Architect. If opening is not shown on structural Drawings, obtain prior approval.
- F. Cleaning:
 - 1. Remove oil, dirt, loose mill scale, or other material that would impair welding performance of friction-type connections or adherence of concrete or sprayed-on fireproofing.
 - 2. For steel that is to be painted, cleaning techniques are to be as required by the appropriate SSPC paint specification.
- G. Shop Priming: Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar.
 - 2. Surfaces to be field welded.
 - 3. Surfaces of high-strength bolted, slip-critical connections.
 - 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 - 5. Galvanized surfaces.
 - 6. Surfaces enclosed in interior; dry construction not exposed to view in finished structure.
- H. Painting:
 - 1. Steel not exposed to view in the finished structure need not be painted.
 - 2. Steel exposed to view, except that to be galvanized is to be painted as follows:
 - a. Other interior exposure: Apply one-coat shop paint system in accordance with SSPC-PS 7.01. Apply two coats to surfaces inaccessible after assembly.
- I. Galvanizing: Where required, galvanizing is to conform to ASTM A123 and A153. Except for bolts, nuts, and anchors, all galvanizing is to be done after fabrication.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

- A. Prior to beginning work of this Section, verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of

the work of this Section. This includes locations of anchor rods, bearing plates, bearing areas, and finished elevations of concrete and concrete masonry.

- B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies until they have been resolved.

3.2 ERECTION

- A. Conform to the applicable provisions of the reference standards listed in Part 1 of this Section, as modified herein.
- B. The structure is designed to be self-supporting and stable after the building is fully completed. It is solely the Contractor's responsibility to determine erection procedure and sequence; and to ensure the stability of the building and its components and parts, and of the adequacy of temporary or incomplete connections during erection. This includes the addition of whatever temporary bracing, guys, or tie-downs that might be necessary. Such material is not shown on the Drawings. If applied, they shall be removed as conditions permit, and shall remain the Contractor's property.
- C. Safety: It is the Contractor's responsibility to follow all applicable safety codes and regulations governing this work.
- D. Clean bearing surfaces and other surfaces in permanent contact with each other prior to assembly.
- E. Splices are permitted only where indicated.
- F. Tolerances: Per AISC Code of Standard Practice.
- G. Field corrections of fabrication errors by gas cutting is not permitted in major members without prior approval of the Architect.
- H. Welds that are subject to foot traffic or are exposed to view in the finished structure are to be ground smooth and flush with adjacent surfaces.
- I. Touch-up painting: After erection, touch-up field connections and abrasions in the shop coat with same paint used for shop coat. Do not paint welds until they have been cleaned in accordance with AWS D1.1.

3.3 FIELD QUALITY CONTROL

- A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide miscellaneous metals as indicated on the drawings and specified herein. Work includes, but is not limited to:
1. Ladders.
 2. Loose steel lintels.
 3. Steel railings and handrails; work includes design.
 4. Downspout boot castings.
 5. Loose leveling and bearing plates.
 6. Miscellaneous steel framing and supports which are not indicated as part of structural steel work.
 7. Miscellaneous steel members to be embedded in concrete.
 8. Elevator sill angles and elevator intermediate structural supports.
 9. Counter supports.
 10. Supports above ceilings for ceiling hung items.
 11. Aluminum pipe and tube guardrailings systems at Juliet openings

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Structural Steel: Section 05 12 00.
- C. Painting: Section 09 90 00.
- D. Alternates: Section 01 23 00.

1.03 REFERENCES

- A. Steel Construction Manual: American Institute of Steel Construction (AISC).
- B. American Welding Society (AWS).
1. AWS D1.1 - Structural Welding Code - Steel.
 2. AWS D1.3 – Structural Welding Code – Sheet Steel.
 3. AWS D1.2 – Structural Welding Code – Aluminum.
 4. AWS D1.6 – Structural Welding Code – Stainless Steel
- C. American Society for Testing and Materials (ASTM).

1. ASTM A36 - Structural Steel.
2. ASTM A53 - Pipe, Steel, Black and Hot-Dipped, Zinc-coated Welded and Seamless.
3. ASTM A123 - Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
4. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
5. ASTM A283 – Low and Intermediate Tensile Strength Carbon Steel Plates.
6. ASTM A307 - Carbon Steel Bolts and Studs Externally and Internally Threaded Fasteners, 60,000 PSI Tensile Strength.
7. ASTM A325 – Structural Bolts, Steel, Heat Strengthened, 120/105 KSI Minimum Tensile Strength.
8. ASTM A500 – Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
9. ASTM A501 - Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
10. ASTM A510 - General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel.
11. ASTM A653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM A569 - Steel, Carbon (0.15 Maximum, Percent), Hot-Rolled Sheet and Strip, Commercial Quality.
13. ASTM A570 - Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.
14. ASTM A611 - Steel Sheet, Carbon, Cold-Rolled, Structural Quality.
15. ASTM A780 - Practice for Repair of Damaged Hot-Dip Galvanized Coatings.

D. American National Standards Institute (ANSI)

1. ANSI A14.3 - Safety Requirements for Fixed Ladders
2. ANSI Z49.1 – Safety in Welding, Cutting and Allied Processes

E. National Association of Architectural Metal Manufacturers, (NAAMM).

F. Society for Protective Coatings (SSPC)

1. SSPC-SP1 - Solvent Cleaning
2. SSPC-SP2 - Hand Tool Cleaning
3. SSPC-SP3 - Power Tool Cleaning
4. SSPC-SP6 - Commercial Blast Cleaning
5. SSPC-SP11 - Power Tool Cleaning to Bare Metal

1.04 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal stairs and railings and ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

- 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.05 SUBMITTALS

- A. Shop Drawings - General: Submit for all items.
- B. Shop Drawings – Handrails and Guardrails: Indicate in detail construction, gages of metals, jointing, methods of installation, fastening and supports, location and sizes of welds, anchors, hangers and other pertinent information and data.
 - 1. In addition, submit plans and details of stairs and handrails, drawn to scale not less than 1/4 inch per foot.
 - 2. Shop drawings shall contain design, type of steel and load assumption, bearing the seal of a licensed professional engineer registered in the State of Ohio.
- C. Samples: Submit samples of materials or workmanship, if requested by the Architect.
- D. Stair manufacturer's certificate of compliance with the Architectural Products Division of the National Association of Architectural Metal Manufacturer's AMP 510 Metal Stairs Manual materials, construction and installation specification.
- E. Special Environmental Requirements: Submit the following in accordance with Section 01 81 13:

1.06 QUALITY ASSURANCE

- A. Fabricate and install metal items in accordance with applicable standards of AISC and NAAMM. Welding and related procedures in accordance with AWS.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1 - Structural Welding Code - Steel.
 - 2. AWS D1.2 - Structural Welding Code - Aluminum.
- C. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- D. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of miscellaneous metal work.

Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

1.07 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible. Do not delay job progress; allow for trimming and fitting where taking field measurements before fabrication might delay work.

1.08 COORDINATION

- A. Inserts and Anchorages: Furnish inserts and anchoring devices which must be set in concrete or built into masonry for installation of miscellaneous metal work. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work to avoid delay.

1.09 STORAGE AND HANDLING

- A. Protect from corrosion.
- B. Store materials in a weathertight and dry place until ready for use in the work.
- C. Store packaged materials in their original unbroken package or container.

PART 2 PRODUCTS

2.01 MATERIALS

A. Ferrous Metals

1. Steel Shapes, Bars and Plates: ASTM A36.
2. Steel Plates to be Bent or Cold Formed: ASTM A283, Grade C.
3. Steel Pipe: ASTM A53, Type E or S, Grade B, black standard weight.
 - a. Pipe Bollards: Heavy weight, schedule 80.
4. Steel for Gratings: ASTM A569 or A36.
 - a. Wire Cross Bars for Gratings: ASTM A510.
5. Steel Tubing: ASTM A500, Grade A, cold-formed; or ASTM A501, hot-formed.
6. Steel Sheets: Hot-rolled ASTM A570, Class 1, Grade 36; or cold-rolled ASTM A611, Grade C, Type 1.
7. Galvanized Steel Sheets: ASTM A653 Grade 33, G90 coating.

B. Aluminum

1. Structural Shapes, Plates and Bars: ASTM B209, 6061-T5.
2. Non-Structural Plates: ASTM B209, 3003.
3. Extruded Structural Pipe and Tube: ASTM B429, 6063-T5 and ASTM B221, alloy 6061-T6/T62, Fy = 35 ksi.

- 4. Aluminum Extrusions: ASTM B221, Alloy 6063-T6
- C. Gray Iron Castings: ASTM A48, minimum Class 30B.
- D. End Welded Studs
 - 1. Material: Compatible with material to which it is attached.
 - 2. Type: Automatically end welded in the shop or field, head or bent top.
 - 3. Welding Procedures: In strict conformance with manufacturer's recommendations.
 - 4. Size: Diameter and length as indicated.
- E. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded

2.02 FASTENERS

- A. General
 - 1. Provide fasteners of types as required for assembly and installation of fabricated items.
 - 2. Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941; Class Fe/Zn 5; at exterior walls.
- B. Bolts, Nuts and Washers: Regular hexagon head type, externally and internally threaded fasteners; include necessary nuts and plain hardened washers. Provide the following materials/finishes:
 - 1. Steel: ASTM A307 Grade A bolts; A563 nuts. For members for support of structural members or connection thereto, provide ASTM A325 bolts.
 - 2. Stainless Steel: ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1
- C. Expansion Anchors: Stainless steel "DH Bolts" or "Ankr Tite" devices by WEJ-IT or similar by REDHEAD, HILTI or SIMPSON. Length as required to provide minimum 2-1/2" embedment into sound masonry.
- D. Adhesive Type Anchor Bolts – In Hollow CMU: Chemically grouted adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors, unless otherwise noted.
 - 1. HIT HY-70 Adhesive Anchors, HILTI, INC.
 - 2. EPCON System, ITW/RAMSET/RED HEAD
 - 3. Chem-Stud Adhesive Anchors, RAWLPLUG COMPANY, INC.
 - 4. Simpson Set Epoxy- Tie Adhesive Anchors, SIMPSON STRONG- TIE COMPANY, INC.

- E. Adhesive Type Anchor Bolts - In solid grouted CMU and Concrete: Chemically grouted adhesive anchor systems. Use $\frac{3}{4}$ inch diameter anchors, unless otherwise noted.
1. HIT HY 200 or RE-500 V "Safe Set System" Adhesive Anchors, HILTI, INC.
 2. EPCON System, ITW/RAMSET/REDHEAD
 3. Chem-Stud Adhesive Anchors, POWERS FASTENERS, INC.
 4. Simpson Set Epoxy-Tie Adhesive Anchors, SIMPSON STRONG-TIE COMPANY, INC.
- F. Miscellaneous Fasteners
1. Lag Bolts: ANSI B18.2.1.
 2. Machine Screws: Cadmium plated steel, ANSI B18.6.3.
 3. Wood Screws: Flat head carbon steel, ANSI B18.6.1.
 4. Plain Washers: Round, carbon steel, ANSI B18.22.1
 5. Toggle Bolts: Tumble-wing or spring wing type, FS FF-B-588, type, class, and style as required.
 6. Lock Washers: Helical spring type carbon steel, ANSI B18.21.1.

2.03 FABRICATION

- A. General
1. Workmanship
 - a. Construct all items to ensure ease of installation and minimal field adjustment.
 - b. Use materials of size and thickness shown, or, if not shown, of required size and thickness to produce strength and durability in finished product. Ease exposed edges to a radius of approximately $\frac{1}{32}$ inch. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - c. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces. Grind crotches to $\frac{1}{8}$ " radius.
 - d. Form exposed connections with hairline joints, flush and smooth.
 2. Field Measuring: Field measure all items required to obtain proper fit.
 3. Exposed mill names and logos not permitted in finished work.
- B. Ladders
1. Fabricate ladders for the locations shown with dimensions, spacings, details and anchorages as indicated. Comply with the requirements of ANSI A14.3 and OSHA, except as otherwise indicated.
 - a. Unless otherwise shown on the drawings, provide $\frac{1}{2}$ inch x 2- $\frac{1}{2}$ inch continuous structural steel flat bar stringers with eased edges, spaced 18 inches apart.

- b. Provide 1 inch diameter solid structural steel bar rungs, spaced maximum 12 inches on center.
 2. Center rungs on stringers, plug weld and grind smooth on outer rail faces.
 3. Coat top of each rung with aluminum oxide granules set in epoxy adhesive to provide non-slip surface.
 4. Finish: Hot-dip galvanize after fabrication.
 - C. Handrail/Guardrail: Fabricate as indicated on the drawings.
 1. Material: Steel pipe or shapes as detailed; meeting the requirements specified herein for the specific material.
 - a. Juliet Railings: Aluminum shapes as detailed
 2. Loadings: Steel guardrails and handrails shall meet the following load requirements:
 - a. Welded construction, fabricated, complete with connectors to structure designed for a concentrated load of 200 pounds applied at any point and in any direction on the handrail and at the top of the guardrail and in compliance with OBC.
 - b. Guardrails: Designed and constructed for a load of 50 pounds per lineal foot applied horizontally at the required guardrail height and a simultaneous load of 100 pounds per lineal foot applied vertically downward at the top of the guardrail.
 - c. Guardrails: Designed and constructed to resist a 200 pound concentrated horizontal load applied on a one foot square area at any point in the system including intermediate rails or other elements serving this purpose.
 - d. Handrails: Designed and constructed for a load of 50 pounds per lineal foot applied in any direction and in compliance with the OBC.
 - e. Loading conditions in paragraphs a, b, c and d shall not be applied simultaneously, but each shall be applied to produce maximum stress in each of the respective components or any of the supporting components.
 3. Verify dimensions on site prior to shop fabrication.
 4. Railing system shall be assembled in a shop in largest sizes for delivery to site and for installation; to minimize field-splicing and assembly.
 - a. Rails shall be disassembled only as necessary for shipping and handling.
 - b. Rails shall be marked for re-assembly and coordinated installations.
 5. Close open ends of railings, not scheduled to be closed with finials, with close fitting steel plates welded in place and ground smooth.
 6. Welded Connection: Cope intersections of rails and posts, weld joints and grind smooth. Butt weld end-to-end joints of railings, or use welding connections at fabricator's option.
 7. Form simple and compound curves by bending pipes in jigs to produce uniform curves.
 - a. Maintain profile of pipes throughout entire bend without buckling, twisting or otherwise deforming exposed surfaces.
 8. Space posts and wall brackets as indicated. If not indicated, 7'-0" maximum center to center.

9. Brackets, Flanges and Anchors: Provide for railing posts and handrail supports. Provide inserts and sleeves as required for anchorage to concrete or masonry.
 10. Provide wall returns at ends of wall mounted rails.
 11. For Exterior Installations: Provide weepholes or other means for evacuation of water trapped in pipe rails.
 12. Expansion Joints: Provide expansion joints at locations indicated. If not indicated, locate at intervals not to exceed 40 feet.
 - a. Provide slip-joint interval sleeve extending beyond joint on each side; secure sleeve to one side.
 - b. Do not locate expansion joints closer than 6" from post.
 13. Toe Boards: Where indicated, provide toe boards around openings and at edge of open-sided floors and platforms.
 - a. Fabricate to dimensions and details shown.
- D. Miscellaneous Steel Lintels: Provide sizes and shapes as indicated with 8" minimum bearing each jamb, unless otherwise noted. When lintel is fabricated of two or more members to accommodate thickness of wall, weld adjacent members to form a single unit.
1. Unless otherwise indicated, provide one 3-1/2" wide angle leg for each nominal 4" wythe of masonry.
- E. Miscellaneous Embedded Items: Provide steel members of shapes and size required per drawings. Equip members to be anchored into concrete or masonry with welded on anchor straps or weld studs as shown or required. Spacing and location of anchors per drawings, but if not otherwise detailed, provide at ends and at maximum intervals of 12" with minimum two per member.
- F. Miscellaneous Framing and Supports
1. Provide as indicated on drawings.
 2. Fabricate members and assemblies to size, shape and dimensions detailed with provisions to receive adjacent construction supported by such items.
- G. Miscellaneous Loose Steel Items: Provide steel shapes such as channels, angles, plates, protection posts, etc., as indicated on drawings.
- H. Accessories: Provide all clips, bolts, anchors, fasteners, etc., as required for completion of miscellaneous metal work. Type, size and strength as noted or as suitable for conditions and construction involved.
- J. Counter Supports:
1. Surface Mounted: 1/8" steel with 45 degree notch that allows for wall cleat and wire run clearance.
 - a. Load to Deformation: 1500 lbf/pair minimum.
 - b. Finish: Powder coated paint.
 - c. Manufacturer: A&M HARDWARE or approved equal

2. In-Wall Mounted (Concealed): Fabricate from steel angles and welded in sizes indicated or as required.
 - a. Load to Deformation: 650 lbf/pair minimum.
 - b. Finish: Powder coated paint.
3. Accessories: Provide all required fasteners to structure type provided.

2.04 FINISHES

- A. Preparation: Grind all exposed cut surfaces as required to remove burrs and sharp edges.
- B. Galvanizing
 1. Galvanize all ferrous metal items exposed to weather, embedded in masonry or concrete, and where indicated.
 2. Hot-dip galvanize after fabrication in accordance with ASTM A123; provide minimum of 2 oz. of galvanizing (Grade 85) per sq. ft. of subsurface. Prepare and pretreat surfaces as recommended by galvanizer. Do not weld after galvanizing.
 3. Galvanizing Repair Paint: Minimum 79% zinc dust by weight in dried film. TNE MEC COMPANY, INC., No. 92 Tneme-Zinc; ZRC Cold Galvanizing Compound by ZRC, Zinc-rich Galvax by ALVIN PRODUCTS.
 4. Do not use stainless steel or other non-galvanized fasteners in the assembly of galvanized components.
- C. Shop Painting (Non-galvanized Ferrous Metal)
 1. Cleaning: After fabrication, clean all items of loose scale, rust, oil, dirt or other foreign matter.
 2. Minimum Surface Preparation: Hand tool cleaning SSPC SP-2 or SP-11. Where required, blast clean in accordance with SP-6.
 3. Solvent Cleaning (SSPC Spec. No. SP-1): Perform where necessary.
 4. Paint: One shop coat of paint compatible with the finish paint system. Section 09 91 00.
- D. Aluminum Surfaces Railings
 1. Shop paint aluminum surfaces with baked-on organic polymer thermosetting powder coating applied over conversion coating.
 2. Finish Coating Properties
 - a. Hardness: H or better in accordance with ASTM D3363.
 - b. Crosshatch Adhesion: In accordance with ASTM D3359.
 - c. Salt Spray Resistance: 1,000 hours, tested in accordance with ASTM D117.
 - d. Humidity Resistance: 1,000 hours tested in accordance with ASTM D2247.
 - e. Detergent Immersion: 1,000 hours tested in accordance with ASTM D2248.
 3. Colors: As Indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Coordinate and furnish anchorages, settings drawings, diagrams, templates, instructions and directions for installation of anchorages, such as concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.02 INSTALLATION

A. General

1. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal fabrications to in-place construction; including threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws and other connectors as required.
2. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation of miscellaneous metal fabrications. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and level. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry or similar construction.
3. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop paint coat. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted or screwed field connections.
4. Field Welding: Comply with AWS Code for procedures of manual shielded metal-arc welding, appearance and quality of welds made, and methods used in correcting welding work. Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
5. Protection from Dissimilar Materials: Coat all aluminum surfaces in contact with steel, concrete or masonry with one coat of heavy bodied bituminous paint. Where aluminum contacts steel surfaces, and only where specifically approved, the painting required on the steel surface may be substituted for the bituminous paint.

B. Handrail

1. Adjust railings prior to anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or specified herein. Plumb posts in each direction. Secure posts in each direction. Secure posts and railing ends to building construction as follows.
2. Anchor posts to concrete as indicated on the drawings.
3. Weld posts to channels as indicated.
4. Secure handrails to wall with wall brackets. Provide brackets with not less than 1-1/2" clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required for design loading. Secure wall brackets and wall return fittings to concrete or masonry with expansion bolts.

3.03 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780.

END OF SECTION

SECTION 06 10 00

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes the following:
1. Fire-Retardant-Treated Materials
 - a. Wood furring, grounds, nailers, blocking, and UL Assemblies.
 2. Wood-Based Structural-Use Panels
 - a. Backing Panels
 3. Framing with dimension lumber.
 4. Framing with engineered wood products
 - a. Parallam parallel strand lumber (PSL),
 - b. Microllam laminated veneer lumber (LVL)
 - c. Timberstrand laminated strand lumber (LSL)
 5. Framing with preservative-treated wood products
 6. Rooftop equipment bases and support curbs
 7. Wood furring, grounds, nailers, and blocking
 8. Fasteners and metal framing anchors
 9. Sheathing
 - a. Wall Sheathing
 - b. Roof Sheathing
 10. Subflooring
- B. Related Sections:
1. Section 06 20 00 - Finish Carpentry for nonstructural carpentry items exposed to view and not specified in another Section.
 2. Section 07 27 26 - Fluid Applied Membrane Air Barrier
 3. Section 08 71 00 - Door Hardware
 4. Section 10 28 00 - Toilet, Bath, and Laundry Accessories
 5. Section 12 30 00 - Architectural Woodwork

1.02 References

1. C2 "Lumber, Timber, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes"
2. C9 "Plywood - Preservative Treatment by Pressure Process Document Number"

3. M4 "Standard for the Care of Preservative-Treated Wood Products Document Number"

B. [ASTM International](#) Publications:

1. A153 "Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware"
2. A307 "Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength"
3. A563 "Standard Specification for Carbon and Alloy Steel Nuts"
4. A653 "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process"
5. C208 "Standard Specification for Cellulosic Fiber Insulating Board"
6. C578 "Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation"
7. C846 "Standard Practice for Application of Cellulosic Fiber Insulating Board for Wall Sheathing"
8. C954 "Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness"
9. C1177 "Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing"
10. D2559 "Standard Specification for Adhesives for Structural Laminated Wood Products for Use Under Exterior (Wet Use) Exposure Conditions"
11. D5055 "Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists"
12. E84 "Standard Test Method for Surface Burning Characteristics of Building Materials"
13. E699 "Standard Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components"
14. F1667 "Standard Specification for Driven Fasteners: Nails, Spikes, and Staples"

C. [The Engineered Wood Association \(APA\)](#) Publications:

1. Form No. E30, "APA Engineered Wood Construction Guide"

1.03 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise specified.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Exposed Framing: Dimension lumber not concealed by other construction and indicated to receive a stained or natural finish.

1.04 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 01 Specification Sections.

- B. Product Data: For the following products submit "Letter of Conformance" in accordance with Section 01 33 00 indicating specified items selected for use in Project:
 - 1. Engineered wood products
 - 2. Underlayment
 - 3. Metal framing anchors
 - 4. Construction adhesives
- D. 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 American Lumber Standards Committee's (ALSC) Board of Review.
- E. Wood treatment data as follows, including chemical treatment manufacturer's instructions for handling, storing, installing, and finishing treated materials:
 - 1. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.
 - 2. For waterborne-treated products, include statement that moisture content of treated materials was reduced to levels indicated before shipment to Project site.
- F. Material test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.
- G. Warranty of chemical treatment manufacturer for each type of treatment.
- H. Shop Drawings: For Engineered Wood Framing Systems provide layout drawings indicating materials, member sizes, member spacing and accessories required for proper installation. Drawings shall clearly reference construction details, loading assumptions (including location of loads transferred from other levels), and minimum live load and total load deflection criteria.
 - 1. Where installed products are indicated to comply with certain design loadings, include structural computations, materials properties, and other information needed for structural analysis that has been signed and sealed by a qualified professional engineer responsible for their preparation.
- I. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for Project.
 - 1. Engineered wood products
 - 2. Metal framing anchors
 - 3. Power-driven fasteners

1.05 QUALITY ASSURANCE

- A. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Owner's Representative satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

- B. Single-Source Responsibility for Engineered Wood Products: Obtain each type of engineered wood product from one source and by a single manufacturer.
- C. Engineering Responsibility: Engineered Wood Framing Systems shall be engineered by qualified professional engineer legally authorized to practice in jurisdiction where Project is located.
- D. Product Identification: All Engineered Wood Products System members shall be clearly marked with manufacturer's name, product series, plant identification, date of manufacture, and code compliance.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.
 - 1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.
 - 2. Store Engineered Wood materials on dry surfaces supported on raised wood sticks located every 10 feet. Store TJI joists in an upright position.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Preferred Manufacturers:
 - 1. Laminated-Veneer Lumber (LVL):
 - a. [iLevel by Weyerhaeuser](#) (800-456-4787)
 - 2. Parallel-Strand Lumber (PSL):
 - a. [iLevel by Weyerhaeuser](#) (800-456-4787)
 - 3. Prefabricated Wood I-Joists (TJI):
 - a. [iLevel by Weyerhaeuser](#) (800-456-4787)
 - 4. Laminated Strand Lumber (LSL):
 - a. [iLevel by Weyerhaeuser](#) (800-456-4787)
 - 5. Oriented Strand Board (OSB)
 - a. "Structurwood Sheathing"; [iLevel by Weyerhaeuser](#) (800-456-4787)
- B. Approved Manufacturers:
 - 1. Wood-Preservative-Treated Materials:
 - a. [Hoover Treated Wood Products, Inc.](#) (877-722-6292, ext. 211)
 - b. [Osiose, Inc.](#) (800-241-0240)
 - 2. Fire-Retardant-Treated Materials, Interior Type A:
 - a. [Hoover Treated Wood Products, Inc.](#) (877-722-6292, ext. 211)
 - b. "FirePRO"; [Osiose, Inc.](#) (800-241-0240)
 - 3. Fire-Retardant-Treated Materials, Exterior Type:
 - a. [Hoover Treated Wood Products, Inc.](#) (877-722-6292, ext. 211)

4. Laminated-Veneer Lumber (LVL):
 - a. "VERSA-LAM"; [Boise Building Solutions](#) (800-232-0788)
 - b. "Gang-Lam LVL"; [Louisiana-Pacific Corp.](#) (800-999-9105)
 - c. "RedLam LVL" [RedBuilt](#) (866-859-6757)
5. Parallel-Strand Lumber (PSL & LSL):
 - a. Approved Substitutions
6. Prefabricated Wood I-Joists (TJI):
 - a. [Boise Building Solutions](#) (800-232-0788)
 - b. [Louisiana-Pacific Corp.](#) (800-999-9105)
 - c. "RedLam LVL" [RedBuilt](#) (866-859-6757)
7. Oriented Strand Board (OSB)
 - a. Approved Substitution
8. Glass-Fiber-Surfaced Gypsum Sheathing Board:
 - a. "DensGlass Gold Exterior Guard"; [Georgia-Pacific Corp.](#) (800-284-5347)
 - b. "GlasRoc Enhanced Glass Reinforced Gypsum Sheathing"; [CertainTeed Corporation](#), a subsidiary of Saint-Gobain (800-233-8990)
 - c. "Securock Glass-Mat Sheathing"; [United States Gypsum Co.](#) (800-950-3839)
 - d. "Gold Bond Brand e²XP Extended Exposure Sheathing"; [National Gypsum Company](#). (800-628-4662)
9. Metal Framing Anchors:
 - a. [Hilti, Inc.](#) (800-879-8000)
 - b. [Cleveland Steel Specialty Co.](#) (800-251-8351)
 - c. [USP Lumber Connectors](#) (800-328-5934)
 - d. [Simpson Strong-Tie Company, Inc.](#) (800-999-5099)
 - e. [EMCO/Southeastern Metals/A Gibraltar Co.](#) (800-690-7235)

2.02 LUMBER, GENERAL

- A. Lumber Standards: Comply with DOC PS 20, "American Softwood Lumber Standard," and with applicable grading rules of inspection agencies certified by ALSC's Board of Review.
- B. Inspection Agencies: Inspection agencies, and the abbreviations used to reference them, include the following:
 1. NELMA - Northeastern Lumber Manufacturers Association.
 2. NLGA - National Lumber Grades Authority (Canadian).
 3. RIS - Redwood Inspection Service.
 4. SPIB - Southern Pine Inspection Bureau.
 5. WCLIB - West Coast Lumber Inspection Bureau.

6. WWPA - Western Wood Products Association.
- C. Grade Stamps: Provide lumber with each piece factory marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
 1. For exposed lumber, furnish pieces with grade stamps applied to ends or back of each piece, or omit grade stamps and provide grade-compliance certificates issued by inspection agency.
- D. 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.
 1. Provide dressed lumber, S4S, unless otherwise indicated.
 2. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
 3. Provide lumber with 15 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.03 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. General: Where lumber or plywood is indicated as preservative treated or is specified to be treated, comply with applicable requirements of AWPA C2 (lumber) and AWPA C9 (plywood). Mark each treated item with the Quality Mark Requirements of an inspection agency approved by ALSC's Board of Review.
 1. Do not use chemicals containing chromium or arsenic.
 2. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- B. Pressure treat above ground items with waterborne preservatives to a minimum retention of 0.25 lb/cu. ft. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively. Treat indicated items 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 members less than 18 inches above grade.
 4. Wood floor plates installed over concrete slabs directly in contact with earth.
- C. Pressure treat wood members in contact with ground or freshwater with waterborne preservatives to a minimum retention of 0.40 lb/cu. ft.
- D. Complete fabrication of treated items before treatment, where possible. If cut after treatment, apply field treatment complying with AWPA M4 to cut surfaces. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.04 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated wood is indicated, comply with applicable requirements of ASTM E84 (lumber) and ASTM C27 (plywood). Identify fire-retardant-treated wood with appropriate classification marking of UL; U.S. Testing; Timber Products Inspection, Inc.; or another testing and inspecting agency acceptable to authorities having jurisdiction.
1. Non-combustible Construction Types: Provide fire treated wood in all concealed areas of construction and as shown, or indicated on the drawings, and as required by code.
 2. Combustible Construction Types: Provide fire treated wood in fire rated construction as required by the UL Designation number(s) indicated on the drawings, and as required by code.
 3. Research or Evaluation Reports: Provide fire-retardant-treated wood acceptable to authorities having jurisdiction and for which a current model code research or evaluation report exists that evidences compliance of fire-retardant-treated wood for application indicated.
 4. For exposed items indicated to receive stained finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- B. Interior Type A: For interior locations, use chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:
1. Bending strength, stiffness, and fastener-holding capacities are not reduced below values published by manufacturer of chemical formulation under elevated temperature and humidity conditions simulating installed conditions when tested by a qualified independent testing agency.
 2. No form of degradation occurs due to acid hydrolysis or other causes related to treatment.
 3. Contact with treated wood does not promote corrosion of metal fasteners.
- C. Exterior Type: Use for exterior locations and where indicated. Comply with ASTM D2898.
- D. After treatment, kiln-dry lumber and plywood to a maximum moisture content of 19 and 15 percent, respectively
- E. Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

2.05 DIMENSION LUMBER

1. General: Refer to Structural Drawings for information.

2.06 BOARDS

- A. Concealed Boards: Where boards will be concealed by other work, provide lumber with 15 percent maximum moisture content and of following species and grade:
1. Species and Grade: Spruce-pine-fir, Standard per WCLIB rules or No. 3 Common per WWPA rules.

2.07 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 15 percent maximum for lumber items not specified to receive wood preservative treatment.
- D. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.08 ENGINEERED WOOD PRODUCTS

- A. General: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that evidence 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.
- B. Laminated-Veneer Lumber: Lumber manufactured by laminating wood veneers in a continuous press using an exterior-type adhesive complying with ASTM D2559 to produce members with grain of veneers parallel to their lengths. Comply with the following requirements:
 - 1. Extreme Fiber Stress in Bending: 2,600 psi for 12-inch nominal-depth members.
 - 2. Modulus of Elasticity: 1,900,000 psi
 - 3. Tension Parallel to Grain: 1,555 psi
 - 4. Compression Parallel to Grain: 2,510 psi
 - 5. Compression Perpendicular to Grain: 750 psi perpendicular to and 480 psi parallel to glue line.
 - 6. Horizontal Shear: 285 psi perpendicular to and 190 psi parallel to glue line.
- C. Parallel-Strand Lumber: Lumber manufactured by laying up wood strands using an exterior-type adhesive complying with ASTM D 2559, and cured under pressure to produce members with grain of strands parallel to their lengths and complying with the following requirements:
 - 1. Extreme Fiber Stress in Bending: 2900 psi for 12-inch nominal-depth members.
 - 2. Modulus of Elasticity: 2,000,000 psi
 - 3. Tension Parallel to Grain: 2,025 psi
 - 4. Compression Parallel to Grain: 2,900 psi
 - 5. Compression Perpendicular to Grain: 750 psi perpendicular to and 475 psi and parallel to wide face of strands.

6. Horizontal Shear: 210 psi perpendicular to and 290 psi and parallel to wide face of strands.
- D. Prefabricated Wood I-Joists: Units manufactured by bonding stress-graded lumber flanges to wood-based structural-use panel webs with exterior-type adhesives complying with ASTM D 2559, produce I-shaped joists complying with the following requirements:
1. Provide continuous "Microllam LVL flanges", by [iLevel by Weyerhaeuser](#) or approved substitution by other listed manufacturers free from finger or scarf joints for the length of the joists.
 2. Provide webs manufactured from "Performance Plus Panels", by [iLevel by Weyerhaeuser](#), or approved substitution by other listed manufacturers, with saw tooth edge detail interlocked and glued at panel joints. Joist web material must not exceed 12% tested average thickness swell due to moisture.
 3. Structural Capacities: Establish and monitor structural capacities according to ASTM D5055.
 4. Sizes: Depths and widths as indicated, with flanges not less than 1-1/2 inches in actual width.
- E. Microllam LVL Beams:
1. "Microllam LVL" as manufactured by [iLevel by Weyerhaeuser](#) or approved substitution by other listed manufacturers.
 2. Construction: Continuous laminated veneer lumber free from finger or scarf joints. Stress graded veneers bonded with waterproof adhesive with face grain parallel to each adjacent layer. Provide Watershed Overlay coating and edge seal to prevent cupping and moisture damage.
 3. Design Values:
 - a. Refer to Structural Drawings for Information
- F. Parallam PSL Beams:
1. "Parallam PSL" as manufactured by [iLevel by Weyerhaeuser](#), or approved substitution by other listed manufacturers.
 2. Construction: Continuous parallel strand lumber bonded with waterproof adhesives and formed into billets. Beams shall be of single ply construction and free from finger joints or splices for full length of span.
 3. Design Values:
 - a. Refer to Structural Drawings for Information
- G. Laminated Strand Lumber (LSL) Headers:
1. "Timberstrand LSL Headers" as manufactured by [iLevel by Weyerhaeuser](#), or approved substitution by other listed manufacturers.
 2. Construction: Laminated strand lumber; strands of aspen or yellow poplar bonded with waterproof resins; cured using a steam injection process.
- 2.09 WOOD-BASED STRUCTURAL-USE PANELS, GENERAL
- A. Refer to Structural Drawings for Information.

2.10 CONCEALED, PERFORMANCE-RATED STRUCTURAL-USE PANELS

- A. General: Where structural-use panels are indicated for the following concealed types of applications, provide APA-performance-rated panels complying with requirements designated under each application for grade, span rating, exposure durability classification, and edge detail (where applicable).
 - 1. Thickness: Provide panels meeting requirements specified but not less than thickness indicated.
 - 2. Span Ratings: Provide panels with span ratings required to meet "Code Plus" provisions of APA Form No. E30, "APA Design/Construction Guide: Residential & Commercial."
- B. Combination Subfloor-Underlayment: APA-rated Sturd-I-Floor Plywood Sheathing.
 - 1. Exposure Durability Classification: Exposure 1.
 - 2. Span Rating: As indicated.
 - 3. Minimum Thickness: 23/32 inches.
 - 4. Edge Detail: Square edge, tongue and groove
 - 5. Surface Finish: Fully sanded face.
 - 6. Refer to Section 01 23 00 - ALTERNATES.
- C. Sub-Floor Sheathing – OSB rated Sturd-I-Floor.
 - 1. Exposure Durability Classification: Exposure 1
 - 2. Span Rating: As indicated.
 - 3. Minimum Thickness: 23/32 inches.
 - 4. Edge Detail: Square edge, tongue and groove.
 - 5. Refer to Section 01 23 00 - ALTERNATES.
- D. Wall Sheathing - Oriented-Strand-Board:
 - 1. Exposure Durability Classification: Exposure 1
 - 2. Span Rating: 32/16
 - 3. Minimum Thickness: As shown on Drawings.
- E. Roof Sheathing - Oriented-Strand-Board:
 - 1. Exposure Durability Classification: As shown on Drawings
 - 2. Span Rating: As shown on Drawings
 - 3. Minimum Thickness: As shown on Drawings.

2.11 STRUCTURAL-USE PANELS FOR BACKING

- A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade, C-D Plugged Exposure 1, in thickness indicated or, if not otherwise indicated, not less than 15/32 inch thick.

2.12 GYPSUM SHEATHING

- A. Glass-Fiber-Surfaced Gypsum Sheathing Board: Gypsum sheathing board consisting of noncombustible gypsum core incorporating a water-resistant material, surfaced on face and back with glass-fiber mats with alkali-resistant coating, and with unsurfaced square edges; complying with ASTM C71177, and requirements indicated below:
 - 1. Type: Type X or as noted on the drawings.
 - 2. Thickness: 5/8" unless indicated otherwise.

2.13 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, contains preservative treatment, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating G185 per ASTM A153 or of Type 304 stainless steel.
- B. Nails, Wire, Brads, and Staples: ASTM F1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
 - 1. For wall and roof sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.
- F. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117. Attach sheathing to comply with ASTM C954.
- G. Lag Bolts: ASME B18.2.1.
- H. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and, where indicated, flat washers.

2.14 METAL FRAMING ANCHORS

- A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:
 - 1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for Project.
 - 2. Allowable Design Loads: Provide products with allowable design loads, 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.

- B. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653, G60 coating designation; structural, commercial, or lock-forming quality, as standard with manufacturer for type of anchor indicated.
- C. Joist Hangers: U-shaped joist hangers with 2-inch-long seat and 1-1/4-inch-wide nailing flanges at least 85 percent of joist depth.
 - 1. Thickness: As indicated on the Structural Drawings.
- D. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
 - 1. Strap Width: As indicated on the Structural Drawings.
 - 2. Thickness: As indicated on the Structural Drawings.
 - 3. Designed for connection of engineered wood products, sized to support design loads.
- E. Bridging: Rigid, V-section, nailless type, 0.064 inch thick, length to suit joist size and spacing.
- F. Post Bases: As indicated on Structural Drawings
- G. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
 - 1. Width: As indicated on the Structural Drawings.
 - 2. Thickness: As indicated on the Structural Drawings.
 - 3. Length: As indicated on the Structural Drawings.
- H. Rafter Tie-Downs (Hurricane Ties): As indicated on the Structural Drawings.
- I. Floor-to-Floor Ties: Flat straps as indicated on the Structural Drawings.

2.15 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 that is approved for use with type of construction panel indicated by both adhesive and panel manufacturers.
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbonate (IPBC) as its active ingredient.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

- E. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

- 1. ["Table 2304.9.1 - Fastening Schedule" of the International Building Code.](#)

- F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. 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; predrill as required.
- G. Use hot-dip galvanized or stainless-steel nails where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity.
- H. Countersink nail heads on exposed carpentry work and fill holes with wood filler.

3.02 WOOD GROUNDS, NAILERS, BLOCKING, AND SLEEPERS

- A. Install wood grounds, nailers, blocking, and sleepers where shown and where required for screeding or attaching other work. Form to shapes shown and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build into masonry during installation of masonry work. Where possible, anchor to formwork before concrete placement.
- C. Install permanent grounds of dressed, 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.

3.03 WOOD FURRING

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
 - 1. Firestop furred spaces of walls at each floor level and at ceiling with wood blocking or noncombustible materials, accurately fitted to close furred spaces.
- B. Furring to Receive Plywood Paneling: Install 1-by-3-inch nominal-size furring at 24 inches o.c., horizontally and vertically. Select furring with no knots capable of producing bent-over nails and damage to paneling.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring at 16 inches o.c., vertically.

3.04 WOOD FRAMING, GENERAL

- A. Framing Standard: Comply with AFPA's "Manual for Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Install framing members of size and at spacing indicated.
- D. Do not splice structural members between supports.
- E. Firestop concealed spaces of wood-framed walls and partitions at each floor level and at ceiling line of top story. Where firestopping is not inherent in framing system used, provide closely fitted wood blocks of 2-inch nominal-thickness lumber of same width as framing members.

- F. Comply with Table 2304.9.1 and Section 2304 of the International Building Code for minimum fastening requirements of wood members, and published requirements of metal fastener manufacturer, whichever is more stringent.

3.05 WALL AND PARTITION FRAMING

- A. General: Arrange studs so that wide face of stud is perpendicular to direction of wall or partition and narrow face is parallel. Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs; except single top plate may be used for non-load-bearing partitions. Nail or anchor plates to supporting construction, unless otherwise indicated.
- B. Construct corners and intersections with "California corner framing" where possible. Provide miscellaneous blocking and framing as shown and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide continuous horizontal blocking at midheight of single-story partitions and multistory partitions, using members of 2-inch nominal thickness and of same width as wall or partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Set headers on edge and support on jamb studs.
 - 1. For non-load-bearing partitions, provide double-jamb studs with headers not less than 4-inch nominal depth for openings 36 inches and less in width, and not less than 6-inch nominal depth for wider openings.
 - 2. For load-bearing walls, refer to Structural Drawings.

3.06 FLOOR JOIST FRAMING

- A. General: Install floor joists with crown edge up and support ends of each member with not less than 1-1/2 inches of bearing on wood or metal, or 3 inches on masonry. Attach floor joists as follows:
 - 1. Where supported on wood members, by toe nailing or by using metal framing anchors.
 - 2. Where framed into wood supporting members, by using wood ledgers as shown or, if not shown, by using metal joist hangers.
- B. Frame openings with headers and trimmers supported by metal joist hangers; double headers and trimmers where span of header exceeds 48 inches.
- C. Do not notch in middle third of joists; limit notches to 1/6 depth of joist, 1/3 at ends. Do not bore holes larger than 1/3 depth of joist; do not locate closer than 2 inches from top or bottom.
- D. Provide solid blocking of 2-inch nominal thickness by depth of joist at ends of joists unless nailed to header or band.
- E. Lap members framing from opposite sides of beams, girders, or partitions not less than 4 inches or securely tie opposing members together. Provide solid blocking of 2-inch nominal thickness by depth of joist over supports.
- F. Anchor members paralleling masonry with 1/4-by-1-1/4-inch metal strap anchors spaced not more than 96 inches o.c. extending over and fastening to 3 joists. Embed anchors at least 4 inches into masonry with ends bent at right angles 4 inches into grouted masonry.
- G. Under jamb studs at openings, provide solid blocking between joist.

H. Prefabricated Wood I-Joists:

1. Comply with manufacturer's written instructions for design, installation, and fastening.
2. Design Loads: Joists shall be sized to support loads indicated on drawings and reviewed by a Registered Engineer in the employ of the joist manufacturer.
3. Allowable deflection:
 - a. Floor Joists: L/360 live load deflection; L/240 total load deflection.
4. Permanently bond the subfloor to the joists using waterproof construction adhesive and nails.
5. End Bearing: 1-3/4" minimum bearing with Timberstrand LSL rim joist.
6. Intermediate bearing: 3-1/2" minimum bearing. Blocking panels shall be installed between the joists when load bearing walls are located above the bearing point.

I. Engineered Wood Beams

1. Comply with manufacturer's written instructions for design, installation, and fastening.
2. Design Loads: Beams shall be sized to support loads indicated on drawings.
3. Allowable deflection:
 - a. Floor Beams: L360 live load deflection; L240 total load deflection.
 - b. Roof Beams: L/180 total load deflection.
4. Protect wood members from direct contact with concrete or masonry.
5. Refer to manufacturers literature for connection of multiple plies of side loaded beams.

3.07 RAFTER AND CEILING JOIST FRAMING

- 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 perpendicular 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 toe nail or 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 shown or, if not shown, 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 shown or, if not shown, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide special framing as shown for eaves, overhangs, dormers, and similar conditions, if any.

D. Engineered Wood Beams

1. Comply with manufacturer's written instructions for design, installation, and fastening.
2. Design Loads: Beams shall be sized to support loads indicated on drawings.
3. Allowable deflection:
 - a. Floor Beams: L360 live load deflection; L240 total load deflection.
 - b. Roof Beams: L/180 total load deflection.
4. Protect wood members from direct contact with concrete or masonry.
5. Refer to manufacturers literature for connection of multiple plies of side loaded beams.

3.08 INSTALLATION OF STRUCTURAL-USE PANELS

- A. General: Comply with applicable recommendations contained in APA Form No. E30K, "APA Design/Construction Guide: Residential & Commercial," for types of structural-use panels and applications indicated.
 1. Comply with "Code Plus" provisions of above-referenced guide.
- B. Securely attach to substrate by fastening as indicated, complying with the following:
 1. ICC NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- C. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- D. 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.
- E. Fastening Methods: Fasten panels as indicated below:
 1. Combination Subflooring-Underlayment: Glue and nail to framing throughout.
 2. Subflooring: Glue and nail to framing throughout.
 - a. Space panels 1/8 inch at edges and ends.
 3. Sheathing:
 - a. [Nail to wood framing.](#)
 - b. Space panels 1/8 inch at edges and ends.
 4. Underlayment: Nail to subflooring.
 - a. Space panels 1/32 inch at edges and ends.
 - b. Fill and sand edge joints of underlayment receiving resilient flooring just before installing flooring.
 5. Plywood Backing Panels: Nail or screw to supports.
 6. Lay-out panels with face grain oriented perpendicular to the supporting members.
 7. Install roof sheathing with panel clips at all edges.

3.09 GYPSUM SHEATHING

- A. General: Install gypsum sheathing to comply with manufacturer's instructions, GA-253, and the following:
1. Cut boards at penetrations, edge, and other obstructions of the work. Fit tightly against abutting construction, except provide a 3/8" setback where non-load-bearing construction abuts structural elements.
 2. Coordinate sheathing installation with flashing and joint sealant installation so that these combined materials are installed in the sequence and manner that prevents exterior moisture from passing through completed exterior wall assembly.
 3. Apply fasteners so that screw heads bear tightly against face of gypsum sheathing boards, but do not cut into face paper.
 4. Do not bridge building expansion joints with gypsum sheathing. Cut and space edges to match spacing of structural support elements.
- B. Vertical Installation: Install four-foot-wide gypsum sheathing boards vertically with vertical edges centered over flanges of studs. Abut ends and edges of each board with those of adjoining boards. Screw-attach boards at perimeter and within field of board to each steel stud as follows:
1. Fasteners spaced approximately 8" o.c. and set-back 3/8" minimum from edges and ends of boards.

END OF SECTION

SECTION 06 10 50

WOOD BLOCKING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Roof blocking, cants and nailers.
- B. Concealed blocking for support of accessories, equipment, specialty items, cabinets, fixtures, trim, facing materials and similar type items.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.

1.02 REFERENCES

- A. Standards
 - 1. American Wood Protection Association (AWPA): Treatment Standards.
 - a. AWPA U1 - Use Category System: User Specification for Treated Wood
 - 2. American Society for Testing and Materials (ASTM)
 - a. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
 - b. D3498 - Standard Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems
 - c. D2898 - Standard Practice for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
 - d. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials
 - 3. American Plywood Association (APA): Grades and Standards

1.03 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
- B. Preservative Treated Wood: Submit certification by treating plant stating chemical and process used and conformance with applicable standards.
- C. Fire Retardant Treatment: Submit certification by treating plant that fire retardant treatment materials comply with governing ordinances and that treatment will not bleed through finish surfaces.

- D. Special Environmental Requirements: Submit the following in accordance with Section 01 81 13:
1. Composite Wood Products: Products shall be made using ultra-low-emitting formaldehyde resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde.
 2. Laboratory Test Reports: For composite wood products, indicating compliance with requirements for low-emitting materials.
 3. Adhesives shall have a VOC content.
 4. Product Data: For installation adhesives, indicating VOC content.
 5. Laboratory Test Reports: For installation adhesives, indicating compliance with requirements for low-emitting materials.
 6. Particleboard shall be made without urea formaldehyde.

1.04 QUALITY ASSURANCE

- A. Softwood Lumber: Grading rules and wood species shall conform with the voluntary Product Standards PS 20 including grading rules of the following associations, as applicable:
1. Southern Pine: Standard Grading Rules for Southern Pine Lumber, published by Southern Pine Inspection Bureau (SPIB).
 2. Douglas Fir, Western Larch and Hemlock: Western Lumber Grading Rules, published by Western Wood Products Association (WWPA), Standard Grading and Dressing Rules for West Coast Lumber Inspection Bureau (WCLIB) or National Lumber Grades Authority (NLGA).
 3. Western Spruce, Pine and Fir: Western Spruce-Pine-Fir Association (WSPFA) and current Canadian Grading Rules by National Grades Association, Canada.
- B. Softwood Plywood: Grading rules and wood species shall conform with Product Standard PS 1.
- C. Grade Marks
1. General: Identify all lumber and plywood by official grade mark.
 2. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping, or combination designation, rules under which graded, where applicable and condition of seasoning at time of manufacture.
 3. Softwood Plywood: Appropriate grade trademark of the American Plywood Association.
 - a. Type, grade, class and identification index.
 - b. Inspection and testing agency mark.

1.05 STORAGE AND HANDLING

- A. Store off the ground.
- B. Protect from direct contact with the weather.
- C. Provide proper ventilation.

PART 2 PRODUCTS

2.01 SOFTWOOD LUMBER

- A. Species: Any commercial softwood.
 - 1. Provide materials 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. Moisture Content: Maximum 19% at time of manufacture.
 - 1. Fire Retardant Treated Materials: Kiln-dry all materials after treatment to maximum 15% moisture content.
- C. Dimensions
 - 1. Specified lumber dimensions are nominal unless otherwise indicated.
 - 2. Actual dimensions conform to industry standards established by the American Lumber Standards Committee and the rules writing agencies.
- D. Surfaces: Surface four sides (S4S) unless specified otherwise.
- E. Grading: Construction grade.

2.02 PLYWOOD

- A. Plywood Blocking: Provide exterior grade plywood for exterior use and interior type with exterior glue for interior use. Formaldehyde free.
 - 1. Exterior: APA-CD-EXT.
 - 2. Interior: APA-CD-EXPOSURE I, with exterior glue.

2.03 FIRE-RETARDANT WOOD TREATMENT

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
- C. After treatment, kiln-dry lumber to maximum 19% moisture content and plywood to maximum 15% moisture content . Inspect each piece of lumber and plywood after drying and discard damaged or defective pieces.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

2.03 PRESERVATIVE WOOD TREATMENT

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC3b.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 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 each piece of treated lumber with AWPB Quality Mark designation denoting conformance to the appropriate specification.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- D. Application: Treat items 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.

2.04 ROUGH HARDWARE

- A. General: Provide all necessary spikes, screws, nails, bolts and other hardware for satisfactory erection of work. Except where noted to be stainless steel, provide hot-dipped galvanized finish for hardware exposed to exterior, located in toilet rooms, in contact with treated wood or in contact with roofing or flashing.
1. Nails: ASTM F1667. Common wire nails, except where noted otherwise on drawings; sizes as noted or specified herein.
 2. Attachment to Concrete or Masonry: Metal expansion type shields or inserts; sizes as required to accommodate applied fastener; spacing as indicated on drawings.
 - a. "DH" or "Ankr-Tight" by WEJ-IT or equal by RED HEAD or HILTI.
 - b. Sleeve type for masonry.
 - c. Wedge type for concrete.
 3. Adhesive Type Anchor Bolts – In Hollow CMU: Chemically grouted adhesive anchor systems with nylon or stainless steel screen inserts. Use 1/2 inch diameter anchors, unless otherwise noted.
 - a. HIT HY20 Adhesive Anchors, HILTI, INC.
 - b. EPCON System, ITW/RAMSET/RED HEAD
 - c. Chem-Stud Adhesive Anchors, RAWLPLUG COMPANY, INC.
 - d. Simpson Set Epoxy- Tie Adhesive Anchors, SIMPSON STRONG-TIE COMPANY, INC.
 4. Adhesive Type Anchor Bolts - In solid grouted CMU and Concrete: Chemically grouted adhesive anchor systems. Use 3/4 inch diameter anchors, unless otherwise noted.
 - a. HIT HY200A Adhesive Anchors, HILTI, INC.
 - b. EPCON System, ITW/RAMSET/REDHEAD
 - c. Chem-Stud Adhesive Anchors, POWERS FASTENERS, INC.
 - d. Simpson Set Epoxy-Tie Adhesive Anchors, SIMPSON STRONG-TIE COMPANY, INC.
 5. Attachment to Steel Studs: Self tapping screws of sufficient length and strength to perform the functions for which they are used.
 6. Roof Construction
 - a. Wood-to-Wood Attachment: 300 Series stainless steel, flat head.
 - 1) Plywood to Nailers: Minimum #8 x 1-3/4".
 - b. Wood-to-Metal Deck Attachment: Hot dip galvanized in accordance with ASTM A153; machine bolts, locknuts and washers; minimum 3/8" diameter.

2.05 ADHESIVE

- A. Adhesives: Water- and mold-resistant formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- 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.

PART 3 EXECUTION

3.01 CONDITIONS OF SURFACES

- A. General: Verify that surfaces to receive blocking are prepared to exact grades and dimensions.

3.02 INSTALLATION

- A. Align and anchor blocking with countersunk bolts, washers, nuts, or nails, as applicable.
- B. Locate blocking to facilitate installation of finishing materials, fixtures, specialty items and trim.
- C. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

3.03 WOOD TREATMENT

- A. Preservative Treated Wood Products: Provide pressure treatment for all lumber and plywood as specified hereinbefore.
 - 1. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - a. Use inorganic boron for items that are continuously protected from liquid water.
 - b. Use copper naphthenate for items not continuously protected from liquid water.
- B. Fire Retardant Treated Wood Products: Provide fire retardant treatment on all lumber and plywood as specified hereinbefore.

3.04 CLEAN UP

- A. Clean up debris and cuttings on a regular daily basis. Remove and dispose of excess materials and debris created by wood blocking.
- B. Maintain the building and site free of accumulations of cutting and waste materials in a neat orderly condition acceptable to the Architect.

3.05 WASTE MANAGEMENT

- A. Do not burn scraps of treated wood. Do not mix treated wood scraps with untreated wood. Hazardous wastes shall be separated, stored, and disposed of according to local regulations.

END OF SECTION

SECTION 06 17 53
SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 DESCRIPTION

- A. Work included: All labor and materials required to furnish and install wood trusses, connectors, bridging, bracing, and accessories as shown on the Drawings and required by these specifications.
- B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other Sections and all Drawings for related work.

1.3 QUALITY ASSURANCE

- A. Reference standards:
 - 1. By the National Forest Products Association (NFPA):
 - a. National Design and Specification for Stress-Grade Lumber and Its Fastenings.
 - b. National Design Specification for Wood Construction.
 - 2. By American Wood Protection Association (AWPA)
 - a. AWPA Book of Standards
 - 3. Reference Standards by the Truss Plate Institute:
 - a. Design Specifications for Light Metal Plate Connected Wood Trusses.
 - b. Quality Control Manual
 - c. Bracing Wood Trusses Manual.
 - d. Handling and Erecting Wood Trusses Manual.
- B. Manufacturer's qualifications: regularly engaged in the design and manufacture of wood trusses for a minimum of 5 years.
 - 1. Pre-engineered metal truss manufacturer must adhere to the Special Inspection requirements for fabricated items.
- C. Where indicated on the Contract Documents, Fire-Retardant-Treated Wood (FRTW) trusses shall be pressure treated with fire retardant chemicals in accordance with AWPA C20.

- D. Shop fabricated items to require special inspections under section 1704.2.5 of the Ohio Building Code, unless the fabricator is registered per section 1704.2.5.1.

1.4 SUBMITTALS

- A. Shop Drawings:
1. Indicate design and fabrication data.
 2. Indicated metal connectors, gauge of plates, nominal lumber size, and location of trusses.
 3. Indicate lumber specifications, pitch, span, spacing, species, size, stress grades, and dimensions of each member.
 4. Design loads including:
 - a. Top chord live load (for roof trusses, this shall be the controlling case of Live, Rain, or Snow load).
 - b. Top chord dead load.
 - c. Bottom chord live load.
 - d. Bottom chord dead load.
 - e. Additional loads and locations.
 - f. Environmental load design criteria (wind speed, snow, seismic, and all applicable factors as required to calculate the truss loads).
 - g. Other lateral loads including drag strut forces.
 5. Adjustments to wood member and metal connector plate design values for conditions of use.
 6. Indicate design loads, allowable stress increases, and maximum axial compression and tension forces in the truss members.
 7. Indicate any camber to be fabricated within the trusses.
 8. Calculated span to deflection ratio and/or maximum vertical and horizontal deflection for live and for live plus dead and KCR (creep factor) as applicable.
 - a. Floor trusses shall be designed to meet the following deflection criteria when the total design loads are applied:
 - i. $L/360$ when supporting a suspended ceiling.
 - ii. $L/480$ when supporting a finished ceiling directly applied to the bottom chord, with or without metal furring channels.
 - iii. $L/600$ when supporting operable walls and partitions.
Coordinate design loads and stacking requirements with the wall supplier.
 - b. Roof trusses shall be designed to meet the following deflection criteria when the total design loads are applied:
 - i. $L/180$ when not supporting a ceiling.
 - ii. $L/240$ when supporting a suspended ceiling.
 - iii. $L/360$ when supporting a finished ceiling directly applied to the bottom chord, with or without metal furring channels.
 - iv. $L/600$ when supporting operable walls and partitions.
Coordinate design loads and stacking requirements with wall supplier.

9. Indicate the locations, sizes, and connections of all permanent bracing required to prevent the buckling of individual truss web and chord members.
10. Provide all truss to truss connections and provide manufacturer's standard published literature which indicates allowable capacities.
11. Provide truss field assembly requirements, if any.
12. Provide an erection plan which indicates the truss layout, identification marks, hanger designations, and location of each type of truss provided.
13. Indicate truss to truss connection hangers and provide manufacturer's standard published literature which indicates allowable capacities.
14. These drawings shall be sealed by a Professional Engineer registered in the state where the project is located.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Store fabricated trusses and sub-assemblies to ensure proper drainage and ventilation. Protect from damage, exposure to weather, or standing water.
- B. Schedule delivery of trusses to minimize job site storage. If storage is required on the site, place trusses on blocking off the ground and in upright position. Cover with waterproof membrane.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Lumber:
 1. Lumber used shall be identified by grade mark of lumber inspection bureau or agency approved by the American lumber standards committee, and shall be the size, species, and grade as shown on the Truss Design Drawings, or equivalent as approved by the Truss Designer.
 2. Lumber shall be kiln dried and moisture content of lumber shall not be more than 15% or less than 7% at the time of fabrication.
 3. Adjustment of value for duration of load or conditions of use shall be in accordance with ANSI/TPI 1.
 4. Fire Retardant Treated (FRT) Lumber, if applicable, shall meet the specifications of the fire-retardant chemical manufacturer, the truss design, and ANSI/TPI 1 and shall be re-dried after treatment to 19% maximum moisture content at temperatures not to exceed 160°F (71°C) in accordance with AWWA Standards C20. FRT lumber design values shall be developed from approved test methods and procedures that consider potential strength-reduction characteristics, including the effects of elevated temperature and moisture. Design values shall be approved by the Authorities Having Jurisdiction. Lumber treater shall supply certificate of compliance.
- B. Metal Connector Plates:

1. Connector plates shall be deformed plate type, 20 gauge minimum steel, ASTM A446, Grade A, and galvanized ASTM A663, Coating G60.
 2. Hangers and connectors in contact with pressure-treated lumber are to be Batch/Post Hot Dipped Galvanized per ASTM A123 with a minimum G185 coating or Stainless Steel with chemical composition conforming to AISI 303/304 or AISI 316.
 3. In highly corrosive environments, special applied coatings or stainless steel may be required, as specified in the Construction Documents.
- C. Pressure Treated Lumber Fasteners:
1. Fasteners which includes nails, anchor rods, bolts, wedge anchors, sleeve anchors, etc. that are in contact with pressure treated lumber are to be Hot Dipped Galvanized per ASTM A153 with a minimum G185 coating or stainless steel with chemical composition conforming to AISI 303/304 or AISI 316.

2.2 DESIGN CRITERIA

- A. Design loading: refer to Contract Documents.
- B. During entire construction period, distribute concentrated loads adequately so that carrying capacity of any one truss or other component is not exceeded.
- C. Design the sizes and connections of all permanent bracing required to prevent buckling of truss members is the responsibility of the Truss Supplier and is to be included within the shop drawing submittal.

2.3 FABRICATION

- A. Cut truss members accurately to length, angle, and true to line to ensure tight joints for finished truss.
- B. Fabricate truss members in special jigs with members tightly clamped in place until connector plates have been installed.
- C. All joints shall be designed as set forth in the TPI standards. Open joints which depend on the stiffness of the metal connector plate to transmit stresses and improperly fitted joints are not permitted.
- D. Lumber defects, such as wane and knots, occurring in the connector plate area must not affect more than 10% of required plate area or number of effective teeth required for each truss member. Apply connector plates to both faces of truss at each joint, making firm, even contact. Cut wood members accurately. Fabricate with wood members in good contact with all trusses uniform. Field connections of truss subassemblies, where necessary, shall be in accordance with details shown on reviewed truss-engineering drawings.
- E. Build camber into the trusses, as required for dead load deflections, by properly positioning the members in the fabricating jig.

- F. Where field connections of the truss subassemblies are necessary, special nail-on splice plates are acceptable, providing the plate sizes and positions are shown on the truss-engineering design as approved by a Professional Engineer.
- G. Multi-ply trusses or girders shall be properly attached together (by nailing, screwing, or bolting) to ensure the trusses are able to perform according to their design as stipulated by the Truss Designer. Follow all requirements provided on the Truss Design Drawings. Whenever possible, connect multi-ply trusses together prior to erection/installation.
- H. Provide framing anchors as shown on the engineering design drawings.
- I. Stamp each truss with the name and address of the Truss Fabricator.

PART 3 - EXECUTION

3.1 HANDLING, INSTALLATION, AND BRACING

- A. Trusses shall be handled during manufacturing, delivery, and by the Contractor at the job site so as not to be subjected to excessive bending.
- B. Trusses shall be unloaded in a manner so as to minimize lateral strain. Trusses shall be protected from damage that might result from on-site activities and environmental conditions. Trusses shall be handled in such a way as to prevent toppling when banding is removed.
- C. Contractor shall be responsible for the handling, installation, and temporary restraint/bracing of the trusses in a good workmanlike manner and in accordance with the recommendation set forth in SBCA/TPI's Building Component Safety Information (BCSI): Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.
- D. Apparent damage to trusses, if any, shall be reported to the Truss Manufacturer prior to erection. Repair as required.
- E. Trusses shall be set and secured level and plumb, and in correct location. Each truss shall be held in correct alignment until specific permanent restraint and bracing is installed.
- F. Cutting and altering of trusses is not permitted. If any truss should become broken, damaged, or altered, written concurrence and approval by a Registered Design Professional is required.
- G. Concentrated loads shall not be placed on top of trusses until all specified restraint and bracing has been installed and structural sheathing is permanently nailed in place. Specifically avoid stacking full bundles of construction materials or other concentrated loads on top of trusses.

- H. The truss submittal package and any supplementary information provided by the Truss Manufacturer shall be provided by the Contractor to the individual or organization responsible for the installation of the trusses.
- I. Trusses shall be permanently restrained and braced in a manner consistent with good Building practices as outlined in BCSI and in accordance with the requirements of the Construction Documents. Trusses shall furthermore be anchored or restrained to prevent out-of-plane movement to keep all truss members from simultaneously buckling together in the same direction. Such permanent lateral restraint shall be accomplished by: (a) anchorage to solid end walls; (b) permanent diagonal bracing in the plane of the web members; or (c) other suitable means.
- J. Install permanent braces on members as required and noted in the shop drawings to prevent buckling of the members.
- K. Provide continuous "strong back" through all floor trusses equivalent to a 2x8 at center of trusses spanning greater than 15 feet. Attach to each truss with a minimum of five 10d nails. Lap 2x8's across two trusses minimum.

3.2 FIELD QUALITY CONTROL

- A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide finish carpentry as indicated and specified. Work includes:
1. Hardwood running and standing trim.
 2. Installation of shop fabricated millwork.
 3. Installation of door hardware, door frames and doors.
 4. Miscellaneous fasteners and hardware.

1.02 RELATED SECTIONS

- A. Wood Blocking: Section 06 10 50.
- B. Architectural Woodwork: Section 06 40 00.
- C. Wood Doors: Section 08 19 00.
- D. Door Hardware: Section 08 71 10.
- E. Painting and Finishing: Section 09 91 00.
- H. Sustainable Design Requirements: Section 01 81 13.

1.03 REFERENCES

- A. Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard:
1. ANSI: American National Standards Institute.
 2. AWI: Architectural Woodwork Institute.
 3. P.S.: U.S. Product Standard.

1.04 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Submit samples of all finish materials, include the following:
1. Lumber with transparent finish for each species and cut. (three pieces,

- 12")
- 2 Lumber with opaque finish. (12")

- C Manufacturer's product data describing type and quality of items specified herein.
- D Certification that fire-retardant treatment materials comply with governing ordinances and meet or exceed ASTM E84 tests. Include certification by treating plant that treatment will not bleed through finish surfaces. Materials shall bear UL label showing Flame Spread 25 or less and smoke developed 40 or less. Mill certification is not acceptable.
- E. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

1.05 QUALITY ASSURANCE

- A. Installation: Performed only by experienced skilled finish carpenters.
- B. Provide lumber factory marked with type, grade, mill and grading agency identification on concealed surfaces. Omit marking and submit mill certificates for materials to receive transparent finishes that cannot be marked on a concealed surface.
- C. Fire-retardant treated wood shall conform to applicable requirements of AWWA and NFPA.
- D. Quality Grade: Materials and fabrication shall be "custom grade" in accordance with "Quality Standard Illustrated," of the AWI conforming to the following sections:
 - 1. Section 100: Solid wood members.
 - 2. Section 300: Standing and running trim.
 - 3. Section 1700: Installation of architectural woodwork.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials until concrete, masonry and other similar wet work has been completed and is thoroughly dry, outside door openings are permanently watertight, exterior windows are glazed and, in case of temperature dropping below 60 degrees F., until temporary heating and ventilating systems are in operation.
 - 1. Do not store adhesives with materials that have a high capacity to absorb VOC emissions (i.e., materials which are woven, fibrous or porous in nature, such as acoustical ceilings, carpets, textiles, etc.).
 - 2. Do not store adhesives in occupied spaces.

- B. Protect finish carpentry during delivery, storage and handling to prevent damage, soiling and deterioration.
- C. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation. Protect materials from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

1.07 PROJECT CONDITIONS

- A. Provide and maintain a constant temperature and humidity before, during and after installation as required to maintain optimum moisture content of installed materials.
- B. Obtain measurements and verify dimensions and details before proceeding with finish carpentry.
- C. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Lumber
 - 1. Provide lumber surfaced four sides (S4S) and worked to profiles and patterns shown. Nominal sizes are as shown, except where detailed dimensions are indicated.
 - 2. Moisture Content: Provide materials kiln-dried to moisture content complying with AWI Standards, Section 100-G-3.
 - 3. Softwood Lumber: Comply with PS-20, "American Softwood Lumber Standard", and with applicable rules of grading and inspection agency for species indicated.
 - a. Western Red Cedar, Ponderosa Pine, White Pine: Western Lumber Grading Rules, published by Western Wood Products Association (WWPA), or Standard Grading Rules for West Coast Lumber, No. 16, published by West Coast Lumber Inspection Bureau (WCLIB).
- B. Wood Trim - Painted Finish: In accordance with AWI 300, "Custom" Grade, and AWI 100, Grade I, except no checks will be allowable on visible surfaces. Plain sliced poplar. Well seasoned and kiln dried. Moisture content at time of fabrication shall not exceed 12%.
- C. Nails

1. Provide steel nails with diamond point for soft woods and blunt point for hardwoods.
2. Interior Work - Finishing Nails: 6d for 3/4" material; 9d or 10d for 5/4" material; and 12d for 1-1/2" material.

2.02 ACCESSORIES

- A. Wood Filler: Oil or solvent base, tint to match surface color.
- B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
 1. Wood glue shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Paneling Adhesive: Comply with paneling manufacturer's written recommendations for adhesives.
 1. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Multipurpose Construction Adhesive: Formulation complying with ASTM D 3498 that is recommended for indicated use by adhesive manufacturer.
 1. Adhesive shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.03 FABRICATION

- A. General: Except as specified hereinafter, fabricate all work in accordance with AWI quality standards as specified. Work not specified with a level of quality shall be not less than "Custom" quality per AWI.
- B. Standing and Running Trim: Fabricate to dimensions, profiles and details indicated.
 1. Cut moldings, wood door and window frames, trims and stops clean and sharply defined. Ease edges to approximately 1/16" radius, unless otherwise shown.
 2. Machine sand all flat work, except items to receive resawn surfaces.

PART 3 EXECUTION

3.01 PREPARATION

- A. Condition finish carpentry materials and products to average prevailing humidity conditions in installation areas before installing.
- B. Install blocking and anchoring devices built into substrates for anchorage of finish carpentry items.

- C. Verify mechanical, electrical, and building items affecting this Section are placed and ready to receive this work.
- D. Verify field dimensions.
- E. Backprime lumber for painted finish exposed on the exterior or to moisture and high relative humidity on the interior. Comply with requirements of Section 09 91 00.
- F. Ventilation for Adhesives: Comply, at a minimum, with the adhesive manufacturers' recommendations for space ventilation during and after installation. Maintain the following ventilation conditions during the adhesive curing period or for 72 hours after installation (whichever is longer): 1) supply 100% outside air 24 hours a day; 2) supply airflow at a rate of 6 air changes per hour, when outside air temperatures are between 55° F and 85° F and humidity is between 30% and 60%; and 3) supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated in the previous item 2.

3.02 INSTALLATION

- A. Discard material which is unsound, warped, bowed, twisted, improperly treated, not adequately seasoned or too small to fabricate work with minimum of joints or optimum jointing arrangements.
- B. Install finish carpentry materials and products plumb, level, true and straight with no distortion. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level, and with 1/16" maximum offset in flush adjoining surfaces, 1/8" maximum offsets in revealed adjoining surfaces.
- C. Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- D. Standing and Running Trim: Install with minimum number of joints possible; using full-length pieces (from maximum length of lumber available) to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners and comply with Quality Standards for joinery.
- E. 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 as required for a complete installation. Use fine finishing nail for exposed nailings, countersunk and filled flush with woodwork.

3.04 CLEANING AND PROTECTION

- A. Repair damaged and defective finish carpentry materials to eliminate functional and visual defects. Where not possible to repair properly, replace finish carpentry as directed by the Architect.

- B. Protect installed work during remaining construction operations.
- C. Clean woodwork on exposed and semi-exposed surfaces. Touch-up shop applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 06 40 00

ARCHITECTURAL WOODWORK

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide architectural woodwork as indicated and specified. Work includes:

1. Custom casework and shelving units
2. Plastic laminate countertops
3. Mantle assembly

1.02 RELATED SECTIONS

- A. Wood Blocking: Section 06 10 50
- B. Finish Carpentry: Section 06 20 00.
- C. Wood Casework: Section 12 32 00.
- D. Sustainable Design Requirements: Section 01 81 13.

1.03 REFERENCES

A. Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard:

1. ANSI: American National Standards Institute.
2. AWI: Architectural Woodwork Institute.
3. NEMA: National Electrical Manufacturer's Association.
4. P.S.: U.S. Product Standard.

1.04 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
 1. Provide large scale details.
 2. Indicate methods of fabrication, edging, location and construction of joints.
 3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections

- C. AWI Quality Standards: A photo-copy of the applicable portions of the AWI publication "Architectural Woodwork Quality Standards", latest edition, shall be submitted with each set of shop drawings.
 - 1. Each copy must be marked to clearly show all details, specifications and finishes proposed for this work.
- D. Submit samples of all finish materials, including the following:
 - 1. Plastic laminate for texture and color selections. (8" x 10").
 - 2. Cabinet hardware (1 of each type).
 - 3. Solid or quartz surface material.
- E. Manufacturer's product data describing type and quality of the following:
 - 1. Plastic laminate (face grade and liner grade).
 - 2. Cabinet hardware (each type).
- F. Submit certification that fire-retardant treatment materials comply with governing ordinances and meet or exceed ASTM E84 tests. Include certification by treating plant that treatment will not bleed through finish surfaces. Materials shall bear UL label showing Flame Spread 25 or less and smoke developed 40 or less. Mill certification is not acceptable.
- E. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material.
 - 2. Building Product Disclosures and Optimization.

1.05 DEFINITIONS

- A. Exposed Portions of Casework: Include surfaces visible when doors and drawers are closed. Bottoms of casework more than 4 feet above floor and tops less than 6 feet 6 inches above floor shall be considered as exposed. Visible members in open cases or behind glass doors also shall be considered as exposed portions.
- B. Semi-Exposed Portions of Casework: Includes those members behind opaque doors, such as shelves, divisions, interior faces of ends, case back, drawer sides, backs and bottoms, and back face of doors. Tops of casework 6 feet 6 inches or more above floor shall be considered semi-exposed.
- C. Concealed Portions of Casework: Include sleepers, web frames, dust panels, and other surfaces not usually visible after installation.

1.06 QUALITY ASSURANCE

- A. Fabricator qualifications: A firm specializing in the fabrication of millwork with a minimum of 5 years experience and a satisfactory record of performance on

projects of comparable size and quality. Shop is in compliance with all AWI's Quality Certification Program requirements.

- B. Installation: Performed only by skilled finish carpenters with a minimum of 3 years experience in installing custom millwork similar to that required for this project.
- C. All solid surface material type work shall be performed by a Manufacturer Certified fabricator.
- D. Provide lumber factory marked with type, grade, mill and grading agency identification on concealed surfaces. Omit marking and submit mill certificates for materials to receive transparent finishes that cannot be marked on a concealed surface.
- E. Quality Grade: Materials and fabrication shall be "custom grade" unless otherwise indicated on the drawings or specified herein as "premium grade", both in accordance with "Quality Standard Illustrated," of the AWI conforming to the following sections:
 - 1. Section 100: Solid wood members.
 - 2. Section 200: Plywood and particleboard.
 - 3. Section 400: Casework and tops.
 - 4. Section 1700: Installation of architectural woodwork.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Protect woodwork materials and items during delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver woodwork materials and items until concrete, masonry, painting, grinding and other similar wet work has been completed and is thoroughly dry, outside door openings are permanently watertight, exterior windows are glazed and, in case of temperature dropping below 60° F., until temporary heating and ventilating systems are in operation.
- C. Store materials in dry, well-ventilated spaces with constant minimum temperature of 60° F., and maximum relative humidity of 55%.
 - 1. Do not store adhesives with materials that have a high capacity to absorb VOC emissions (i.e., materials which are woven, fibrous or porous in nature, such as acoustical ceilings, carpets, textiles, etc.).
 - 2. Do not store adhesives in occupied spaces.

1.08 PROJECT CONDITIONS

- A. Provide and maintain a constant temperature and humidity before, during and after installation as required to maintain optimum moisture content of installed materials.

- B. Field Measurements: Where cabinets are 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 cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.09 COORDINATION

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

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide materials that comply with Project Sustainable Design Requirements and Low Emitting Material goals.
- B. Lumber
 - 1. Provide lumber surfaced four sides (S4S) and worked to profiles and patterns shown. Nominal sizes are as shown, except where detailed dimensions are indicated.
 - 2. Moisture Content: Provide materials kiln-dried to maximum moisture content of 6% complying with AWI Standards, Section 100-G-3.
 - 3. Softwood Lumber: Comply with PS-20, "American Softwood Lumber Standard," and with applicable rules of grading and inspection agency for species indicated.
 - a. Western Red Cedar, Ponderosa Pine, White Pine: Western Lumber Grading Rules, published by Western Wood Products Association (WWPA), or Standard Grading Rules for West Coast Lumber, No. 16, published by West Coast Lumber Inspection Bureau (WCLIB).
 - 4. Species: Fabricator's option.
- C. Softwood Plywood: Thickness as indicated. Formaldehyde free.
 - 1. Concealed Use: APA-BB-EXPOSURE I, with exterior glue (Plyform).
 - 2. Comply with PS-1, "Construction and Industrial Plywood".
- D. Particle Board (Substrate for Laminate Surfaces): High density industrial grade

with a minimum density of 45 pounds per cubic foot and a moisture content between 12% maximum and 8% minimum, meeting or exceeding ANSI A208.1 grade M-2 minimum or ASTM D1037; formaldehyde-free. ASTM E84, Class A.

1. ARAUCO Vesta FR Particleboard
 2. SIERRAPINE Encore FR
 3. PANEL SOURCE INTERNATIONAL Pyroblock Platinum Particleboard
- E. Hardwood Lumber: In accordance with AWI 300, "Custom" Grade, and AWI 100, Grade I, except no checks will be allowable on visible surfaces. Well seasoned and kiln dried. Moisture content at time of fabrication shall not exceed 6%.
1. Species and Cut: As indicated on casework details.
- F. Hardwood Plywood: "Custom" Grade, in accordance with AWI 200, Grade I (one-side or two side as required). MDF fiberboard core typical except veneer core permitted for thickness less than 1/2". Thickness as indicated. Formaldehyde free
- G. Medium Density Fiberboard (MDF): Thickness as specified unless otherwise indicated on Drawings. Moisture content between 12% maximum and 7% minimum . Formaldehyde free. Meets ANSI A208.2 and the following minimum standards:
1. Internal Bond: 90 psi.
 2. Modulus of Rupture: 2,500 psi.
 3. Screw Holding Power: 325 pounds.
 4. Density: Minimum 40 pounds per cubic foot.
 5. Fire Rating: ASTM E84 Class A
 - a. Smoke Developed: 95
 - b. Flame Spread: 15
 6. Manufacturers
 - a. ARAUCO Vesta FR MDF
 - b. ROSEBURG FOREST PRODUCTS Medite FR
 - c. PANEL SOURCE INTERNATIONAL Pyroblock Platinum MDF
- H. Thermoset Decorative Overlay: Particle board or MDF with surface of thermally fused, melamine impregnated decorative paper complying with Laminating Materials Association (LMA) SAT-1 and NEMA LD 3, Grade VGL. Formaldehyde free.
- J. Plastic Laminate: Conform to the requirements of the National Electrical Manufacturer's Association (NEMA) Publication Number LD-3. Colors, patterns and finishes as indicated.
1. General Purpose Grade: 0.05 inches thick.
 2. Backing Sheet Grade: 0.02 inches thick.
 3. Post-Forming Grade: 0.042 inches thick.
 4. Cabinet Liner: 0.02 inches thick.
 5. Provide solid color type where indicated on drawings.

6. Fill and seal plastic laminate joints with Seamfil by KAMPEL ENTERPRISES, INC. or equal. Colors to match plastic laminate.
7. Manufacturer and Color: As indicated
8. Other Acceptable Manufacturers: Solid surface manufactured by the following companies are acceptable providing they meet the requirements specified herein and the colors and pattern are an acceptable match as determined by the Architect.
 - a. FORMICA
 - b. PIONITE
 - c. NEVAMAR
 - d. WILSONART.
 - e. LAMINART

K. Hardware Items:

1. Drawer Slides: Self-closing, side mounting type with nylon tire, steel ball-bearing rollers. Manufactured by BLUM, GRASS, AMEROCK, KNAPE & VOGT; ACCURIDE. Load capacity as follows:
 - a. 75 pounds: Drawers up to 3-1/2 inches deep: Similar to ACCURIDE Series 2132.
 - b. 100 pounds: Drawers up to 8 inches deep: Similar to ACCURIDE Series 2832.
 - c. 150 pounds: Drawers over 8 inches deep, all file drawers: Similar to ACCURIDE Series 4034.
2. Drawer and Door locks: 5-pin tumbler, dead bolt. KENSTAN; BEST; COMPLEX NATIONAL; CORBIN. Provide 2 keys per cylinder.
3. Concealed Hinges: European style, self-closing, type as required for construction. HAFELE; GRASS; PRAMETE; BLUM.
4. Drawer and Door Pulls: As indicated.
5. Adjustable Cabinet Shelf Supports – Spoon Type: 5mm; nickel plated.
6. Catches: Magnetic, STANLEY #45 or equal by NATIONAL LOCK or EPCO.
7. Adjustable Cabinet Shelf Supports – Clip Type: KNAPE & VOGT steel nickel plated.
 - a. Standards: KV #255 NP for dado installation.
 - b. Clips: KV #256 NP.

I. Nails

1. Provide steel nails with diamond point for soft woods and blunt point for hardwoods.
2. Interior Work - Finishing Nails: 6d for 3/4" material; 9d or 10d for 5/4" material; and 12d for 1-1/2" material.

J. Adhesive: Low-VOC, FS MMM-A-125C, Type II, water- and mold-resistant; complying with required VOC regulations.

K. Quartz Composition Material: Non porous, scratch and high temperature resistant crushed quartz composition.

1. Thicknesses: As indicated.
2. Flexural properties: ASTM D 790, ASTM C 880
3. Compression strength: ASTM C 170
4. Certified food contact: NSF/ANSI 51 Certified.
5. Surface burning characteristics - ASTM E 84: Class I or A, and as follows:
 - a. Flame spread: <25.
 - b. Smoke developed: <25.
6. Joints: Provide watertight color matched, fused joints as recommended by manufacturer.
7. Edge Treatment: As detailed on drawings. Ease all exposed edges not otherwise detailed.
8. Manufacturer and Color: As indicated
9. Other Acceptable Manufacturers: Solid surface manufactured by the following companies are acceptable providing they meet the requirements specified herein and the patterns and colors are an acceptable match as determined by the Architect.
 - a. DU PONT Corian
 - b. CAMBRIA
 - c. CAESERSTONE
 - d. LG VIATERA

2.02 FABRICATION

- A. General: Except as specified hereinafter, fabricate all work in accordance with AWI quality standards as specified. Work not specified with a level of quality shall be not less than "Custom" quality per AWI. All particle board panels to be balanced construction.
- B. Custom Casework
 1. Quality Standard: Custom Grade per AWI Section 400.
 2. "Flush Overlay" design as shown in AWI Architectural Casework Details.
 3. Core Materials
 - a. Partical Board: Typical for plastic laminated finish materials.
 - b. Plywood Core: Typical for wood veneered surfaces.
 - c. Solid Hardwood: Typical for all drawer construction, except drawer faces.
 - d. Hardboard or Luan Plywood: Drawer bottoms.
 4. Plastic Laminate Facing
 - a. All exposed surfaces: Plastic laminate, general purpose grade. Include on exposed face and edges of all cabinets except where detailed otherwise on the drawings. Apply to all edges of doors and drawer fronts. Doors shall have laminate on both faces. Cabinet elements (tops, counters, face panels, end panels, rails, etc.) that are finished with laminate on the exposed surfaces shall have laminate balancing sheets on the concealed or semi-concealed faces.
 - 1) Back Panels: Standard 1/4" prefinished hardboard. Install in

- c. Finish bottom of all overhangs with laminate.
- 7. Custom Edges: Finish as indicated on drawings.
- 8. Edges: Except where cabinet design requires matching laminate edge, provide 3mm PVC on Front & Back Edges, 1mm PVC on Side Edges.

PART 3 EXECUTION

3.01 PREPARATION

- A. Condition architectural woodwork materials, items and products to average prevailing humidity conditions in installation areas before installing.
- B. Install blocking and anchoring devices built into substrates for anchorage of architectural woodwork.
- C. Deliver inserts and anchoring devices to be built into substrates well in advance of time substrates are to be built.
- D. Before installing woodwork, examine shop-fabricated work for completion and back priming.
- E. Ventilation for Adhesives: Comply, at a minimum, with the adhesive manufacturers' recommendations for space ventilation during and after installation. Maintain the following ventilation conditions during the adhesive curing period or for 72 hours after installation (whichever is longer): 1) supply 100% outside air 24 hours a day; 2) supply airflow at a rate of 6 air changes per hour, when outside air temperatures are between 55° F and 85° F and humidity is between 30% and 60%; and 3) supply airflow at a rate of 1.5 air changes per hour, when outside air conditions are not within the range stipulated in the previous item 2.

3.02 INSTALLATION

- A. Quality: Comply with AWI Section 1700.
- B. Install woodwork materials and products plumb, level, true and straight with no distortion. Shim as required using concealed shims. Install to a tolerance of 1/8" in 8'-0" for plumb and level (including countertops, window stools and shelves), and with 1/16" maximum offset in flush adjoining surfaces, 1/8" maximum offsets in revealed adjoining surfaces.
- C. Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- D. Install countertops level, true to alignment, accurately fit to wall conditions and securely fastened to base units and other support systems as indicated.
 - 1. Solid Surface Type Countertops: Form joints using tinted adhesive as recommended by top manufacturer.

- E. Casework: Install without distortion so that doors and drawers will fit openings properly and be accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete the installation of hardware and accessory items as indicated.
- 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 as required for a complete installation. Use fine finishing nail for exposed nailings, countersunk and filled flush with woodwork.

3.03 CLEANING AND PROTECTION

- A. Repair damaged and defective millwork to eliminate functional and visual defects. Where not possible to repair properly, replace millwork as directed by the Architect.
 - 1. Chipped, scratched or patched plastic laminate will not be accepted and must be replaced.
- B. Clean hardware, lubricate and make final adjustments for proper operation.
- C. Protect installed work during remaining construction operations.
- D. Clean woodwork on exposed and semi-exposed surfaces. Touch-up shop applied finishes to restore damaged or soiled areas.
- E. Cover completed casework with 4-mil polyethylene film protective enclosure, applied in a manner that will allow easy removal and without damage to woodwork or adjoining work. Remove cover immediately before the time of final acceptance.

END OF SECTION

SECTION 06 61 00

CAST POLYMER FABRICATIONS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work includes cast polymer sinktops.

1.02 WORK SPECIFIED IN OTHER SECTIONS

- A. Wood Blocking: Section 06 10 50.

1.03 QUALITY ASSURANCE

- A. Fabricator qualifications: A firm specializing in the fabrication of cast polymer items with a minimum of 5 years experience and a satisfactory record of performance on projects of comparable size and quality. Fabricator shall be acceptable to the Architect.
- B. Installation: Performed only by skilled finish carpenters with a minimum of 3 years experience in installing custom solid surface items similar to that required for this project.

1.04 SUBMITTALS

- A. Submit shop drawings for all items. Include
 1. large scale details.
 2. methods of fabrication, edging, location and construction of joints.
- B. Submit samples of cast polymer.
- C. Product Data: Submit for all items.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect materials and items during delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver materials and items until concrete, masonry, painting, grinding and other similar wet work has been completed and is thoroughly dry.
- C. Store materials in dry, well-ventilated spaces with constant minimum temperature of 60 degrees F., and maximum relative humidity of 55%.

1.06 PROJECT CONDITIONS

- A. Provide and maintain a constant temperature and humidity before, during and after installation as required to maintain optimum moisture content of installed materials.
- B. Obtain measurements and verify dimensions and details before proceeding with architectural woodwork.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Cast Polymer: Cast Polymer: Homogenous compression molded material composed of acrylic resins or polyester/acrylic resin blend, fire-retardant filler materials, fiber reinforcement, and coloring agents with surface gel coat meeting the following requirements.

- 1. Material: Homogeneous filled acrylic meeting ANSI Z124.3 and .6, Type Six, and Fed. Spec. WW-P-541E/GEN.
- 2. Basic Minimum Material Properties
 - a. Surface burning ASTM E 84: Flame spread meets Class A, Smoke Developed Index 85.
 - b. Liquid Absorption, ASTM D 570, for 1/4 inch material thickness: 0.321 percent.
 - c. Izod Impact, ASTM D 256, Method A: 3.0 ft.-lb./in. Method E: 4.0 ft.-lb./in.
 - d. Tensile Modulus, ASTM D 638 Nominal: 7.48 X 105 PSI.
 - e. Hardness, ASTM D 2583, Barcol Hardness: 51. Rockwell RB Hardness: 60.5, IST Hardness: 34.7.
 - f. Flexural Modulus, ASTM D 790: 7.49 X 105 PSI.
 - g. Gloss Level 40% at 60°, NEMA LD 3.; +/- 5%.
 - h. Stain Resistance, CSA B45.5/IAPMO Z124-2011, Passes.
 - i. Boiling Water Resistance, NEMA LD 3, Method 3.5: No effect.
 - j. Ball Impact Resistance, NEMA LD 3, Method 3.8, 1-1/2" diameter steel ball: Over 72", no damage.
 - k. Abrasion Resistance, ASTM D4060, Passes.
- 3. Colors: As selected by Architect.

- B. Manufacturer

- 1. Basis of Design: As indicated.
- 2. Other Manufacturers: Products by SWANSTONE COMPANY, AMI, CREATIVE DESIGN MARBLE, MINCEY MARBLE MANUFACTURING, MPL CORPORATION or other manufacturers will be considered during bidding. Products must meet the performance requirements specified, match colors selected as determined by the Architect, conform to details indicated on the drawings and be approved by Architect.

2.02 ACCESSORIES

- A. 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.
- B. Adhesive and Sealant: As recommended by manufacturer.

2.03 SOURCE QUALITY CONTROL

- A. Allowable Tolerances
 - 1. Variation in Component Size: Plus or minus 1/8 inch.
 - 2. Location of Openings: Plus or minus 1/8 inch from indicated location.

2.04 FABRICATION

- A. Shop assemble cast polymer materials for delivery to site in units easily handled and to permit passage through building openings.
- B. 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.
- C. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

PART 3 EXECUTION

3.01 PREPARATION

- A. Condition materials, items and products to average prevailing humidity conditions in installation areas before installing.
- B. Install blocking and anchoring devices built into substrates for anchorage of solid surface fabrications.
- C. Deliver inserts and anchoring devices to be built into substrates well in advance of time substrates are to be built.

3.02 INSTALLATION

- A. General
 - 1. Install components plumb and level, in accordance with approved shop drawings and product installation details.

- a. Install to a tolerance of 1/8" in 8'-0" for plumb and level, and with no offset in flushness of adjoining surfaces.
- 2. Keep components and hands clean during installation. Remove adhesives, sealants, and other stains.
- B. Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.

3.03 CLEANING AND PROTECTION

- A. Protect surfaces from damage until Date of Substantial Completion.
- B. Repair damaged and defective items to eliminate functional and visual defects. Where not possible to repair properly, replace items as directed by the Architect.
- C. Protect installed work during remaining construction operations.

END OF SECTION

SECTION 06 83 16

FIBERGLASS REINFORCED PANELING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Fiber glass reinforced composite wall panels.
- B. Trim and installation accessories.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B.** Joint Sealants: Section 07 92 00.

1.03 REFERENCES

- A. Conform to the following standards of the American Standards for Testing and Materials (ASTM)
 - 1. ASTM D 149 - Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
 - 2. ASTM D 256 - Standard Test Method for Determining the Pendulum Impact Resistance of Notched Specimens of Plastics.
 - 3. ASTM D 543 - Standard Test Method for Resistance of Plastics to Chemical Reagents.
 - 4. ASTM D 570 - Standard Test Method for Water Absorption of Plastics.
 - 5. ASTM D 638 - Standard Test Method for Tensile Properties of Plastics.
 - 6. ASTM D 696 - Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30 degrees C and 30 degrees C.
 - 7. ASTM D 790 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 8. ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement.
 - 9. ASTM D 2583 - Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
 - 10. ASTM D 3841 - Standard Specification for Glass-Fiber-Reinforced Polyester Plastic Panels.
 - 11. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

- A. Product Data: Provide manufacturer's standard details and catalog data demonstrating compliance with referenced standards. Provide installation instructions.
- B. Samples
 - 1. Submit 6 x 6-inch samples of each surface and color required.
 - 2. Submit 6-inch samples of each trim profile and trim color required.
- C. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

1.05 QUALITY ASSURANCE

- A. Conform to building code requirements for interior finish for smoke and flame spread requirements as tested in accordance with:
 - 1. ASTM E 84 (Method of test for surface burning characteristics of building Materials) Wall Required Rating – Class A.
- B. Sanitary Standards: System components and finishes to comply with:
 - 1. United States Department of Agriculture (USDA) requirements for food preparation facilities, incidental contact.
 - 2. Food and Drug Administration (FDA) 1999 Food Code 6-101.11.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store products indoors and protect from moisture, construction traffic, and damage.
- B. Store panels flat on clean, dry surface. Do not stand on edge or stack on fresh concrete or other surfaces that emit moisture.
- C. Store panels at least 24 hours temperature and humidity conditions approximating the average environment of the finish room.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Subject to requirements, products manufactured by CRANE COMPOSITES, NUDO PRODUCTS, INC., MARLITE, SEQUENTIA, INC. or KEMLITE are acceptable.

2.02 PANEL MATERIALS

A. General: Provide materials that comply with Project Sustainable Design Requirements and Low Emitting Material goals

1. Composite plastic panels of random chopped fiber glass roving, modified polyester copolymer, inorganic fillers, and pigments.
2. Resistant to rot, corrosion, staining, denting, peeling, and splintering.
3. USDA accepted.
4. Comply with ASTM D 3841, Type II.

B. Panel:

1. Typical Standard Panel Physical Properties:
2. Surface burning classification: Class A.
 - a. Flame spread (ASTM E 84): 25 or less.
 - b. Smoke developed (ASTM E 84): 450 or less.
3. Flexural strength (ASTM D 790): 8,830 psi.
4. Flexural modulus (ASTM D 790): 0.26 x 10(6) psi.
5. Tensile strength (ASTM D 638): 5,700 psi.
6. Tensile modulus (ASTM D 638): 0.50 x 10(6) psi.
7. Impact strength, IZOD (ASTM D 256): 7.7 ft.lb./in.
8. Thermal Conductivity (ASTM C 17): 0.50 BTU/in./hr./sq.ft. deg.F.
9. Water absorption (ASTM D 570): 0.16% in 24 hrs. @ 77 deg.F.
10. Chemical resistance (ASTM D 543):

Distilled water	0.59	0.19	No change.
Ethyl alcohol, 95%	0.92	0.18	Some fibers showing.
Sulfuric acid, 3%	0.43	0.08	Some fibers showing.
Sulfuric acid, 30%	0.28	0.13	Some fibers showing.
Sodium hydroxide, 1%	0.63	0.12	Some fibers showing.
Sodium hydroxide, 10%	0.26	0.17	Some fibers exposed, reduction in glass.
Toluene	0.14	0.13	Few fibers showing.
Sodium chloride, 1%	0.43	0.18	No change.
Hydrochloric acid, 10%	0.24	0.01	Few fibers showing.
Chlorine Gas	NC	NC	No change (NC).
Hydrogen sulfide	NC	NC	No change (NC).

No dimensional change under any of the listed reagents.

C. Size

1. Wall panel width: 48 inches.
2. Wall panel length: Provide full-length panels unless substrate dimensions exceed available fabricated size.

D. Thickness: 0.09 inch.

E. Dimensional Tolerances:

1. Width and length: +/- 1/8 inch.
2. Thickness: +/- 10%.
3. Squareness: Not more than 1/8 inch out of square.

2.03 FINISHES

- A. Exposed Surface: Pebble-like embossed finish.
- B. Back Surface: Smooth. Imperfections that do not affect functional properties are not cause for rejection.
- C. Colors: As selected by Architect; uniform throughout.

2.04 TRIM ACCESSORIES

- A. Provide panel manufacturer's standard vinyl moldings to meet project conditions. Provide types as required by layouts and wall conditions indicated on the drawings.
- B. Fasteners: Non-staining nylon drive rivets.
 1. Match panel colors.
 2. Length to suite project conditions.
- C. Adhesive: Structural construction adhesive as recommended by manufacturer.
 1. Adhesive shall have a VOC content of not more than 100 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Sealant: Clear silicone sealant. See Section 07 92 00.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates to receive panels to ensure surfaces are smooth, dry, true, and free of dirt, dust, oil, or grease.
- B. Remove high spots. Fill low spots.
- C. Verify that substrate construction is completed and approved.
- D. Correct deficiencies in substrate before installing panels.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's printed installation instructions, using both mechanical fasteners and adhesive.

B. Cutting Panels

1. Cut panels with carbide-tipped saw blade or swivel head shear.
2. Allow 1/2-inch clearance in length per 8-foot panel length.
3. Allow 1/8-inch clearance at cut-outs for penetrations.

C. Pre-drill fastener holes before applying adhesive. Use carbide-tipped drill. Space as recommended by manufacturer.

D. Apply adhesive between 50 and 90 degrees F, unless otherwise approved.

1. Spread adhesive 1/4-inch deep over entire back side of panel to achieve 100% coverage.
2. Do not use beads of adhesive.
3. Do not use mechanical fasteners or adhesive alone.
4. Roll panel surface to ensure complete contact.
5. If necessary, install bracing to maintain intimate contact until adhesive cures in accordance with manufacturer's instructions.

E. Panel Fasteners

1. Apply silicone sealant in pre-drilled fastener holes.
2. Drive fasteners for snug fit. Do not over-tighten.
3. Fasten leading edge of each panel after installing moldings.

F. Moldings: Install as recommended by panel manufacturer. Apply sealant within all trim pieces.

G. Sealants: Seal corner seams, ceiling and base junctures, around door frames and other openings, and between penetrating items and panel cut-outs.

3.03 ADJUST AND CLEAN

A. Remove scraps and debris from the site, and leave in a neat and clean condition.

END OF SECTION

SECTION 07 10 00

WATERPROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Whether indicated on the drawings or not, provide waterproofing in the following applications and areas:
 - 1. Elevator pit walls: Semi-liquid or sheet membrane, Contractor's option.
 - 2. Elevator pit bottom slab: Sheet membrane.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Ceramic tile waterproofing membrane: Section 09 30 00.
- C. Building Insulation: Section 07 21 00.
- D. Sealants: Section 07 92 00.
- E. Traffic Coatings: Section 07 18 00.

1.03 SUBMITTALS

- A. Shop Drawings: Submit details of special joint or termination conditions and conditions of interface with other materials. Edge terminations, flashing details, treatment of joint penetrations or projections at large scale. Details shall reference each material, sequence of placement and application procedure.
 - 1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
- B. Product Data: Submit for all items. Include construction details, material descriptions, and tested physical and performance properties of waterproofing and manufacturer's written instructions for evaluating, preparing, and treating substrate..
- C. Statement of Application: Submit statement signed by Contractor and installer, stating that work complies with these specifications and that the installation methods complied with the manufacturer's printed specifications and instructions for the conditions of installation and use on this project.

- D. Applicator's License Certificate: Copy of "Certificate of License" issued to system applicator by manufacturer.
- E. Sample warranty.
- F. Contamination Profile: Manufacturer shall provide the Installer, Contractor and Owner with a tabular profile of chemicals, solutions, oils, compounds or materials which are injurious to the fluid-applied membrane system. This profile shall be established by generic (or trade name) basis, including those materials normally found to exist in the work environment or likely to occur on this work. The system should not be exposed to materials (directly or indirectly) as established by the Contamination Schedule during application or after completion of the work.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in the manufacture of specific type of waterproofing membrane systems specified with ten years minimum experience.
- B. Installer/Applicator: Company specializing in application of specified waterproofing with five years minimum experience and trained and approved by waterproofing manufacturer.
- C. Obtain primary materials for each waterproofing type required from single manufacturer. Provide secondary materials only as recommended and approved by manufacturer of primary materials.
- D. Pre-Waterproofing Conference
 - 1. Contractor: Prior to installation of waterproofing and associated work, schedule and administer a pre-installation meeting at the project site to review the material selections, installation procedure, special details, flashings, coordination, inspection procedures, and protection and repairs.
 - a. Attendance: Architect, Contractor, Installer, manufacturers' representatives and trades requiring coordination with the work.
 - b. Contractor: Take minutes and provide copies to all attendees.
- E. Manufacturer's Representative (primary material manufacturer): Furnish services of manufacturer's technical representative at the job site at the start of installation, periodically as work progresses and after completion as necessary to advise on every phase of the waterproofing work.
 - 1. Install entire system in accordance with the manufacturer's instructions except where more stringent requirements are indicated or specified, then the more stringent requirements shall govern.
- F. Contractor: Notify Architect 72 hours in advance of scheduled waterproofing work.
- G. Installer to advise General Contractor of finish and curing requirements of concrete

surfaces, as relates to application of the waterproofing materials, prior to installation of those substrates.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened packaging fully identified with brands, type, grade, class and other qualifying information including instruction for use and identifying numbers.
- B. Storage waterproofing materials in a dry area away from high heat, flames or sparks. Provide weatherproof covering on top and all sides, allowing for adequate ventilation.
- C. Store protection board flat and off the ground, preferably on a wood platform. Provide weatherproof covering on top and all sides.
- D. Store only as much material at point of use as required for each day's work.
- E. Handling: Handle all materials in a manner to prevent damage of any kind. Remove damaged material from the site and replace with new specified material.

1.06 JOB CONDITIONS

- A. Apply waterproofing within the range of ambient and substrate temperatures recommended in writing by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Surfaces to receive membrane shall be free of water, dew, frost, snow and ice.
- B. Ventilation: Provide positive ventilation for enclosed areas continuously throughout the application and for a minimum of 8 hours afterward or until coatings have completely cured.
- C. Do not allow waste products (petroleum, grease, oil, solvents, vegetable or mineral oil, etc.) to come in contact with the membrane. Exposures to foreign materials or chemical discharges must be presented to membrane manufacturer for evaluation to determine impact on membrane. See "Contamination Profile" specified under paragraph 1.03G herein.
- D. Special Precautions: Allow no open fires or spark-producing equipment in the application area until vapors and fumes have dissipated. Post "No Smoking" signs in area during application and maintain for at least 8 hours following application.

1.07 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for

waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.

1. Warranty Period: Five (5) years from date of Substantial Completion.
- B. Installer's Special Warranty: Provide warranty for two (2) years against leaks, failures and defects. Upon notification of such defects, within the warranty period, make necessary repairs and replacements at the convenience of the Owner without additional cost to the Owner.
1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 PRODUCTS

2.01 MATERIALS

A. Semi-Liquid Applied System

1. Membrane: Elasticized rubberized asphaltic compound, self-bonding to normal substrates, hot poured, quick setting.
2. Physical Properties
 - a. Water Vapor Permeability - ASTM E96, Procedure E: 0.027 perms.
 - b. Water Resistance - CGSB 37-GP-50M: No delamination, blistering, emulsification or deterioration.
 - c. Water Absorption - CGSB 37-GP-50M: Gain in weight 0.35 g maximum. Loss in weight 0.18 g maximum.
 - d. Penetration - ASTM D5329: At 77 degrees F, maximum 110; at 122 degrees F, maximum 200.
 - e. Elongation - ASTM D5329: 1000% minimum.
 - f. Low Temperature Crack Bridging Capability - CGSB 37-GP-50M: No cracking, adhesion loss, or splitting.
3. Miscellaneous Materials: Primer, detail coatings, flashing, bonding adhesive, splicing cement, lap sealant, water cut-off mastic, pipe seals, pourable sealer, and other related items as recommended by membrane manufacturer.
 - a. Primer: Cut-back solvent type conforming to ASTM D41.
 - b. Reinforcing Sheet: EPDM/Butyl laminate sheet in uncut rolls.
 - 1) Heavy Duty: 63 mils.
 - 2) Standard Duty: 47 mils.
4. Miscellaneous: As required to complete installation.
5. Manufacturers
 - a. Liquid Membrane 6125 by AMERICAN HYDROTECH
 - b. TremProof 6100 by TREMCO
 - c. CCW-500R by CARLISLE
 - d. 790-11 by HENRY
 - e. STRATASEAL HR by CETCO

B. Sheet Membrane System

1. Membrane: Self-adhering laminated sheet comprised of rubberized asphalt and polyethylene film; minimum 60 mil thickness. Furnish in 36" wide x 60' long rolls with release paper.
2. Physical Properties
 - a. Tensile Strength, Film - ASTM D882: 5000 psi.
 - b. Tensile Strength, Membrane - ASTM D412: 325 psi.
 - c. Pliability, 180 degree bend over 1" mandrel - ASTM D1970: -25 degrees F.
 - d. Cycling over 1/4" crack, 100 cycles - ASTM C836: At -25 degrees, no effect.
 - e. Permeance - ASTM E96, Method B: 0.05 perm.
 - f. Water Absorption: ASTM D570: 0.1% (weight/72 hours).
3. Miscellaneous Materials: Primer, detail coatings, flashing, bonding adhesive, splicing cement, lap sealant, water cut-off mastic, pipe seals, pourable sealer, and other related items as recommended by membrane manufacturer.
4. Cants: At all inside corners; minimum face 3/4".
5. Miscellaneous: As required for complete installation.
6. Manufacturers
 - a. Bituthene 4000 by W.R. GRACE
 - b. Mel-Rol System by W.R. MEADOWS
 - c. CCW MiraDri 860/861 by CARLISLE
 - d. WP-200 by HENRY
 - e. Polyguard 650 by POLYGUARD PRODUCTS
 - f. ENVIROSHEET by CETCO

C. Underslab Sheet Membrane: Reinforced, composite waterproofing sheet specifically designed for pre-applied underslab waterproofing conditions.

1. Performance Properties
 - a. Resistance to Puncture (1" Rod) – ASTM E154: 220 pounds.
 - b. Tensile Strength – ASTM D4632: 80 pounds.
 - c. Resistance to Permeance by Moisture – ASTM E96: .01 perms.
 - d. Water Absorption – ASTM D570: 0.5% maximum.
2. Miscellaneous Materials: Primer, detail coatings, flashing, bonding adhesive, splicing cement, lap sealant, water cut-off mastic, pipe seals, pourable sealer, and other related items as recommended by membrane manufacturer.
3. Manufacturer: The following products are acceptable provided they meet the specified performance properties:
 - a. Polyguard Underseal Underslab by POLYGUARD PRODUCTS
 - b. Preprufe 300 Membrane by W.R. GRACE.
 - c. Mel-Rol Precon Membrane by W. R. MEADOWS.
 - d. Miraply H by CARLISLE CCW
 - e. ULTRASEAL by CETCO

D. Accessories

1. Vertical Protection Board
 - a. Vertical Protection Board - At Elevator Pit Walls: Asphaltic hardboards "Protection Course" by W.R. MEADOWS or W.R. GRACE; 1/4" thick; one layer required.
2. Horizontal Protection/Drainage Board
 - a. Description: 3/8" thick high impact polystyrene drainage core with filter fabric adhered to core.
 - b. Adhesive and Tape: Types as recommended by drainage board manufacturer.
 - c. Manufacturer: Hydroduct HSF by W.R. GRACE; Amerdrain 650 by AMERICAN WICK DRAIN CORPORATION; CCW Miradrain 6200XL by CARLISLE; Hydrodrain by HYDROTECH; PolyFlow 18 by POLYGUARD PRODUCTS, AQUADRAIN 30H by CETCO.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the waterproofing.
 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D4263.
 3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION OF SUBSTRATES

- A. Prepare, fill, prime, and treat substrates to receive waterproofing membrane, including joints, cracks, corners and penetrations according to manufacturer's written instructions and recommendations. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction. Mask termination elevations to prevent application of waterproofing materials on surfaces exposed to view.
- C. Remove grease, oil, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

- D. Remove fins, ridges, and other projections and fill honeycomb, aggregate pockets, and other voids.
- E. Semi-Liquid Membrane: Close off deck drains and other deck penetrations to prevent spillage and migration of waterproofing fluids.
- F. Outside Corners: Bevel or round outside corners of substrate by grinding to produce a minimum 3/4" face or radius if not provided under Division 03 or use other means to treat outside corners approved by waterproofing manufacturer.
- G. Inside Corners: Prepare and treat using methods recommended by manufacturer.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to manufacturer's written instructions and recommendations and ASTM D 6135 (for sheet membrane).

3.03 INSTALLATION - SEMI-LIQUID SYSTEM

A. General

- 1. Comply with manufacturer's instructions and details, except where more stringent requirements are indicated or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
- 2. Terminate membranes above wearing surface as indicated and where concealed by subsequent finish materials. Where concealment is not possible, terminate slightly below wearing surface (approximately 1/2").

B. Flashing

- 1. Install elastomeric flashing sheets at terminations of waterproofing membrane according to manufacturer's written instructions.
- 2. Prime substrate with surface conditioner.
- 3. Install elastomeric flashing sheet and adhere to deck and wall substrates in a layer of hot rubberized asphalt.
- 4. Extend elastomeric flashing sheet up walls or parapets a minimum of 8 inches above and 6 inches onto deck to be waterproofed.
- 5. Install termination bars and mechanically fasten to top of elastomeric flashing sheet at terminations and perimeter of waterproofing.

C. Membrane

- 1. Apply surface conditioner, at manufacturer's recommended rate, over prepared substrate and allow to dry.
- 2. Heat and apply rubberized asphalt according to manufacturer's written instructions.

- a. Heat rubberized asphalt in an oil- or air-jacketed melter with mechanical agitator specifically designed for heating rubberized asphalt.
3. Start application with manufacturer's authorized representative present.
4. Reinforced Membrane: Apply hot rubberized asphalt to substrates and adjoining surfaces indicated. Spread to a thickness of 90 mils; embed reinforcing fabric, overlapping sheets 2 inches; spread another 125-mil-thick layer to provide a uniform, reinforced, seamless membrane 215 mils thick.
5. Apply waterproofing over prepared joints and up wall terminations and vertical surfaces to heights indicated or required by manufacturer.
6. Cover waterproofing with protection course with overlapped joints while membrane is still hot to ensure good bond.

3.04 INSTALLATION - SHEET MEMBRANE SYSTEM

A. General

1. Comply with manufacturer's instructions and details, except where more stringent requirements are indicated or specified, and except where project conditions require extra precautions or provisions to ensure satisfactory performance of the work.
2. Terminate membranes above wearing surface as indicated and where concealed by subsequent finish materials. Where concealment is not possible, terminate slightly below wearing surface (approximately $\frac{1}{2}$ ").

B. Comply with ASTM D6135.

C. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.

D. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.

1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.

E. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.

F. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.

G. Seal edges of sheet-waterproofing terminations with mastic.

- H. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.
- J. Immediately install protection course with butted joints over waterproofing membrane.

3.05 INSTALLATION – UNDER SLAB SHEET MEMBRANE

- A. Preparation: As recommended by membrane manufacturer. Compact substrate as specified in Division 31, Earthwork. Remove loose aggregate or sharp protrusions. Fill gaps or voids greater than ½". Remove standing water prior to membrane applications.
- B. Installation: In accordance with manufacturer's instructions.

3.07 INSTALLATION OF DRAINAGE AND PROTECTION ASSEMBLY

- A. Exposed Waterproofing System: Provide protection assemblies as follows:
 - 1. Horizontal Surfaces: After all curing, testing and repair work is complete, install protection/drainage board assembly as follows:
 - a. Install drainage panels over membrane, with tight butt joints and completely covering membrane. Adhere with adhesive as recommended by panel manufacturer.
 - b. Overlap fabric onto previous panel. Adhere overlapped filter fabric with tape or mastic as recommended by manufacturer.
 - 2. Vertical Surfaces
 - a. Elevator Pit Walls: After all curing and repair work is complete and prior to backfilling, install one layer of 1/4" thick protection board over membrane, placing boards with tight butt joints and completely covering membrane.

3.08 CLEANING, PEOTECTION AND REPAIR

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- B. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Perimeter and under slab insulation.
- B. Glass fiber blanket wall and ceiling insulation.
- C. Sound attenuation blankets in stud/gypsum board walls.
- D. Loose fill attic insulation

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Roof Insulation: Section 07 54 23.
- C. Firestopping (Safing): Section 07 84 00.

1.03 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.
 - 2. All products to be compliant with CA Section 01350

1.04 QUALITY ASSURANCE

- A. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
 - 1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289.
- B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver insulation materials in manufacturer's original, unopened, and labeled packages.
- B. Store insulation materials at the site inside storage trailers or the building in a dry, ventilated place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
- C. Remove fibrous batt insulation that has become wet before or after installation. Replace with new, dry insulation.
- D. Protect plastic insulation from excessive exposure to sunlight. Protect at all times against ignition. Complete installation and covering of plastic insulation materials as rapidly as possible in each area of work.

PART 2 PRODUCTS

2.01 RIGID BOARD INSULATION - POLYSTYRENE

- A. Extruded-Polystyrene Board Insulation: ASTM C578, Type IV, 25 psi, 1.6 p/cf.; maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E84.
 - 1. Insulation in contact with ground to have $\leq 0.3\%$ water absorption rate per ASTM C272
- B. Thicknesses: Provide the following unless otherwise indicated on the drawings.
 - 1. Perimeter/Under Slab Application: 2 inch.
 - 2. Masonry Cavity Wall Application: 2 inch.
- C. Adhesive: Types as recommended by insulation manufacturer for substrates and substrate coating materials where applicable.
- D. Manufacturer: Subject to compliance with requirements, provide products by DOW CHEMICAL Styrofoam; OWENS CORNING Foamular; KINGSPAN GreenGuard; DIVERSIFOAM PRODUCTS Certifoam

2.02 GLASS-FIBER BLANKET INSULATION

- A. Type: Glass fiber high density blanket designed to friction fit with metal. Manufacturers standard lengths; widths as required to fit framing conditions; Provide facings as follows:
 - 1. Unfaced: Conform to ASTM C665 Type I, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E 136 for combustion characteristics.

2. Kraft Facing: Areas where insulation is not exposed (concealed behind gypsum board). Conform to ASTM C665 Type II, Class C, Category 1.
 3. Flame Resistant Foil Facing: Areas where insulation is exposed (not covered by gypsum board or concealed interstitial space between faced insulation and gypsum wall board face). Conform to ASTM C665 Type III, Class A, Category 1; flame-spread index of 25 or less.
- B. Thickness: 5 ½".
1. R Value: R-21
- C. Basis of Design: OWENS-CORNING High Density EcoTouch PINK Fiberglas
- D. Other Manufacturer: Subject to compliance with requirements, provide equivalent products by JOHNS MANVILLE, FIBERGLASS, CERTAINTEED, GUARDIAN BUILDING PRODUCTS or KNAUF INSULATION.
- E. Tape: Type as approved by insulation manufacturer.

2.03 SOUND ATTENUATION BLANKETS

- A. Type: Unfaced semi-rigid mineral fiber or glass fiber blankets. Conform to ASTM C665, 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.
- B. Thickness: 3 inch, unless otherwise indicated.
- C. Manufacturer: Subject to compliance with requirements, provide products by JOHNS MANVILLE; THERMAFIBER, OWENS-CORNING FIBERGLAS, CERTAINTEED, ROXUL or FIBREX.

2.04 LOOSE FILL INSULATION

- A. Glass Fiber Loose-Fill Insulation. ASTM C 764 Type 1 for pneumatic application with maximum flame spread of and smoke indexes of 5 per ASTM E 84.
- B. Manufacturer: Subject to compliance with requirements, provide products by OWENS-CORNING or CERTAINTEED
- C. Thickness: As indicated.

2.05 ACCESSORY MATERIALS

- A. Supplementary Support: Provide galvanized wire mesh, woven wire ties or flexible metal rods where required for supplementary support of insulation in permanent proper location.
- B. Insulation Clips

1. Description: Perforated metal plates (2" x 2") with metal spindle welded and extending through center. Speed washer (1" x 1") snaps over spindle to secure insulation.
2. Adhesive: Type as recommended by clip manufacturer for adhesion to the various substrates.
3. Spacing: As recommended by manufacturer.
4. Spindle Length: As selected to ensure tight fit without compressing insulation so as to decrease insulation value.
5. Manufacturer: AGM INDUSTRIES, INC. Series T TACTOO Insul-Hangers; ECKEL INDUSTRIES OF CANADA; Stic-Klip Type N Fasteners; GEMCO; Spindle Type.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrates and installation conditions. Do not proceed with insulation work until unsatisfactory conditions have been corrected.
- B. Verify substrate surfaces are dry and free of irregularities or substances harmful to insulation. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.
- C. Verify mechanical and electrical services within walls have been installed and tested.
- D. Fill miscellaneous voids and spaces in wall framing and at window and door framing with batt insulation loosely stuffed in place.

3.02 INSTALLATION OF RIGID BOARD INSULATION - PERIMETER INSULATION

- A. Place at all slab-on-grade conditions at building perimeter.
- B. Adhere to substrate as required to maintain insulation in final location prior to backfilling.
- C. Coordinate placement of insulation with placement of vapor barrier. See Section 07 26 00.

3.03 INSTALLATION OF BLANKET/BATT INSULATION

- A. Install blanket type insulation with tight fitting butt joints. Provide supplementary support at vertical and horizontal installations when required to maintain insulation in permanent proper location.
 1. Spot adhere insulation to inside face of exterior sheathing or similar back-

up material as required to maintain insulation in it's proper location.

- B. Fit insulation between members.
- C. Locate facing to room side, where applicable.
- D. Install interior wall sound attenuation at interior partitions where indicated on floor plans or wall types.

3.04 INSTALLATION OF RIGID BOARD INSULATION - CAVITY WALL

- A. Place insulation horizontally within cavity where indicated. Fit boards tightly together and around penetrations.
- B. Place to ensure tight joints between all insulation panels installed.
- C. Use manufacturer's suggested adhesive and or mechanical fasteners to bond the insulation panel to substrate. Keep perimeter fasteners 3/8" from edges and ends of boards
- D. CMU Backup Cavity: Place insulation panels to clear wall ties, yet maintain a tight joint between the panels.

3.05 LOOSE FILL INSULATION

- A. Apply according to ASTM C 1015 and manufacturer's written instruction. Level horizontal application to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.

END OF SECTION

SECTION 07 27 19

PLASTIC SHEET AIR BARRIERS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide plastic film air barrier at exterior stud walls. Materials to bridge and seal the following air leakage pathways and gaps:
1. Connections of the walls to the roof air barrier or membrane.
 2. Connections of the walls to the foundation or structure.
 3. Expansion joints.
 4. Openings and penetrations of all window frames, storefront, curtain wall.
 5. Door frames.
 6. Piping, conduit, duct and similar penetrations.
 7. Masonry ties, screws, bolts and similar penetrations.
 8. All other air leakage pathways in the building envelope.

1.02 SUBMITTALS

- A. Product Data: Submit material Manufacturer's Product Data, material manufacturer's instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, Technical Data, and tested physical and performance properties.
- B. Submit manufacturer's instructions and details for installation over sheathing and related methods approved and recommended by air barrier manufacturer for Architects approval and comments. Details to include but not limited to:
1. Opening for windows, doors, storefronts, louvers and related openings.
 2. Penetrations
 3. Transitions
 4. Terminations
 5. Fastening methods and patterns
 6. Tapes and seaming.
- C. Compatibility: Submit letter from primary material manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use.

1.03 QUALITY CONTROL

- A. Pre-installation Conference: Conduct to review conditions and review installation requirements and all detailing.

1. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.
- B. All tapes, fasteners and accessories to be approved by air barrier manufacturer for complete continuous assembly.
- C. Representative: Provide air barrier manufacturer representative to attend job site to inspect installation to verify compliance with manufacturer's standard installation requirements.

1.04 PROJECT CONDITIONS

- A. Do not install membrane air barriers until substrate construction and all penetrating items and features are completed.
- B. Sequencing. Do not install air barrier material before the roof assembly has been sufficiently installed to prevent a buildup of water in the interior of the building
- C. Field Conditions: Do not install air barrier in snow, rain, fog, or mist. Do not install air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the primary material manufacturer.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Flexible Plastic Sheet Air Barrier: Tyvek Commercial Wrap by DuPONT or equal by GLOBAL WRAP, STEGO, RAVEN INDUSTRIES or HENRY COMPANY meeting the following performance requirements:
 1. Air Penetration – ASTM E1677: Type I
 2. Water Vapor Transmission – ASTM E96 Method B: 200.
 3. Water Penetration Resistance – AATCC-127: >280.
 4. Tear Resistance – ASTM D882 Method A: 38/35.
 5. Surface Burning Characteristics – ASTM E84: Class A for flame spread and smoke developed.
 6. Water Vapor Transmission: ASTM E96-05 Method B (perms) 30
- B. Mechanical Fasteners, Flashings and Tape: Types as recommended by film manufacturer.
 1. Steel Frame Fasteners: Corrosion resistant, gasketed with washer in sufficient length(s).
 2. Wood Frame Fasteners: Corrosion resistant nail with plastic cap or plastic cap staple in sufficient length(s).
 3. Flashings and Tapes: Self adhering for substrates encountered.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Verify substrate is visibly dry.
- C. Ensure that the following conditions are met:
 - 1. Surfaces are sound, dry, even, and free of contaminants.
 - 2. Inspect surfaces to be smooth without large voids or sharp protrusions.
- D. Verify sealants are compatible with flexible sheet air barrier proposed for use.

3.02 INSTALLATION

- A. Install air barrier in a way that provides continuity throughout the building envelope. Install materials in accordance with manufacturer's instructions and the following (unless manufacturer requires other procedures in writing based on project conditions or particular requirements of their recommended materials):
 - 1. Install head flashing material over all doors, windows and similar openings which to be later covered by air barrier material for proper drainage of water away from the window.
 - 2. Install building wrap over sheathing board, rigid insulation or other fully-supported continuous substrates as per manufacturer's instructions.
 - 3. Ensure air barrier material is plum and level on foundation, and unroll extending over window and door openings.
 - 4. Ensure air barrier material is applied over back edge of weep screed for proper water drainage.
 - 5. Unroll the air barrier material with the printed side facing out, wrapping the entire building, including door and window openings.
 - 6. Attach into wood stud framing, through insulated sheathing board or into metal stud framing with plastic cap nails or fasteners specified by air barrier material manufacturer. The fasteners must penetrate the framing member a minimum of 1/2 inch on every vertical stud line.
 - 7. Fasteners need to be installed along every stud vertically and 12" or closer together as specified by the material manufacturer apart horizontally to maintain integrity of air barrier assembly to ensure the material is fastened to building when negative and positive pressures are exerted.
 - 8. Install with drainage plane surface pattern in horizontal position. Install lower level air barrier material ensuring the upper layers of air barrier material lap the bottom layer to ensure proper shingling and water drainage.
 - 9. Overlap at all corners of building by a minimum of 12 inches.
 - 10. Overlap vertical seams by a minimum of 6 inches.

11. Prepare each window and door rough opening as recommended by the air barrier manufacturer or prepare by cutting a modified "I" pattern and wrap excess material to the inside of the rough opening and fasten securely to a framing member. At the window header, make a 6 to 8 inch diagonal cut at the corners of the air barrier and fold the material up above the rough opening, exposing the underlying sheathing. If windows are already in place when installing air barriers, trim as close to them as possible and tape all edges with manufacturer approved sealant tape.
12. Detail remaining terminations and penetrations with accessory materials as per manufacturer's instructions for air leakage and ensuring lapping of the material for proper shingling and drainage of bulk water.
13. When the end of a roll is reached, fold the edge of the building wrap under itself and attach to the structural sheathing or through non-structural sheathing to the nearest framing member.
14. Tape all horizontal and vertical seams with manufacturer approved construction tape.
15. Seal top and bottom edges of rolled out material to substrate with manufacturer approved construction tape.
16. Seal all tears and cuts with manufacturer approved construction tape.

3.02 PROTECTION

- A. Protect installed air barrier from damage until installation of covering materials. Seal all cuts, punctures, and penetrations with tape.

END OF SECTION

SECTION 07 31 13
ROOFING SHINGLES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work of this Section includes roofing shingles, felt underlayment, eave protection underlayment, ridge vents and miscellaneous fasteners.

1.02 RELATED SECTIONS

- A. Flashing and Sheet Metal: Section 07 62 00.

1.03 REFERENCES

- A. American Society for Testing and Materials
 1. ASTM D 1970 - Standard Specification for Self-Adhering Modified Bituminous Steep Roofing Underlayment.
 2. ASTM D 3018 - Standard Specification for Class A Shingles Surfaced with Mineral Granules.
 3. ASTM D 3161 - Standard Test Method for Wind-Resistance of Asphalt Shingles.
 4. ASTM D 3462 - Standard Specification for Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules.
 5. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 6. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings.
 7. ASTM E 2178 - Standard Test Method for Air Permeance of Building Materials
- B. International Code Council (ICC)
 1. AC 48 - Acceptance Criteria For Roof Underlayment For Use In Severe Climate Areas.
 2. AC 207 - Acceptance Criteria for Polypropylene Roof Underlayments.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.05 SUBMITTALS

- A. Product Data: Provide manufacturer's printed product information indicating

material characteristics, performance criteria, and product limitations.

- B. Manufacturer's Installation Instructions: Provide published instructions that indicate preparation required and installation procedures.
- C. Certificate of Compliance: Provide Certificate of Compliance from an independent laboratory indicating that the asphalt fiberglass shingles made in normal production meet or exceed the requirements of the following:
 - 1. ASTM E 108/UL 790 Class A Fire Resistance.
 - 2. ASTM D 3161/UL 997 Type I Wind Resistance.
 - 3. ASTM D 3462.
- D. Shop Drawings: Indicate specially configured metal flashing, jointing methods and locations, fastening methods and locations, and installation details, as required by project conditions indicated.
- E. Samples: For each exposed product and for each color and texture specified.
 - 1. Asphalt Shingles: Full size.
 - 2. Ridge and Hip Cap Shingles: Full size.
 - 3. Ridge Vent: 12-inch long Sample.
 - 4. Exposed Valley Lining: 12 inches square.

1.06 STORAGE AND HANDLING

- A. Store all materials off ground on wooden pallets.
- B. Stand felt rolls on end for storage.
- C. Use care not to damage products in handling.

1.07 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace roofing shingles that fail within specified warranty period. Failures include, but are not limited to, the following:
 - 1. Manufacturing defects.
 - 2. Material Warranty Period: 40 years from date of Substantial Completion, prorated, with first five years nonprorated.
 - 3. Wind-Speed Warranty Period: Roofing shingles will resist blow-off or damage caused by wind speeds of up to 90 mph for five years from date of Substantial Completion.
 - 4. Algae-Resistance Warranty Period: Roofing shingles will not discolor for 10 years from date of Substantial Completion.
 - 5. Workmanship Warranty Period: Two years from date of Substantial Completion.

- B. Roofing Installer's Warranty: On warranty form at end of this Section, signed by Installer, in which Installer agrees to repair or replace components of shingle roofing that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 ASPHALT GLASS FIBER ROOFING SHINGLES

- A. Type: Laminated, multi-ply overlay construction, glass-fiber reinforced, mineral-granule surfaced, and self-sealing.

- B. Conformance: ASTM D3018 Type I - self-sealing; UL Certification of ASTM D 3462/D 3462M; UL 997 Wind Resistance, Impact Resistance: UL 2218, Class 4.

- 1. Fire Resistance: Class A according to ASTM E 108 or UL 790.

- C. Color: As selected by Architect.

- 1. Algae Resistance: Granules resist algae discoloration.

- D. Warranty: 40 year minimum.

- E. Hip and Ridge Shingles: Manufacturer's standard units to match asphalt shingles.

- F. Style and Manufacturer: Slateline by GAF/ELK. Products by CERTAINTEED, TAMKO, OWENS CORNING are acceptable providing they meet the requirements specified.

- 1. Color: English Gray.

2.02 ROOFING FELT - UNDERLAYMENT

- A. Type: Asphalt-saturated felt. ASTM D4869, Type I.

- B. Weight: 15 lbs per 100 square feet.

- C. Size: 36 inch minimum roll width.

2.03 SELF-ADHERED UNDERLAYMENT

- A. Material: Polyethylene sheet backed rubberized asphalt membrane, 40 mils thick. Provide primer as recommended by membrane manufacturer.

- B. Conformance: ASTM D1970.

- C. Warranty: Equal to shingle warranty.

- D. Manufacturers: Bituthene Ice and Water Shield by W. R. GRACE; Polyken 640 Underlayment Membrane by POLYKEN TECHNOLOGIES; Polyguard Deck Guard by POLYGUARD PRODUCTS; Weather Watch by GAF; Winterguard by CERTAINTEED.

2.04 ACCESSORIES

- A. Roofing Nails: ASTM F 1667; aluminum, stainless-steel, copper, or hot-dip galvanized-steel wire shingle nails, minimum 0.120-inch diameter, sharp-pointed, with a minimum 3/8-inch diameter flat head and of sufficient length to penetrate 3/4 inch into solid wood decking or extend at least 1/8 inch through OSB or plywood sheathing.
 - 1. Where nails are in contact with metal flashing, use nails made from same metal as flashing.
 - 2. Felt-Underlayment Nails: Aluminum, stainless-steel, or hot-dip galvanized-steel wire with low-profile capped heads or disc caps, 1-inch minimum diameter.
- B. Roofing Cement: Asphalt roofing cement as recommended by roof product manufacturer; ASTM D4586.
- C. Vent Pipe Flashings: ASTM B 749, Type L51121, at least 1/16 inch thick. Provide lead sleeve sized to slip over and turn down into pipe, soldered to skirt at slope of roof, and extending at least 4 inches from pipe onto roof.

2.05 SHINGLE RIDGE VENT

- A. Vent Material: Preformed high density linear polyethylene; .08" thick with weather filter.
- B. Length: Continuous along each ridge, unless otherwise indicated on drawings. Provide with connector and end plugs.
- C. Color: As selected by Architect.
- D. Provide end transitions as required.
- E. Manufacturers: Shinglevent II by CERTAINTEED or equal by COR-A-VENT INC., GAF, LOMANCO INC., TAMKO and OWENS CORNING
 - 1. Net Free Area: 16 sq. inch/foot min.
 - 2. Roof to Wall Transition: COR-A-VENT Roof-2-Wall Vent or equal from listed manufacturers.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that roof penetrations and plumbing stacks are in place and flashed to deck surface.
- B. Verify roof openings are correctly framed prior to installing work of this section.
- C. Verify deck surfaces are dry and free of ridges, warps, or voids.

3.02 ROOF DECK PREPARATION

- A. Follow shingle manufacturer's recommendations for acceptable roof deck materials.
- B. Broom clean deck surfaces under eave protection and underlayment prior to their application.

3.03 INSTALLATION - UNDERLAYMENT

- A. Place eave edge and gable edge metal flashing tight with fascia boards. Weather lap joints 2 inches. Secure flange with nails spaced 8 inches on center.
- B. Apply eave protection shingle underlayment in accordance with manufacturer's instructions.
- C. Extend eave protection membrane minimum 24 inches up slope beyond interior face of exterior wall. (Eave width plus wall thickness and 24 inches.)
 - 1. In addition to eaves, apply at entire perimeter surfaces to receive asphalt shingles, including ridges, hips and rakes.

3.04 INSTALLATION - PROTECTIVE UNDERLAYMENT

- A. Roof Slope Between 2:12 and 4:12: Apply one layer of self adhered underlayment over entire roof area, with ends and edges weather lapped minimum 12 inches. Stagger end laps each consecutive layer.
- B. Roof Slope 4:12 and Greater
 - 1. Roofing Felt Underlayment
 - a. Apply one layer of felt underlayment horizontal over entire surface to receive asphalt shingles. Lap succeeding courses a minimum of 2 inches; end laps a minimum of 4 inches, and hips a minimum of 6 inches.
 - b. Secure felt underlayment to deck with roofing nails 1 inch in from edge and 12 inches o.c. Three rows per sheet width. Lap felt underlayment 12 inches at valleys and hips.
 - c. Omit felt underlayment at areas listed below to receive self-adhering underlayment. Lap felt underlayment over eave underlayment as recommended by manufacturer but not less than 2

- inches.
2. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free, on roof deck. Comply with environmental restrictions of underlayment manufacturer. Install membrane lapped in direction to shed water. Lap sides not less than 3-1/2 inches. Lap ends not less than 6 inches staggered 24 inches between courses. Roll laps with roller. Cover underlayment within seven days. Provide at the following locations:
 - a. Eaves: Extend from edges of eaves to a minimum of 24 inches beyond interior face of exterior wall.
 - b. Rakes: Extend from edges of rake 24 inches beyond interior face of exterior wall.
 - c. Valleys: Extend from lowest to highest point a minimum of 18 inches on each side.
 - d. Hips: Extend 18 inches on each side.
 - e. Ridges: Extend 36 inches on each side without obstructing continuous ridge vent slot.
 - f. Sidewalls: Extend beyond sidewall 18 inches, and return vertically against sidewall not less than 4 inches.
 - g. Dormers, Chimneys, Skylights, and Other Roof-Penetrating Elements: Extend beyond penetrating element 18 inches, and return vertically against penetrating element a minimum of 4 inches.
 - h. Roof Slope Transitions: Extend 18 inches on each roof slope.

3.05 VALLEY FLASHING

- A. Provide metal valley flashing installed to provide an open valley.
- B. Provide flashing with the following:
 1. 1" V-crimp at flashing center running parallel with direction of valley.
 2. Edges formed with hook edge and cleated on 24" centers.
 3. Lap ends 8" in direction of water flow.
 4. Conform to SMACNA Figure 4-10.
- C. See Section 07 62 00 for prefinished metal flashing material.

3.06 STATIC VENTS - INSTALLATION

- A. Install where indicated on drawings in accordance with manufacturer's instructions and recommendations of roofing shingle manufacturer.
- B. Coordinate with installation of substrates and roofing as required to ensure that each element of the work performs properly, and that combined elements are waterproof and weathertight.

3.07 SHINGLE - INSTALLATION

- A. Use starter strip of shingle material cut on slotted end to 9" width and nail to eave with slot end up and edge overhanging eave 3/8".
- B. Use shingles with 5" maximum exposure unless manufacturer recommends less.
- C. Lay first course directly over starter strip with ends flush with starter strip at eaves.
- D. Insure alignment by running vertical line down center of roof and laying shingles from center to rake.
- E. Cutouts may break joints at either thirds or halves but system shall be consistent over entire roof.
- F. Use number of nails and locations per shingle as recommended by shingle manufacturer.
- G. Run a chalk line so valley will be 6" wide at top and diverge 1/8" per ft down to eaves. Neatly trim shingles to this line. Clip off shingle and glue upper inside corner of each shingle to valley with asphalt cement.
- H. Ridge shingles shall be 9" x 12" cut from strip shingles or factory supplied. Apply with 5" exposure, blind nailed, and tabbed. Run ridge shingles with wind.
- I. Vent pipe sleeve flange minimum width 6". Fit shingles under lower edge and over sides and upper edge.
- J. Run courses true to line with slots properly placed. Leave shingles flat without wave and properly placed.
- K. Clean shingles and building of soiling caused by this installation.

END OF SECTION

SECTION 07 41 13
METAL ROOF PANELS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide clipless, one-piece, positive-locking, standing seam system complete, including prefabricated roof sheets, fasteners, flashing, trim, gutters, snow guards and accessories as required for a watertight installation.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Sealant: 07 92 00.

1.03 REFERENCES

- A. Standards
 - 1. American Society for Testing and Materials (ASTM).
 - a. B209: Aluminum Alloys Sheet and Plate.
 - b. A792: Steel Sheet, Aluminum-Zinc Alloy Coated by the Hot-Dip Process, Structural Quality, minimum 50,000 psi yield strength in appropriate gage.
 - 2. National Roofing Contractors Association (NRCA).
"The NRCA Construction Details".
 - 3. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
"Architectural Sheet Metal Manual".
 - 4. American Iron and Steel Institute
"Light Gage Cold-Formed Steel Design Manual".
 - 5. American Architectural Manufacturers Association (AAMA)
 - a. AAMA 2605; Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's literature for all items. Data to fully explain product indicating materials, sizes and finishes, and installation procedures.
- B. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting

Material Building Product Disclosures and Optimization.

- C. Shop Drawings: Submit for all items. Include the following:
 - 1. Panel profile and gage.
 - 2. Erection layout.
 - 3. Special framing details.
 - 4. Flashing details.
- D. Samples: Submit minimum 9 inch long by full width sample showing finish, pattern, color, gage and profile.
- E. Certification
 - 1. Submit written evidence from manufacturer of roofing system that installer is approved by manufacturer for installation of specified roofing system.
 - 2. Submit copies of production quality control test and written assurance from an officer of manufacturer that materials furnished for the project are the same type and dimension as that produced for tests.
- F. Submit invoices and documentation from manufacturer of the amounts of post-consumer and post-industrial recycled content by weight for products with specified recycled content.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications and Responsibilities
 - 1. Minimum 10 years experience in architectural roofing; and roof panel supplied shall have been in use for a minimum 10 years.
 - 2. Review and comment to Architect on shop drawings submitted.
- B. Installer Qualifications: Approved and authorized by roofing manufacturer.
 - 1. Provide supervisory personnel trained by roofing manufacturer in the proper application of product with a minimum related experience of 10 years.
 - 2. All Other Personnel: Minimum 5 years experience in sheet metal roofing with previous experience in comparable size projects.
- C. Wind Uplift: Meet or exceed requirements of U.L. for Class 90 Wind Uplift Resistance.
- D. Water Infiltration Under Static Pressure: Tested with sidelap sealant per ASTM E1646.
 - 1. No leakage through panel joints at 12.0 psf.

- E. Air Infiltration: Tested in accordance with ASTM E1680.
 - 1. 0.006 cfm per linear foot of joint at static test pressure differential of 20.00 psf.
- F. Wind Uplift Classification: The panel system shall be listed as a Class 90 windstorm rated system, as determined by UL 580.
- G. Painted Finishes: Factory painted finish to be performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.

1.06 HANDLING AND STORAGE

- A. Exercise care so as not to damage or deform materials.
- B. Stack on platforms or pallets and cover to protect from weather.
- C. Provide anti-stick compound or ply on finished surfaces to protect finish. Compound or ply shall be readily removable type with no adverse effects on finish.

1.07 WARRANTY

- A. Prior to completion of project, submit copies of the following:
 - 1. Panel manufacturer's 20 year warranty against structural defects and corrosion.
 - 2. Installation Contractor's 2 year guaranty on workmanship and watertightness.
 - 3. Provide manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM D523) and chalking shall not less than a rating of 8 per ASTM D4214.
 - a. Warranty Period: 20 years.

PART 2 PRODUCTS

2.01 MATERIALS

- A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, bearing plates, sealants and accessories required for weathertight installation.
- B. Roofing Sheets: 24 gage, aluminum-zinc alloy-coated steel sheet, 50,000 psi minimum yield, structural grade 50A, coating designation AZ50 per ASTM A792.

- C. Joints: Standing rib, approximately 1" to 1 ½" high, 15" to 18" on center, with continuous groove capillary break. Securely lock ribs over concealed anchor clips with field applied mechanically sealed seam cover strips.
- D. Panel Length: Full length from ridge to eaves (or flashing break to flashing break). No end joints permitted in the field of a span length.
- E. Finish: Fluoropolymer finish containing not less than 70% PVDF (Kynar 500) resins; "Trinar" by AKZO; "Duronar" by PPG; "Fluropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
 - 1. Color: DMI Metallic Silver.
 - 2. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.

2.02 ACCESSORIES

- A. Flashing, Trim and Accessories: Same material and finish as roofing panel. Gage of various components as designed by roofing manufacturer to meet design conditions encountered. Fabricate to profiles indicated.
 - 1. Flashing and Counterflashing: 0.0276".
 - 2. Gutters and Downspouts: 0.0396".
 - 3. Downspout Straps: 0.0635".
 - 4. Gutter Brackets and Supports: 0.0635".
 - 5. Fascia: 0.0396".
 - 6. Others: 0.0276".
- B. Exposed Flashing Fasteners: #300 stainless steel. For weathertightness, screws shall have separate washers with hot bonded neoprene faces and pop-rivets shall be set in wet sealant. Exposed fasteners shall be a minimum #14 size screw or 3/16" rivet. Locate fasteners so that leakage does not run directly inside the structure.
- D. Closures: Precut foam profile closures cut from a black closed cell foam meeting specification ASTM D1056 grade SCE-41 Black EPT. Field fabricated hip closures shall be gray PVC foam. All hip and ridge closures shall be supported and protected from weathering by a channel matching the roof and flashing.
- E. Underlayment: Provide under entire metal roof surface.
 - 1. Material: Polyethylene sheet backed rubberized asphalt membrane, 40 mils thick. Provide primer as recommended by membrane manufacturer.
 - 2. Manufacturers: Bituthene Ice and Water Shield by W.R. GRACE; Polyken 640 Underlayment Membrane by POLYKEN TECHNOLOGIES; Polyguard Deck Guard by POLYGUARD PRODUCTS; Weather Watch by GAF; Winterguard by CERTAINTEED.

- F. Sealant used with the roofing shall be applied between surfaces during assembly with a minimum amount exposed on the completed installation.
 - 1. Concealed sealant shall be a non-curing polyisobutylene tape of sufficient thickness to make full contact with both surfaces.
 - 2. Exposed Sealant: Urethane elastomeric type with excellent weathering and sunlight resistance. See Section 07 92 00.
 - a. Color: Match prefinished exterior metal.
 - b. Apply sealant in accordance with manufacturer's recommendations.

- G. Snow Guards: Non - penetrating bar clamp and fence type consisting of clamp to seam bracket, tubing, tubing couplers, tubing caps, tubing collars and ice stops.
 - 1. Bracket: 2 piece extruded aluminum approximately 4"long x 2.5" wide and 5" tall with 2 tubing holes for high pith and 1 hole for low pitch roofs.
 - 2. Tubing: 6061-T6 aluminum with 1" outside diameter and .0125 wall thickness.
 - 3. Tubing Couplers: 6061-T6 Aluminum shaft with stainless washers and tightening bolts, nylon slip washers and rubber expansion washers.
 - 4. Tubing Caps: 302 stainless steel
 - 5. Tubing Collars: 6061-T6 aluminum with stainless steel set screws.
 - 6. Ice Stops are 601-T6 aluminum with stainless fasteners.
 - 7. Manufacturers: S-5! by ROCKY MOUNTAIN SNOW GUARDS INC. or approved equal.
 - 8. Finish: Match roof panels.

2.03 FABRICATION

- A. Shop fabricate to the maximum extent practicable.
 - 1. Brake-form to the indicated arrangement and profile with sharply defined lines and with braked shapes sharp and true. Seams, ridges and other edges and corners are straight and well aligned.
 - 2. Tolerances: Maximum 1/16" in 8' of length (non-accumulative) and maximum 3/8" in 40' or more.
 - 3. Flat Planes: Free of wave, warp, buckle or other deficiencies in appearance.
 - 4. Seams
 - a. Standing Seams: Straight, of uniform height and profile and without wave.
 - b. Cross Seams: Lay out panels so cross seams, when required and permitted, will be made in the direction of flow with higher pans overlapping lower pans. Provide continuous sight line.

2.04 MANUFACTURER AND DESIGN

- A. Basis of Design: DIMENSIONAL METALS (DMI) Nail Strip NS15

- B. The following manufacturers and models are acceptable provided they meet the requirements specified herein and conform to the design intent indicated on the drawings.
 - 1. BERRIDGE MANUFACTURING
 - 2. MBCI
 - 3. AEP- SPAN
 - 4. FIRESTONE
 - 5. ATAS
- C. Design roofing system in accordance with the dimensions and general arrangements indicated on the drawings.

PART 3 EXECUTION

3.01 INSPECTION

- A. Before installation of panels, verify that the structure is ready to receive work. Check field dimensions and alignment of structural members to assure that the roof panels and flashing are straight and true.
- B. Notify Architect of conditions which may adversely affect the appearance of the installed roof; work on that location will not proceed until resolved by the Architect.

3.02 INSTALLATION

- A. Erect in accordance with Drawings and manufacturer's instructions and recommendations under the direct supervision of an experienced sheet metal craftsman trained in application of metal roofing.
- B. General
 - 1. Do not allow installed work of this section to be used as a storage space for other materials.
 - 2. Do not permit unnecessary walking on the finished roof. Require personnel to wear rubber-soled shoes when installing or walking on finished roof.
- C. Erect panels true and to the slopes indicated on the drawings. Final appearance of the roof shall be visually flat, straight and free from defects and dents.
- D. Install all work so as to allow for thermal movement without distortion or elongation of fastener holes.
- E. Installation Tolerance: Shim and align panel units within installed tolerance of 3/8" in 40' on level/plumb/slope and location/line as indicated, and within 1/8" offset of adjoining faces and of alignment of matching profiles.
- F. Install flashing in accordance with the recommended practices of AA, NRCA and SMACNA architectural sheet metal manuals, without fasteners in end laps.

- G. Seal all panel/panel, panel/trim, and accessory/panel joints to provide resistance to air and water penetration.

3.03 FIELD TESTING

- A. Conduct 5 random fastener pull tests in areas designated by Architect. Submit test results for comparison to design requirements.

3.04 DAMAGED PANELS

- A. Do not install panels that are bent, chipped, or otherwise damaged.
- B. Refinish all abraded surfaces to match original finish, using materials and methods recommended by roofing manufacturer. Materials shall be fully compatible with the original finish system.
- C. Repaired surfaces shall be uniform and free from variations in color and surface texture from that of adjacent, like surfaces.
- D. If repaired sheet is not acceptable to the Architect, remove sheet and replace with a new sheet, at no additional cost to the Owner.

3.05 CLEAN UP

- A. Clean all roofing surfaces of dirt, grime, excess sealant and other surface blemishes.
- B. Remove from the site all excess material, shipping cartons debris and etc., related to the roofing work.

3.06 PROTECTION

- A. Protect installed panels from abuse by other trades.
- B. Installing Contractor shall advise General Contractor of any necessities for protection from the work of other trades.

END OF SECTION

SECTION 07 46 46

MINERAL-FIBER CEMENT SIDING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide prefinished mineral-fiber cement lap siding, panels, trim, fasteners, building paper and other miscellaneous items as required for a complete installation.

1.02 RELATED SECTIONS

- A. Sheathing: Section 06 10 00.
- B. Sealant: Section 07 92 00.
- C. Wood Blocking and Framing: Section 06 10 00.

1.03 REFERENCE STANDARDS

- A. ASTM: American Society for Testing and Materials.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications, details, drawings and installation instructions for each component required.
- B. Samples: Submit minimum 9" long by full width sample of siding and trim showing Each type of finish, pattern, color, profile, and thickness, as applicable.
- C. Shop Drawings: Submit installation drawings for all components indicating relationship with each other and with adjacent materials and construction. Where installation details deviate from drawings or specification requirements, indicated such deviations on shop drawings.
- D. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.05 DELIVERY, HANDLING AND STORAGE

- A. Conform to manufacturer's requirements for delivery, handling and storage.
- B. Exercise care so as not to damage or deform material.
- C. Stack on platforms or pallets and cover to protect from weather.

1. Install covering to allow adequate ventilation.
2. Allow approximately 2 weeks acclimation to atmosphere at construction site.
3. Protect edges and corners from chipping.

1.06 WARRANTY

- A. Materials: Provide manufacturer's 15 year warranty (from date of installation) covering the following:
1. Substrate: Warranted against splitting, cracking and delamination.
 2. Cracking (Definition): Refers to cracking to such a degree as to render the product unsuitable for ordinary use. Cracking does not include minute fractures of the applied finish.
- B. Workmanship: Application limited warranty 3 years.
- C. Finish Warranty: Limited product warranty against manufacturing finish defects. For a period of 15 years from the date of installment: will not peel; will not crack; and will not chip. Finish warranty to include the coverage for labor and material.

PART 2 PRODUCTS

2.01 SIDING AND TRIM

- A. Manufacturer: Subject to the specified requirements, products manufactured by the following are acceptable:
1. JAMES HARDIE
 2. ALLURA/PLY CEM
- B. Manufacturer and Material
1. Basis of Design Panels: Specifications based on 5/16" thick HZ-5 Vertical Siding manufactured by JAMES HARDIE or equal.
 - a. Texture: Smooth. Provide battens as indicated.
 2. Basis of Design Lap Siding: Specifications based on by Hardieplank JAMES HARDIE or equal.
 - a. Texture: Cedarmill
 - b. Size: 8-1/4" w/7" Exposure
 3. Other Manufacturer: Subject to the specified requirements, products manufactured by the following are acceptable:
 - a. ALLURA/PLY CEM
- C. Material
1. Non-asbestos fiber-cement siding to comply with ASTM Standard Specification C1186 Grade II, Type A.

2. Flame-Spread index of 25 or less and smoke-developed index of 450 or less when tested in accordance of ASTM E84 or UL 723.
3. Factory Primer: Provide factory applied universal primer.
4. Properties
 - a. Flexural Strength: At least 1450 psi (10 MPa) when in equilibrium condition, and at least 1015 psi (7 MPa) when in wet condition, tested in accordance with ASTM C 1185.
 - b. Freeze Thaw Resistance: At least eighty (80) percent flexural strength retained, when tested in accordance with ASTM C 1185
 - c. Water tightness: No water droplets on underside when tested in accordance with ASTM C1185.

D. Trim

1. Texture: Smooth; material and finish to match siding.
2. Sizes: As indicated

2.02 MISCELLANEOUS ITEMS/FASTENERS

A. Fasteners

1. Wood framing: 4d common corrosion resistant nails.
2. Metal framing: 1 1/4" No. 8-18 x 0.375" head self-drilling, corrosion resistant S-12 ribbed buglehead screws.

B. Sealant: Urethane type. See Section 07 92 00.

C. Building Paper

1. Type: Asphalt-saturated felt. ASTM D4869, Type I.
2. Weight: 15 lbs per 100 square feet.
3. Size: 36 inch minimum roll width.

D. Flashing: 24 ga stainless-steel.

E. Patching Compound: 1 or 2 part fiber cement compound as recommended for smooth patching of fastener holes.

2.03 FACTORY FINISH

1. Product: ColorPlus Technology by JAMES HARDIE or equal.
2. Definition: Factory applied finish; defined as a finish applied in the same facility and company that manufactures the siding substrate.
 - a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
3. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as

- measured by photospectrometer and verified by third party.
4. Accessories: Provide pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.

PART 3 EXECUTION

3.01 INSPECTION

- A. Commencement of siding installation implies acceptance of the substrate as suitable to accept siding.
- B. Discard materials that are chipped, unsound, improperly treated, not adequately seasoned or too small to fabricate work with a minimum number of joints, or which are of defective manufacture with respect to surfaces, sizes or patterns.

3.02 COORDINATION

- A. Coordinate installation of siding and corner trim with installation of exterior sheathing/building paper and with installation of trim.

3.03 INSTALLATION

- A. Building Paper: Install over entire wall area to receive siding. Install shingle style starting at bottom. Lap joints a minimum 2"; staple to sheathing as recommended by manufacturer.
- B. Trim
 1. Install inside and outside corner trim as recommended by siding manufacturer.
 2. Coordinate installation of siding with installation of GFRC trim.
 3. Provide 1/8" clearance between siding and trim.
 4. Seal siding/trim gap with sealant as specified in Section 07 92 00.
- C. Lap Siding
 1. Starting: Install a minimum 1/4 inch thick lath starter strip at the bottom course of the wall. Apply planks horizontally with minimum 1-1/4 inch wide laps at the top. The bottom edge of the first plank overlaps the starter strip.
 2. Allow minimum 1 inch vertical clearance between roofing and bottom edge of siding.
 3. Face nail to sheathing.
 4. Locate splices at least 12 inches away from window and door openings.
- D. Panel Siding: Install per manufacturers recommendation and the following:
 1. Position panel fasteners 3/8" from panel edges and no closer than 2" away from corners.

2. Vertical Joints, Install panels in moderate contact.

3.04 CLEAN UP

- A. Clean all siding surfaces of dirt, grime, and other surface blemishes.
- B. Remove from the site all excess material; shipping, packaging, debris, and etc., related to the siding work.

END OF SECTION

SECTION 07 54 23

THERMOPLASTIC POLYOLEFIN ROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide a thermoplastic membrane roofing system as shown and specified. Work includes:
 - 1. Fully adhered single ply polyester reinforced thermoplastic polyolefin (TPO) membrane.
 - 2. Insulation.
 - 3. Flashing, pipe seals, and roofing accessories.
 - 4. Installing roof flashings and sheet metal furnished under Section 07 62 00.
 - 5. Membrane flashing under metal copings.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Wood Blocking: Section 06 10 50.
- C. Flashing and Sheet Metal: Sections 07 62 00.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: To participate as a qualified company in production of Elasto/Plastic materials, the company must have a minimum of five (5) years as the sole manufacturer of the brand name. Manufacturer shall also furnish notarized certification that he has been in business and had roofs installed for a minimum of five (5) years.
- B. Installer Qualifications: An experienced roofing installer approved or licensed by roofing materials manufacturer and with not less than five (5) years of successful experience installing thermoplastic membrane roofing systems similar to those required for this project.
- C. Manufacturer's representative shall conduct timely inspection of the roof installation to satisfy all warranty requirements.
- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108 "Standard Test Methods for Fire Tests of Roof Coverings," for application and roof slopes indicated.
- E. Insulation Thermal Properties: Thermal conductivity k-factors and thermal resistance R-values indicated are values at 75 degrees F., mean temperature.
1. Where insulation is identified by R-value, provide thickness required to achieve indicated R-value. Foam insulation R-values are "aged" thermal values in accordance with LTTR – Long Term Thermal Resistance predicted by ASTM C1289.

1.04 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.
- B. Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by membrane roofing manufacturer based on testing and field experience
- C. FM Approvals Listing: Provide membrane roofing, base flashings, and component materials that comply with requirements in FM Approvals 4450 and FM Approvals 4470 as part of a membrane roofing system, and that are listed in FM Approvals' "RoofNav" for Class 1 or noncombustible construction, as applicable.
1. Fire/Windstorm Classification: Class 1A-90.
 2. Hail Resistance: SH.
- D. Fire Classification: U.L. Class A.
- E. Energy Star Roof Compliance: Roofing shall be Energy Star labeled, to verify compliance with requirements of the U.S. Environmental Protection Agency Energy Star Program.

1.05 SUBMITTALS

- A. Product Data: Submit for all items.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work. Include as a minimum the following:
1. Layout of roof showing sheet sizes and field joint locations.
 2. Location and type of penetrations.

3. Perimeter, penetration and special details.
 4. Description of all materials.
 5. Conformance to fire classifications requirements of IBC 1505.
 6. Layout of tapered insulation, including slopes.
- C. Manufacturer's Approval: Obtain manufacturer's written approval of final shop drawings prior to beginning roofing operations.
- D. Samples: Submit samples of all roofing and flashing materials.
- E. Submit certification from roofing manufacturer that the roofing membrane and the selected roofing insulation are compatible.
- F. Certifications
1. Copies of documents verifying conformance with CRRC and Energy Star requirements.
 2. Roof manufacturer's certification of compatibility with all adjacent materials that come in contact with roofing membrane.
- G. Warranties: Sample of special warranties detailing terms as required herein.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened, undamaged, labeled bundles or containers.
- B. Store roofing materials, insulation and accessories at the site in storage trailers or the building in a dry, well-ventilated, weather tight place. Exterior storage not permitted. Comply with manufacturer's recommendations for handling and protection during installation.
1. Handle rolled goods to prevent damage to edge or ends.
 2. Do not apply roofing materials to damp, frozen, dirty or dusty substrate surfaces.
- C. Protection
1. Protect adjacent materials and surfaces from damage and soiling during roofing system installation.
 2. Provide special protection or avoid heavy traffic on completed roofing work.
 3. Protect paving and structure walls adjacent to hoists before starting work.
 4. Do not overload the building structure with storage of materials or installation equipment on the substrate decking.
 5. Handle and store materials and equipment to avoid damage to substrate decking.

1.07 PROJECT CONDITIONS

- A. Environmental Conditions: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.07 WARRANTY

- A. Contractor and roofing subcontractor shall warrant the total roofing system (membrane, insulation and flashing) with respect to workmanship and proper application for two (2) years from the date of acceptance by the Owner. Should any leaks covered under the warranty occur during this period, corrective action will be taken by the Contractor to repair the roof to the satisfaction of the owner and membrane manufacturer. ALL CORRECTIVE WORK WILL BE DONE AT NO COST TO THE OWNER. Work includes all components of membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, substrate boards, vapor retarders, roof pavers, and walkway products.
- B. The manufacturer(s) of the materials used shall provide a written, [No Dollar Limit,] **twenty (20)** year guarantee on the complete roof installation. Upon warranty inspection and acceptance of the roof, the guaranty will be turned over to the Owner on behalf of the Contractor, by an authorized representative of the manufacturer. The guaranty shall begin when the project is completed and accepted by the Owner. Submit final guaranty in triplicate.
 - 1. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, substrate board, roofing accessories and other components of membrane roofing system.
 - 2. System shall be warranted for all requirements specified herein, including for wind uplift as required.
- C. Corrective measures on leaks shall be undertaken within seventy-two (72) hours after notification has been received by the Contractor or membrane manufacturer from the Owner.

PART 2 PRODUCTS

2.01 MEMBRANE ROOFING

- A. Thermoplastic Polyolefin (TPO) Type
 - 1. Thermoplastic Sheet Membrane: Reinforced single ply membrane factory fabricated into flexible sheets.
 - 2. Material Standard: Conform to ASTM D6878, Standard Specification for Thermoplastic Polyolefin Based Sheet.
 - 3. Thickness: Minimum 60 mils (0.60").
 - 4. Physical Properties
 - a. Breaking Strength - ASTM D751: 330 lbf/in.
 - b. Elongation at Break - ASTM D751: 30%.
 - c. Seam Strength - ASTM D751: 75 lbf.
 - d. Retention of Properties After Heat Aging - ASTM D3045

- 1) Breaking Strength - ASTM D751: 330 lbf.
 - 2) Elongation - ASTM D751: 25% of original.
 - e. Tearing Strength - D1004: 156 lbg.
 - f. Low Temperature Bend - D2136: Pass.
 - g. Accelerated Weathering Test (Xenon Arc) - D2565: 10,000 hrs.
 - 1) Cracking (7x magnification): None.
 - 2) Discoloration (By Observation): Negligible.
 - 3) Cracking (7x magnification): None.
 - h. Linear Dimensional Change - ASTM D1204: 0.1%.
 5. Color: White.
- B. Flashing: 60 mils (0.60") nominal thick reinforced sheet factory fabricated to the required shapes and sizes to suit project conditions; furnished by sheet roofing membrane manufacturer.
1. Inside and Outside Corners and Vent Flashing: Preformed.
 2. Provide asphalt compatible flashing membrane where asphalt contamination is anticipated.
- C. Adhesive: Provide types as recommended by manufacturer for materials and conditions encountered.
1. Provide asphalt compatible flashing membrane where asphalt contamination is anticipated.
- D. Flashing Bars and Screws: Manufacturer's standard bars and fasteners. Spacings as required to meet design loads.
- E. Mechanical Fasteners: As recommended by roofing manufacturer.
- F. Splice Wash, Lap Sealant, Fastener Sealer, Etc.: Sheet material manufacturer's recommended materials for waterproof sealing of seams in membrane and waterproof sealing of joints between flashings and roofing membrane, adjoining surfaces, projections and penetrations through the roofing membrane. Compatible with materials with which used.
- G. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. GEN FLEX ROOFING SYSTEMS
 2. JOHNS MANVILLE
 3. GAF
 4. CARLISLE
 5. FIRESTONE.
 6. VERSICO.
 7. MULE HIDE.

2.02 INSULATION

- A. Polyisocyanurate Board Insulation: ASTM C1289 "Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board," Type II, glass-fiber mat facer on both major surfaces.
 - 1. Tapered Insulation: 1/4" per foot. No slope under 1/4" per foot will be permitted.
 - 2. R-Value: Provide thickness for average R of 38 over entire roof area.
 - 3. Minimum Thickness at Drain: 2".
 - 4. Compressive Strength: Minimum 20 (Grade 2).
- B. Provide adhesives and mechanical fasteners as recommended by insulation manufacturer for substrates encountered.
- C. Crickets (Tapered Insulation): Provide tapered insulation crickets sloped approximately 1/4" per foot. Locate and arrange as indicated on drawings or as required to divert water at rooftop equipment or vertical obstructions.
 - 1. Material: Polyisocyanurate; conform to requirements and manufacturers specified herein.

2.03 MISCELLANEOUS ITEMS

- A. Wood Members: Comply with requirements of wood blocking, Section 06 10 50, for wood members indicated as roofing system work. Provide wood pressure treated as specified.
- B. Mastic: Type as recommended by roofing manufacturer.
- C. PVC Walkway Membrane: Roof manufacturer's recommended reinforced PVC heat weldable walkway membrane; minimum 30" wide x lengths indicated. Minimum 2.4mm thick (0.096").
- D. Substrate Board:
 - 1. 1/2" glass-mat, water-resistant gypsum substrate, primed surface; ASTM C1177, Dens-Deck by GEORGIA-PACIFIC, Secure Rock Roof Deck by USG, GlasRoc Roof Board by CERTAINTEED.
 - 2. Adhered Roofing and Parapet Walls: 1/2" ASTM C1177 with face mat enhancement to allow adhesives to bond uniformly.
 - a. Manufacturers GEORGIA-PACIFIC Dens-Deck Prime with EONIC Technology or equal by above coverboard manufacturers.
 - b. Water Absorption (ASTM C473): Less than 5 percent of weight.
 - c. Surface Water Absorption (ASTM C473): Nominal 1.0 grams.

2.04 FASTENERS

- A. Provide roofing membrane manufacturer's recommended type mechanical fastener for deck. Type, size and spacing shall be as required to maintain manufacturer's 15 year system warranty and FM I-90.

PART 3 EXECUTION

3.01 INSPECTION

- A. Pre-Installation Conference: Not less than two weeks before start of roofing installation, meet at project site with Architect, Owner's representative, Contractor, roofing installer, and roofing material manufacturer's representative.
 - 1. Review project requirements, required submittals, status of substrate work, areas of potential conflict and interference, availability of materials, installer's personnel, equipment and facilities, construction schedule, weather and forecasted weather conditions, and coordinate methods, procedures and sequencing requirements for proper installation, integration and protection of the work.
- B. Examine substrates and installation conditions. Do not proceed with insulation and roofing work until unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Verify that work which penetrates roof deck, or requires men or equipment to traverse roof deck, has been completed.
- B. Examine substrate surfaces for adequate anchorage, foreign materials, moisture and unevenness that would prevent the execution of roofing system specified.
- C. Correct unsatisfactory conditions before starting roofing. Roof deck surface conditions shall comply with manufacturer's requirements and be acceptable to the roofing system installer.
- D. Protect other work from spillage of roofing materials. Repair or replace other work damaged by installation of the thermoplastic membrane roofing system work.

3.03 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install one or more layers of insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2 inches or greater, install 2 or

more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 12 inches in each direction.

- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
 - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Mechanically Fastened and Adhered Insulation for Roof Deck: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
 - 1. Fasten first layer of insulation according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
 - 3. Install subsequent layers of insulation in a cold fluid-applied adhesive.
- I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Stagger joints from joints in insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
 - 1. Fasten according to requirements in FMG's "Approval Guide" for specified Windstorm Resistance Classification.
 - 2. Fasten to resist uplift pressure at corners, perimeter, and field of roof.

3.05 ADHERED MEMBRANE INSTALLATION

- A. Comply with roofing manufacturer's instructions and recommendations for handling and installing roofing system.
- B. Flash and make watertight equipment curbs for mechanical equipment located on the roof.
- C. General flashing details for roof penetrations, curbs, parapets and roof perimeters shall comply with roofing material manufacturer's standard details and recommendations for flashings.
 - 1. Provide base flashing at perimeters and edges of membrane abutting walls, curbs or other construction. Provide prefabricated pipe seals for pipe and conduit penetrations, properly cemented to membrane and sealed to pipe or conduit with stainless steel clamp and top bead of sealant.

2. Mechanical fasteners below counterflashing, where required at perimeter flashings, to be fully enclosed with suitable membrane to form water tight seal.
 3. Minimum height of membrane flashing terminations to be 8" above top of membrane, unless otherwise indicated.
- D. Install roof flashing and sheet metal work provided herein and furnished under Section 07 62 00.
- E. PVC Walkway Pads: Locate pads as indicated. Maintain approximately 4" between pads. Secure pads to membrane as recommended by membrane manufacturer.
- F. Blocking Shim blocking solidly as required to make top surface of blocking level with top of insulation.
- G. Perform test cuts at lap edges (seams) to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
1. Perform test cuts after stoppages in the work and when recommended by roofing manufacturer after environmental changes.
 2. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.

3.08 CLEANING AND PROTECTION

- A. Patch installations by other trades and make all necessary repairs as required.
- B. Upon completion of roofing work, clean gutters and drains of foreign materials and aggregate and remove all debris and surplus materials.
- C. Protect finished roof areas from foot traffic and construction damage until Contract Completion.

END OF SECTION

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide flashing and sheet metal work as shown and specified. Work includes:
1. Gutters, scuppers, leader boxes (conductor heads) and downspouts including brackets and supports.
 2. Copings.
 3. Flashing and counterflashing.
 4. Fasteners, sealants, solder and accessories to complete the work.

1.02 RELATED SECTIONS

- A. Masonry Flashing: Section 04 00 00.
- B. Metal roofing (standing seam) and related flashing: Section 07 41 13.
- C. Sustainable Design Requirements: Section 01 81 13.

1.02 QUALITY ASSURANCE

- A. Comply with Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) "Architectural Sheet Metal Manual" recommendations for fabrication and installation of the work.
- B. Reference Standards
1. American Society for Testing and Materials (ASTM).
 2. American Architectural Manufacturers Association (AAMA)
 - a. AAMA 2605; Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels.
 3. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
 - a. SMACNA "Architectural Sheet Metal Manual".
 4. Single Ply Roofing Industry: SPRI ES-1, Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
- C. Subcontractor: Subcontract sheet metal associated with roofing as a part of the roofing contract for undivided responsibility.

- D. Attachments to or penetrations in roofing systems to be made only with full approval of roofing manufacturer. Obtain approvals as required for installation of work under this section. Notify Architect if deviations from documents is required to obtain approval from roofing manufacturer prior to fabrication.
- E. SPRI Wind Design Standard: Manufacture and install [copings and fascia] tested according to SPRI ES-1 and capable of meeting the design pressures indicated on the Structural Drawings.
- F. Painted Finishes: Factory painted finish to be performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.

1.03 SUBMITTALS

- A. Shop Drawings and Product Data: Submit on all sheet metal work specified herein. Drawings to show all expansion joint details, joint details, waterproof connections to adjoining work and at obstructions and penetrations, methods of attaching to building and all formed sections. Include the following:
 - 1. Gutter and downspout construction, including brackets, supports and gutter expansion joints.
 - 2. Scupper and leader box construction.
 - 3. Standing seam roofing.
 - 4. Coping and gravel stops.
 - 5. Prefinished aluminum cornice.
- B. Submit 8" square material samples for each type of sheet metal required.
- C. Submit full width by 8" long samples of all manufactured and fabricated items. Provide with specified finish and color.

1.04 PROJECT CONDITIONS

- A. Do not proceed with the installation of flashing and sheet metal work until substrate construction, blocking and other construction to receive the work are completed.
 - 1. Metal roofing work is to follow progress of substrate as close as practical to limit exposure of insulation and wood materials.

1.05 WARRANTY

- A. Contractor's warranty required for membrane roofing system work shall include all related roof flashing and sheet metal work. Refer to Section 07 54 23.
- B. Provide Contractor's guarantee for all sheet metal work under this Section to be free from defects of material and workmanship for a period of two years. Work that is not water tight or is damaged by winds that do not exceed 90 mph will be

considered defective.

- C. Provide manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM D523) and chalking shall not less than a rating of 8 per ASTM D4214.

- 1. Warranty Period: 20 years.

PART 2 PRODUCTS

2.01 MATERIALS

A. Galvanized Steel Sheet - All Flashings Exposed to View

- 1. Material: Galvanized steel, ASTM A653, G90 coating with factory applied finish.
- 2. Finish
 - a. Exposed Surfaces
 - 1) Material/Manufacturer: Fluoropolymer finish containing not less than 70% PVDF (Kynar 500) resins; "Trinar" by AKZO; "Duronar" by PPG; "Fluropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
 - 2) Reference: Meet the requirements of AAMA 621, Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 - 3) Color: Provide (3) colors to align with adjacent finishes. Match the following:
 - a) DMI Sandstone
 - b) DMI Charcoal gray
 - c) DMI White
 - 4) Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
 - b. Concealed Surfaces: Can be manufacturer's standard coating for concealed surfaces.
- 3. Thicknesses: Provide the following minimum thicknesses:
 - a. Flashing and Counterflashing: 0.0276".
 - b. Gutters and Downspouts: 0.0396".
 - c. Downspout Straps: 0.0635".
 - d. Gutter Brackets and Supports: 0.0635".
 - e. Others: 0.0276".

- B. Miscellaneous Flashing - Not Exposed to View: Galvanized steel, ASTM A653 G60. Mill phosphatized for paint adhesion. 0.0276". minimum unless otherwise indicated.

- C. Fasteners: Provide same metal as sheet metal or other non-corrosive compatible metal recommended by sheet metal manufacturer.
- D. Joint Sealants: See Section 07 92 00. Color matched to factory finished materials at roofing, cornice, fascia, coping and similar type systems.
- E. Metal accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work; matching or compatible with material installed, non-corrosive, size and gage as required for performance.
- F. Underlayment
 - 1. Membrane: Bituthene Ice and Water Shield by W. R. GRACE; Polyken 640 Underlayment Membrane by POLYKEN TECHNOLOGIES; Polyguard Deck Guard by POLYGUARD PRODUCTS; Weather Watch by GAF; Winterguard by CERTAINTEED, a modified bituminous membrane, minimum 40 mils thick, self-adhering, self-sealing moisture barrier.
 - 2. Slip sheet: 4 lb./100 sq. ft., rosin-sized building paper.
- G. Wood members: Comply with requirements of Wood Blocking, Section 06 10 50.

2.02 PREFABRICATED MATERIALS

- A. Coping
 - 1. Fabricated in 10'-0" lengths to sizes indicated of 0.063" smooth aluminum. Provide manufacturer's standard 12" wide, 20 gage perforated galvanized steel cleats, molded styrene or aluminum gutter chairs and special adhesive for cleat installation. Coping cover snapped-on to cleat spaced 5'-0" on center.
 - 2. Special Shapes: Provide units fabricated to radius indicated on drawings and fabricated to curve indicated on drawings. Provide metal locking corners.
 - 3. Provide factory welded and mitered corners, butt joints and concealed .032" aluminum cover plates.
 - 4. Manufacturers
 - a. OMG ROOFING PRODUCTS; "Permasnap Coping".
 - b. PETERSEN ALUMINUM CORP.; "Tite-Loc Coping".
 - c. ARCHITECTURAL PRODUCTS COMPANY; "Snap-Tight Coping".
 - d. CARLISLE SYN TEC, INC.; "SecurEdge 200 Coping".
 - e. FIRESTONE BUILDING PRODUCTS; "Firestone Coping System".
 - f. JOHNS MANVILLE, INC.; "Presto Lock Coping System".
 - g. METAL-ERA, INC., "Perma-Tite".
- B. Finish
 - 1. Exposed Surfaces
 - a. Material/Manufacturer: Fluoropolymer baked enamel finish with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA

- INC.; "Trinar" by AKZO; "Duramar" by PPG, "Fluropon" by VALSPAR. Total dry film thickness not less than 1.0 mils
- b. Reference: Meet the requirements of AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels.
 - c. Color: Provide (3) colors to align with adjacent finishes. Match the following:
 - 1) DMI Sandstone
 - 2) DMI Charcoal gray
 - 3) DMI White
 - d. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
2. Concealed Surfaces: Can be manufacturer's standard coating for concealed surfaces.

2.03 FABRICATION

- A. Shop fabricate sheet metal work to comply with standard industry standards as shown by SMACNA in the "Architectural Sheet Metal Manual."
- B. Form sections square, true and accurate to size and profile, free from distortion and other defects detrimental to appearance or performance.
 - 1. Make all lines, edges, angles and moldings straight, sharp and true; reinforce for rigidity and strength.
- C. Fabricate for watertight and weatherproof performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form exposed sheet metal work with exposed edges folded back to form hems.
 - 1. Fabricate with seams overlapping in the direction of water flow.
- D. Fabricate non-moving seams in sheet metal with flat lock or butt hairline joints except as otherwise indicated. Fabricate corners mitered, soldered and sealed as one piece. Locate corner joints 2'-0" from corners and intersections.
- E. Seal movable non-expansion type joints with joint sealant. Form joints as indicated, when not indicated, in compliance with industry standards to receive joint sealants.
- F. Provide for separation of metal from non-compatible or corrosive substrates by coating concealed surfaces with bituminous coating or other permanent separation as recommended by the sheet metal manufacturer.
- G. Gutters

1. Form to size and shape as detailed or comply with (SMACNA) recommendations if not indicated. Provide adequate reinforcing, brackets, straps and fasteners for attachment to building as indicated and as required.
 2. Provide downspout outlets as indicated on drawings.
- H. Downspout: Form to size and shape detailed or comply with (SMACNA) recommendations if not indicated.

PART 3 EXECUTION

3.01 PREPARATION

- A. Examine substrates and installation conditions. Do not install flashing and sheet metal work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.
- C. Coordinate flashing and sheet metal work with other work for the correct sequencing of items which make up the entire membrane or system of weatherproofing and rain drainage.

3.02 INSTALLATION

- A. Comply with SMACNA "Architectural Sheet Metal Manual" recommendations, and drawing details for installation of the work.
- B. Install prefabricated items in accordance with manufacturer's instructions and recommendations.
- C. Anchor units securely in place by methods indicated, providing for thermal expansion. Conceal fasteners and expansion provisions whenever possible. Install joint sealants where indicated.
- D. Set units true to lines and levels indicated. Install work with laps, joints and seams which will be permanently watertight and weatherproof.
- E. Separate sheet metal work from dissimilar metals, treated wood, and cementitious materials. Provide roofing felt underlayment and rosin-sized paper slip sheet over treated wood surfaces.
- F. Fabricate, support and anchor downspouts in a manner which will withstand thermal expansion, stresses and full loading by ice or water without damage, deterioration or leakage.
- H. Continuously seal exposed joints where flashing or counter flashing terminates into reglets after sheet metal is adequately wedged and secured.

- G. Metal flashings which may be built into masonry mortar joints shall be preformed with corrugations, ribs or crimps which will maintain integrity of mortar bond for masonry.

- J. Coping
 - 1. Install membrane roofing flashing over top of parapet substrate prior to installing coping. See Section 07 54 23. Coordinate installation.
 - 2. Apply continuous bead of sealant on both sides of joints immediately prior to setting coverplates.

END OF SECTION

SECTION 07 81 10

SPRAY-APPLIED FIREPROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide rated installations which comply with indicated ratings for fire endurance, flame spread, and combustibility; including applicable code interpretations by governing authorities, and listing and labeling by UL or FM where applicable.
- B. This Section includes both mineral fiber type and cementitious type fireproofing. Unless otherwise indicated, the Contractor may use either type of fireproofing on the project. A combination of types may be used (i.e. mineral fiber type on decks and cementitious type on framing members).
 - 1. However, unless otherwise indicated, one type shall be used throughout the entire project for each type of application (i.e. the same type shall be used for all beams; the same type for all decks; etc).

1.02 RELATED SECTIONS

- A. Firesafing: Section 07 84 00.
- B. Intumescent Fireproofing: Section 07 81 23.
- C. Structural Steel: Section 05 12 00.
- D. Sustainable Design Requirements: Section 01 81 13.

1.03 QUALITY ASSURANCE

- A. Applicator: Acceptable to fireproofing manufacturer.
- B. Regulatory Requirements
 - 1. Underwriters' Laboratories, Inc.: Products, execution and thickness shall conform to approved UL designs as published in UL Fire Resistance Directory.
 - 2. Conform to OBC for fire resistance ratings.
- C. References: Wherever the following abbreviations occur, they shall refer to the corresponding standard:
 - 1. ASTM: American Society for Testing and Materials.
 - 2. U.L.: Underwriters' Laboratories, Inc.

1.03 SUBMITTALS

- A. Manufacturer's Product Data: Submit for all items. Include instructions for bonding and applying fireproofing.
- B. Submit copies of certified test reports of:
 - 1. Manufacturer's certification or independent test reports confirming that materials meet or exceed performance criteria specified.
 - 2. Reports from independent testing agencies of product proposed for use, which indicate conformance to ASTM E84 and E119.
- C. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in original unopened packages bearing the manufacturer's name, brand and UL label verifying compliance with UL's quality control inspection program and the appropriate fire resistance ratings.
- B. Keep materials dry until ready for use. Keep materials off the ground, under cover and away from sweating walls and other damp surfaces. Discard materials that have been exposed to water before actual use.

1.05 JOB CONDITIONS

- A. Environmental Requirements
 - 1. Do not apply fireproofing when temperature of substrate, material and surrounding air is below 40° F. Maintain temperature 24 hours before and 24 hours after application of fireproofing.
 - 2. Provide ventilation in areas to receive fireproofing during and for 24 hours after application, to help dry material and maintain nontoxic, unpolluted working area.

PART 2 PRODUCTS

2.01 MINERAL FIBER TYPE

- A. Materials
 - 1. Metal Lath: 3.4 pound per square yard expanded diamond steel lath, galvanized finish; with reinforcing members, anchorage and accessories as appropriate for substrate conditions and applications indicated.
 - 2. Sprayed-On Mineral Fiber Fireproofing: Non-combustible (ASTM E136),

non-asbestos, mineral fiber mixed with binders, fillers and additives for spraying in place to form a rigid, porous fireproofing blanket with thermal insulating K value of 0.30 at 75° F.

3. Sealer: Manufacturer's standard sprayed-on resinous coating, for control of dusting without significant increase in surface burning characteristics. Color tinted to distinguish sealed fireproofing from unsealed.
- B. Manufacturer: Specifications are based on ISOLATEK INTERNATIONAL (CAFECO). Equal products manufactured by AMERICAN SPRAYED FIBERS INC. and AD FIRE PROTECTION SYSTEMS (SOUTHWEST FIREPROOFING) are acceptable providing the performance requirements specified herein are maintained.
- C. Performance Requirements: Factory mixed material applied to provide compliance with specified performance specifications and test criteria.
1. Dry Density: No less than 12 pcf.
 2. Deflection - ASTM E759: No cracks or delaminations.
 3. Bond Impact - ASTM E760: No cracks or delaminations.
 4. Air Erosion - ASTM E859: Maximum allowable weight loss of the fireproofing material is .025 gm./sq. ft.
 5. Compressive Strength - ASTM E761: The fireproofing shall not deform more than 10 percent when subjected to 500 psf compressive forces.
 6. Surface Burning Characteristics - ASTM E84:
Flame Spread: 10.
Smoke Developed: 0.
 7. Indentation Hardness - ASTM C569: Less than 0.50 inch.
 8. Cohesion/Adhesion - ASTM E736: Over 100 psf.
- D. Water: Clean; potable.
- E. Hour Ratings and UL Test Designs: As indicated on drawings.

2.02 CEMENTITIOUS TYPE

- A. Type: Spray applied cementitious fireproofing.
- B. Manufacturer: Specifications are based on MK-6 by GCP APPLIED TECHNOLOGIES INC. Equal products by ISOLATEK INTERNATIONAL (CAFECO), AD FIRE PROTECTION SYSTEMS (SOUTHWEST FIREPROOFING), CARBOLINE COMPANY or ALBI MANUFACTURING are acceptable providing the performance requirements specified herein are maintained.
1. Fibrous Ingredients: Asbestos or mineral wool are not permitted; comply with OSHA Regulation 29, FR, 1926.58.
- C. Factory mixed material applied to provide compliance with specified performance specifications and test criteria.

1. Dry Density: The field density shall be measured in accordance with ASTM Standard E605. Minimum average density shall be that required by the manufacturer, listed in the UL Fire Resistance Directory for each rating indicated, ICBO Evaluation Report, as required by the authority having jurisdiction, or minimum average 15 pcf, whichever is greater.
2. Deflection: Material shall not crack or delaminate when tested in accordance with ASTM E759.
3. Impact Resistance: Fireproofing material tested in accordance with ASTM E760 shall not crack or delaminate.
4. Bond Strength: Fireproofing, when tested in accordance with ASTM E736, shall have a minimum average bond strength of 200 psf and a minimum individual bond strength of 150 psf.
5. Air Erosion: Maximum allowable total weight loss of the fireproofing material shall be .005 g/ft² when tested in accordance with ASTM E859. Sample surface shall be "as applied" (not pre-purged) and the total reported weight loss shall be the total weight loss over a 24 hour period from the beginning of the test.
6. Compression: The fireproofing shall not deform more than 10 percent when subjected to 1200 psf compressive forces in accordance with ASTM E761.
7. Corrosion Resistance: Steel shall be tested in accordance with ASTM E937 without evidence of corrosion of the steel.
8. Surface Burning Characteristics - ASTM E84:
Flame Spread: 0.
Smoke Developed: 0.
9. Resistance to Mold: The fireproofing material shall be formulated at the time of manufacturing with a mold inhibitor. Fireproofing material shall be tested in accordance with ASTM G21 and shall show resistance to mold growth for a period of 28 days for general use.
10. Combustibility: Material shall have a maximum total heat release of 20 MJ/m² and a maximum 125 kw/m² peak rate of heat release 600 seconds after insertion when tested in accordance with ASTM E1354 at a radiant heat flux of 75 kw/m² with the use of electric spark ignition. The sample shall be tested in the horizontal orientation.
11. VOC Content: 0.0 g/L.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that surfaces to receive fireproofing material are free of oil, grease, loose mill scale, or other substances which may impair proper adhesion.
- B. Confirm compatibility of surfaces to receive fireproofing material.
- C. Verify clips, hangers, supports, sleeves and other items required to penetrate fireproofing are in place.
- D. Verify ducts, piping, equipment or other items which would interfere with

application of fireproofing materials are not positioned until fireproofing work is completed.

- E. Beginning of installation means acceptance of substrates and installation conditions.
- F. Testing and Inspection shall be in accordance with Technical Manual 12-A "Standard Practice for the Testing and Inspection of Field Applied Sprayed Fire-Resistive Materials; an Annotated Guide."

3.02 PROTECTION

- A. Protect adjacent surfaces and equipment from damage by overspray, fallout and dusting.
- B. Close off and seal ductwork in areas where fireproofing is being applied.
- C. Protect applied sprayed fireproofing from damage.

3.03 APPLICATION

- A. Apply fireproofing in strict accordance with manufacturer's instructions.
- B. Apply fireproofing in sufficient thickness to achieve rating with as many passes as necessary to cover with monolithic blanket of uniform density and texture.
- C. Apply adhesive as recommended by fireproofing manufacturer to horizontal surfaces.
- D. Apply sealer to all mineral fiber type fireproofing. Apply at rates as indicated by manufacturer.

3.04 CLEANING, PROTECTING, AND REPAIR

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protect fireproofing, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at time of Substantial Completion.
- C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect fireproofing and patch any damaged or removed areas.

3.05 CLEANING

- A. After completion of fireproofing work, equipment shall be removed and all exposed wall and floor areas shall be left in a broom-clean condition.

END OF SECTION

SECTION 07 81 23

INTUMESCENT FIREPROOFING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Preparing surfaces to receive fireproofing.
- B. Protection of adjacent surfaces from overspraying.
- C. Spray application of intumescent, fire-resistive coatings on interior, exposed structural steel wide flange columns, beams, pipe columns, and related exposed structural steel to provide rated fireproofing.
- D. Application of decorative topcoat.

1.02 RELATED SECTIONS

- A. Structural Steel: Section 05 12 00.
- B. Firestopping: Section 07 84 00
- C. Sustainable Design Requirements: Section 01 81 13
- D. VOC Limits: Section 01 81 16.

1.03 REFERENCES

- A. American Society for Materials and Testing
 - 1. ASTM D 256: Impact Resistance Test.
 - 2. ASTM D 638: Tensile Strength.
 - 3. ASTM D 695: Standard Test Method for Compressive Strength.
 - 4. ASTM D 790: Standard Test Method for Flexural Strength.
 - 5. ASTM D 1002: Standard Test Method for Bond Strength.
 - 6. ASTM D 1044: Standard Test Method for Abrasion Resistance Test.
 - 7. ASTM D4541: Bond Strength.
 - 8. ASTM E84: Test Method for Surface Burning Characteristics of Building Materials.
 - 9. ASTM E119: Fire Tests of Building Construction and Materials.
- B. Underwriters' Laboratories
 - 1. U.L.: Fire Resistance Directory.
- C. Steel Structures Painting Council (SSPC)

1. SSPC-SP-1 Solvent Cleaning.
2. SSPC-SP-2 Hand Tool Cleaning.
3. SSPC-SP-3 Power Tool Cleaning.
4. SSPC-SP-6 Commercial Blast Cleaning.

1.04 SUBMITTALS

- A. Product Data: Submit for all items.
 1. Indicate product characteristics, performance, and limitation criteria.
- B. Submit manufacturer's installation instructions.
- C. Submit manufacturer's certification that products meet or exceed specified requirements.
- D. Submit certified test reports indicating the following:
 1. Bond Strength of Fireproofing: ASTM E760, tested to provide minimum bond strength twenty times weight of fireproofing materials.
 2. Fire test reports of fireproofing application to substrate materials similar to project conditions.
 3. U.L. Design Listings.
 4. Submit applicator's current certification, by product manufacturer, as a factory trained and manufacturer approved installer of this product.
- E. Sample: Submit 12" x 12" sample of fireproofing indicating thickness, density, fire rating, and finish texture that will be used in the finished project. Resubmit until approved by Architect. Approved sample will demonstrate minimum quality of work.
- F. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

1.06 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum five years documented experience.
- B. Applicator: Company specializing in applying the work of this Section with minimum 3 years documented experience and approved by manufacturer.
- C. Field Tests: Installer shall hire and pay for the services of an independent testing agency to test random samples, as applied, to verify thickness of intumescent fireproofing, in accordance with SSPC-PA2, Steel Structures Painting Council, "Paint Application Specification No.2 - Measurement of Dry Paint Thickness with Magnetic Gages".

1. Testing agency must be approved by Architect prior to their being retained by the Installer.
2. Testing and Inspection shall be in accordance with AWCI Technical Manual 12-B "Standard Practice for the Testing and Inspection of Field Applied Thin-Film Intumescent Fire-Resistive Materials; an Annotated Guide.

1.07 REGULATORY REQUIREMENTS

- A. Conform to applicable code for fire resistance ratings.
- B. Submit certification of acceptability of fireproofing materials to authority having jurisdiction and to Architect.

1.08 MOCKUP

- A. Provide mockup of applied intumescent fireproofing.
- B. Provide testing and analysis of mockup to manufacturer's published data.
- C. Apply sample section of 10 sq ft in size to representative substrate on site.
- D. Comply with project requirements as to thickness, density, fire rating, and finish texture. [Apply decorative topcoat to half of the mockup.]
- E. Examine installation to determine variances.
- F. If accepted, mockup will demonstrate minimum standard for the Work for materials and execution and to demonstrate finish. Approved mockup may remain as part of the Work.
 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. When temperature is less than 40° F, follow manufacturer's field instructions for cold weather installation. So not apply when surface temperature is less than 5° F above the dew point.
- B. Provide ventilation in areas to receive fireproofing during and 72 hours, minimum, after application, to dry materials and dissipate solvent odors.
- C. Maintain non-toxic, unpolluted working area. Provide temporary enclosure to prevent spray from contaminating air.

1.10 SEQUENCING AND SCHEDULING

- A. Sequence work in conjunction with placement of ceiling hanger tabs, mechanical component hangers, and electrical components.

- B. Steel surfaces with less than 3 feet clear working access may necessitate applying materials to inaccessible surfaces prior to erection of the finished steel members.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Specifications are based on AD Firefilm III manufactured by the CARBOLINE COMANY. Equal system manufactured by BASF, CAFCO, HILTI INC. SHERWIN WILLIAMS or ALBI MANUFACTURING is acceptable providing it meets the performance requirements specified herein.

2.02 MATERIALS

- A. Intumescent Fireproofing: Water based, factory mixed, asbestos free, intumescent material blended for uniform texture; conforming to the following requirements:
 - 1. Bond Strength: ASTM D4541, minimum 125 psi.
 - 2. Impact Resistance: ASTM D2794, 152 in-lb.
 - 3. Surface Burning Characteristics, ASTM E84: Class A.
 - 4. Durometer Hardness: ASTM D2240, minimum 65-70 Shore D.
 - 5. Abrasion Resistance: ASTM D4060, maximum 103 mg loss at 1000 cycles.
 - 6. VOC: 0 lbs./gal.
 - 7. Density: Minimum 89 pcf.
 - 8. Compressive Strength: ASTM E761, Minimum 755 psi.
- B. Primer: Type recommended or approved by fireproofing manufacturer.] [See Section 05 12 00.
- C. Top Coat: Type as recommended by intumescent fireproofing manufacturer. Prior to applying Top Coat, finely sand base coat per manufactures recommendations to achieve smoothest finish possible.
 - 1. Colors: As selected by Architect.

PART 3 EXECUTION

3.01 INSPECTION

- A. Verify that surfaces are ready to receive work.
- B. Verify that clips, hangers, supports, sleeves, and other items required to penetrate fireproofing are in place.
- C. Verify ducts, piping, equipment, or other items which would interfere with application of fireproofing are not positioned until fireproofing work is complete.

- D. Verify that voids and cracks in substrate are filled, and projections are removed where fireproofing is exposed to view as a finish material.
- E. Beginning of installation means applicator accepts existing substrate.

3.02 PREPARATION

- A. Work in accordance with SSPC guidelines SP-1, SP-2, SP-3, or SP-6 as appropriate to prepare substrate.
- B. Clean substrate of dirt, dust, grease, oil, loose material, or other matter which may effect bond of fireproofing.
- C. Seal all penetrations or open ended fireproofing termination by chamfering at a 45 degree angle and sealing with high heat silicone sealant.

3.03 PROTECTION

- A. Protect floor areas from this Work by completely covering with tarps or 4 mil polyethylene sheets.
- B. Protect adjacent surfaces and equipment from damage by overspray, fall-out, and dusting.
- C. Close off and seal ductwork in areas where fireproofing is being applied.

3.04 APPLICATION

- A. Apply primer and fireproofing in accordance with manufacturer's instructions. Do not apply to surfaces that would prohibit proper adhesions.
- B. Apply primer in accordance with primer manufacturer's recommendations. Provide primer "cut-back" three inches for bolted connections and 12 inches for welded connections.
- C. Apply fireproofing in sufficient thickness to achieve **2 hour fire rating** unless otherwise indicated, with as many passes necessary to cover with monolithic blanket of uniform hardness, density and texture. Spray and roll smooth the finished surface.

3.05 FIELD QUALITY CONTROL

- A. Inspections will be performed to verify compliance with requirements. Inspection and Testing shall be in accordance with AWCI Technical Manual 12-B "Standard Practice for the testing and Inspection of Field Applied Thin-Film Intumescent Fire-resistive materials".
- B. Patch fireproofing, which has been cut away to facilitate work of other trades, so as to maintain complete coverage of full thickness on appropriate substrate.

- C. Correct unacceptable Work and provide further inspection to verify compliance with requirements, at no cost.

3.06 CLEANING

- A. Clean work under provisions of Section 01 74 00.
- B. Remove excess material, overspray, droppings, and debris.
- C. Remove fireproofing from materials and surfaces not specifically required to be fireproofed.
- D. Leave work ready to receive decorative finishing.

END OF SECTION

SECTION 07 84 00

FIRESTOPPING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide firestop systems consisting of a material, or combination of materials installed to retain the integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and/or hot gases through penetrations, blank openings, construction joints, or at perimeter fire containment in or adjacent to fire-rated barriers in accordance with the requirements of the Building Code for this project.
- B. Firestop systems shall be used in locations including, but not limited to, the following:
 - 1. Penetrations through fire resistance rated floor and roof construction including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 2. Penetrations through fire resistance rated walls and partitions including both empty openings and openings containing cables, pipes, ducts, conduits, and other penetrating items.
 - 3. Penetrations through smoke barriers and construction enclosing compartmentalized areas involving both empty openings and openings containing penetrating items.
 - 4. Sealant joints in fire resistance rated construction.
 - a. Gaps between the top of walls and ceilings, floor or roof assemblies. Includes filling metal deck flutes where applicable.
 - b. Openings around structural members which penetrate floors or walls.
 - c. Control joints.
 - d. Floor joints not requiring expansion joints.
 - 5. Walls enclosing plenum spaces, rated and unrated.
 - a. Gaps between the top of walls and ceilings or roof assemblies.
 - b. Openings around items which penetrate walls.
 - 6. Other locations indicated.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Masonry: Section 04 00 00.
- C. Gypsum Wallboard Partitions: Section 09 21 16.

- D. Deflection tracks for metal stud fire walls: Section 09 21 16.
- E. Plumbing: Division 22.
- F. HVAC: Division 23.
- G. Electrical: Division 26.

1.03 DEFINITIONS

- A. Firestopping: Material or combination of materials (assembly) to retain integrity of fire rated construction by maintaining an effective barrier against the spread of flame, smoke, and gases.
- B. Through-penetration: Any penetration of a fire-rated wall or floor that completely breaches the barrier.
- C. Through-Penetration Firestop Systems: Material or combination of materials which are field constructed of fill, void, or cavity materials and forming materials, designed to resist fire spread when installed as a complete firestop system.
- D. Through-Penetration Firestop Devices: Factory built products designed to resist fire spread. Complete when delivered to site; ready for installation.
- E. System: The use of a specific firestop material or combination of materials in conjunction with a specific wall or floor construction type and a specific penetrant(s).
- F. Barrier: Any bearing or non-bearing wall or floor that has an hourly fire and smoke rating.
- G. Membrane-penetration: Any penetration in a fire-rated wall that breaches only one side of the barrier.
- H. Fire Resistive Joint: Any gap, joint, or opening, whether static or dynamic, between two fire rated barriers including where the top of a wall meets a floor; wall edge to wall edge applications; floor edge to floor edge configurations; floor edge to wall.
- I. Perimeter Barrier: Any gap, joint, or opening, whether static or dynamic, between a fire rated floor assembly and a non-rated exterior wall assembly.

1.04 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. E84: Test Method for Surface Burning Characteristics of Building Materials.
 - 2. E119: Fire Tests of Building Construction Materials.

3. E814: Fire Tests of Through Penetration Fire Stops.
 4. E2174: Standard Practice for On-Site Inspection of Installed Fire Stops
- B. National Fire Protection Association (NFPA)
1. 70: National Electrical Code (NEC)
 2. 101: Code for Safety to Life from Fire in Buildings and Structures (Life Safety Code).
- C. Underwriters' Laboratories (UL)
1. UL1479: Fire Tests of Through Penetration Fire Stops.
 2. UL2079: Tests for Fire Resistance of Building Joint Systems
- D. Firestop Design Classification References
1. Warnock Hersey Listing Manual
 2. UL Fire Resistance Directory - Vol. 1
- E. Factory Mutual (FM) Research
1. FM Approval Standard of Firestop Contractors – Class 4991

1.05 SYSTEM PERFORMANCE REQUIREMENTS

- A. System Design and Product Selection: Contractor responsible for selection of products and tested designs that fulfill the firestopping requirements of this section.
- B. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gasses.
- C. F-Rated Through Penetration Firestop Systems: Provide through penetration firestop systems with F ratings indicated as determined per ASTM E814, UL 1479 but not less than that equaling or exceeding the fire resistance rating of the constructions penetrated.
- D. T-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas. T -rated assemblies are required where specified by codes or where the following conditions exist:
1. Where firestop systems protect penetrations located outside of wall cavities.
 2. Where firestop systems protect penetrations located outside fire resistive shaft enclosures.
 3. Where firestop systems protect penetrations located in construction containing doors required to have a temperature rise rating.

4. Where firestop systems protect penetrating items larger than a 4 inch diameter nominal pipe or 16 square inch in overall cross sectional area.
- E. L – Rated Through-Penetration Firestop Systems: Provide firestop systems with L ratings, in addition to F and T ratings, as determined per UL 1479, where indicated by Code.
- F. Fire Resistive Joint Sealants: Provide joint sealants with fire resistance ratings indicated, as determined per ASTM E119, UL 1479 and UL 2079 but not less than that equaling or exceeding the fire resistance rating of the construction in which the joint occurs.
- G. For firestopping exposed to traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions and will meet load requirements.
 1. For piping penetrations for plumbing and wet pipe sprinkler systems, provide moisture-resistant through-penetration firestop systems.
 2. For floor penetrations with annular spaces exceeding 4 inches in width and exposed to possible loading and traffic, provide firestop systems capable of supporting floor loads involved either by installing floor plates or by other means.
 3. For penetrations involving insulated piping, provide through-penetration firestop systems not required removal of insulation.
- H. For through-penetration firestop systems exposed to view, provide products with flame spread of less than 25 and smoke developed ratings of less than 450, as determined per ASTM E 84.
- I. Where there is no specific third party tested and classified firestop system available for an installed condition, obtain from the firestopping material manufacturer an Engineering Judgment (EJ) to be submitted to the Approving Authority and Authority Having Jurisdiction for approval prior to installation. The EJ shall follow International Firestop Council (IFC) guidelines.
- J. Mold Resistance: Provide penetration firestopping with mold and mildew resistance rating of one (1) or less as tested per ASTM G21.

1.06 SUBMITTALS

- A. Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL or other nationally recognized independent testing laboratories firestop systems to be used, and manufacturer's installation instructions.
 1. Manufacturer's engineering judgement identification number and drawing details when no tested system is available.

- B. Shop drawings detailing materials, installation methods, and relationships to adjoining construction for each through-penetration firestop system, and each kind of penetrating item. Include firestop design designation of qualified testing and inspecting agency evidencing compliance with requirements for each condition indicated.
 - 1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each through-penetration firestop configuration for construction and penetrating items.
 - 2. Where project conditions require modification of qualified testing and inspecting agency's illustration to suit a particular through-penetration firestop condition, submit illustration approved by firestopping manufacturer with modifications marked.
- C. Product certificates signed by manufacturers of firestopping products certifying that their products and installation comply with specified requirements. Certification shall be signed by the Installer.
- D. Certification is required from manufacturer that Installer has been trained in the handling and installation of their products.
- E. Firestopping installer shall provide a letter of certification stating that all firestopping systems have been installed in accordance with the Contract Documents.
- F. Special Environmental Requirements: Submit the following in accordance with Section 01 81 13:
 - 1. Product Data: For Sealant and Mastics, documentation indicating VOC Content

1.07 QUALITY ASSURANCE

- A. Meet requirements of ASTM E814 or UL 1479 tested assemblies that provide a fire rating equal to that of construction being penetrated and other ASTM Standards as applicable for the installation.
 - 1. ASTM E84 "Test Method for Surface Burning Characteristics of Building Materials."
 - 2. ASTM E119 "Test Methods for Fire Tests of Building Construction and Materials."
- B. Requirements of Regulatory Agencies: Comply with the applicable requirements for fire separations and penetrations of the following:
 - 1. OBC: See Chapter 6, Table 601 and 602 for the time rated construction requirements.
 - 2. NFPA 70.
 - 3. NFPA 101.

- C. Installer: Specialist in the installation of type(s) of firestopping required; trained and approved by the firestop manufacturer.
 - 1. Shown to have successfully completed not less than 5 firestop projects similar in type and size to that of this Project.
- D. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy".
- E. Do not use any product containing solvents that require hazardous waste disposal or which after curing dissolve in water.
- F. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.
- G. Single Source Responsibility: Obtain firestop systems for each kind of penetration and construction condition indicated from a single primary firestop systems manufacturer.
 - 1. Materials of different manufacture than allowed by the tested and listed system shall not be intermixed in the same firestop system or opening.
 - 2. Tested and listed firestop systems are to be used before an Engineering Judgment (EJ) or Equivalent Fire Resistance Rated Assembly (EFRRA) is installed.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver firestopping undamaged products to project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacturer; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi-component materials.
 - 1. Comply with recommended procedures, precautions, or remedies described in material safety data sheets as applicable.
- B. Store and handle firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
- C. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS

- A. Environmental Conditions: Do not install firestopping when ambient or substrate temperatures are outside limits permitted by firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilation: Ventilate firestopping per firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.

1.10 SEQUENCING AND SCHEDULING

- A. Coordinate this Work as required with work of other trades. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate through-penetration firestop systems.
- B. Do not cover up those firestopping installations that will become concealed behind other construction until Owner's inspection agency and authorities having jurisdiction, if required, have examined each installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide products from one or more of the following manufacturers according to the suitability of the product for the intended purpose.
 - 1. W.R. GRACE (Flamesafe System)
 - 2. FYRESLEEVE INDUSTRIES
 - 3. TREMCO
 - 4. HILTI, INC.
 - 5. SPECIFIED TECHNOLOGIES (STI).
 - 6. 3M FIRE PROTECTION PRODUCTS.
 - 7. THE RECTORSEAL CORPORATION (Metacaulk and Bio Fireshield).
 - 8. NELSON FIRESTOP PRODUCTS.

2.02 MATERIALS - GENERAL

- A. As selected by Contractor. See SYSTEM PERFORMANCE REQUIREMENTS in Part 1 hereinbefore.
- B. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.
 - 1. All materials shall comply with ASTM E814 or E 119 (UL 1429), and shall be manufactured of nontoxic, non-hazardous, asbestos free materials, and unaffected by water or moisture when cured.
 - 2. Primers: Conform to manufacturer's recommendations for primers required for various substrates and conditions.

3. Backup Materials: Backup materials, supports, and anchoring devices shall be provided as required by UL testing.
 4. Provide all firestopping sealant materials within the VOC limits specified in Section 01 81 13.
- C. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire resistance rated systems. Accessories include but are not limited to the following items:
1. Permanent forming/damming/backing materials must be noncombustible and may include the following:
 - a. Semi-refractory fiber (mineral wool) insulation.
 - b. Sealants used in combination with other forming/damming materials to prevent leakage of fill materials in liquid state.
 - c. Joint fillers for joint sealants.
 2. Temporary forming materials.
 3. Substrate primers.
 4. Collars.
 5. Steel sleeves.

2.03 RATED STUD DEFLECTION ASSEMBLY

- A. Deflection Track Ceiling Runner: See Section 09 21 16.
- B. Gypsum Wallboard: See Section 09 21 16.
- C. Insulation: Mineral wool, 3.5 PCF minimum density.
- D. Firestopping Compound: Types as manufactured by listed manufacturers in 2.01A herein.
- E. Accessories: Provide all fasteners, clips and other related installation accessories as required for a complete UL approved assembly.

2.04 MIXING

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

PART 3 EXECUTION

3.01 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 firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.

3.02 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing firestopping to comply with recommendations of firestopping manufacturer and the following requirements:
 - 1. Remove all foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of firestopping.
 - 2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with 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 through-penetration firestop system 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 through-penetration firestop systems from contacting adjoining surfaces that will remain exposed on completion of work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from firestop system materials. Remove tape as soon as possible without disturbing firestop systems seal with substances.

3.03 INSTALLING THROUGH-PENETRATION FIRESTOPS

- A. General: Comply with the "System Performance Requirements" in Part 1 and the through-penetration firestop manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install forming/damming materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross sectional shapes and depths required to achieve fire ratings of designated through-penetration firestop systems. After installing fill materials, remove combustible forming materials and other accessories not indicated as permanent components of firestop systems.

- C. Install fill materials for through-penetration firestop systems by proven techniques to produce the following results:
 - 1. Completely fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
 - 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 Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.04 INSTALLING FIRE RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" in Part 1 with ASTM C1193, and with the sealant manufacturer's installation instructions and drawings -pertaining to products and applications indicated.
- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint.
Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

3.05 INSTALLING PERIMETER FIRE BARRIER SYSTEMS

- A. General: Comply with "System Performance Requirements" article in Part 1 and with the firestop manufacturer's installation and drawings pertaining to products and applications indicated.
- B. Install metal framing, curtain wall insulation, mechanical attachments, safing materials and firestop materials as applicable within the system design.

3.06 IDENTIFICATION

- A. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where

labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:

1. The words "Warning - Through-Penetration Firestop System - Do Not Disturb. Notify Building Management of Any Damage".
2. Contractor's name, address, and phone number.
3. Through-penetration firestop system designation of applicable testing and inspecting agency.
4. Date of installation.
5. Through-penetration firestop system manufacturer's name.

3.08 FIELD QUALITY CONTROL

- A. The inspector shall advise the contractor of any deficiencies noted.
- B. Do not proceed to enclose firestopping with other construction until inspection agency has verified that the firestop installation complies with the requirements.
- C. Where deficiencies are found, repair or replace the firestopping so that it complies with requirements of tested and listed system design.

3.09 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Contract Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop system complying with specified requirements.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.01 SCOPE

- A. General: Prepare joints and apply sealant at all locations which normally require sealing to prevent infiltration of air, water, and insects and to reduce transmission of sound.
- B. Apply sealants to exterior and interior non-static joints. Do not seal normal drainage points or weep holes. Include the following:
 - 1. masonry control and expansion joints
 - 2. stone joints
 - 3. around louvers, exterior trim, windows, door frames, aluminum entrances and other penetrations or openings in exterior walls
 - 4. threshold bedding
 - 5. joints between different wall materials
 - 6. termination in joints between wall materials and adjacent materials
 - 7. perimeter seal of metal door and borrowed light frames where they abut masonry
 - 8. other applications indicated
- C. Sealing of joints in concrete construction, including sidewalk joints, concrete paving joints and floor joints, tile floor expansion joints and other floor joints as indicated.
- D. Sealing of all exterior and interior locations where materials or equipment do not fit together or against the adjoining surface with a hairline joint.
- E. Caulking of interior static joints. Include the following:
 - 1. intersection of exposed structure or ceiling construction with masonry walls
 - 2. perimeter seal of metal door and borrowed light frames where they abut drywall
 - 3. intersection of grilles and louvers with adjacent surfaces
 - 4. intersection of cabinets, casework and similar items applied to or recessed in walls
 - 5. other applications indicated
- F. Sealing between wall and wall mounted plumbing fixtures and floor and floor mounted plumbing fixtures.
- G. Sealing at intersection of plastic laminate tops and side/backsplashes to each other and to wall.

- H. Sealing at reglets and flashings set in sealant.
- I. Seal penetrations through ceramic tile work.
- J. Trim exposed masonry flashing.
- K. Joints, perimeter, and penetrations in fire-rated assemblies. Use firestopping specified in Section 07 84 00.
- L. Joints, perimeter, and penetrations in sound-rated assemblies. See Section 09 21 16.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Firestopping Sealants: Section 07 84 00.

1.03 GENERAL PERFORMANCE

- A. Except as otherwise indicated, joint sealant is required to establish and maintain airtight and waterproof continuous seals on a permanent basis, within recognized limitations of wear and aging as indicated for each application.
- B. Failures of installed sealant to comply with this requirement will be recognized as failures of both materials and workmanship.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions.
 - 1. Certification, in the form of manufacturer's standard data sheet or by letter, stating that each type of compound and sealant to be furnished complies with these specifications.
 - 2. Statement that each product to be furnished is recommended for the application shown and is compatible with all materials to which applied.
 - 3. Instructions for handling, storage, mixing, priming, installation, curing and protection for each type of sealant.
- B. Submit manufacturer's color chart for color selections.
- C. Submit cured sealant samples in colors required for the work. Architect's approval will be for color only. Compliance with other requirements is the Contractor's responsibility.
- D. Stone and sealant test reports for each type of stone used.

1.05 STORAGE AND HANDLING

- A. Prevent inclusion of foreign matter or the damage of materials by water or breakage.
- B. Procure and store in original containers until ready for use.
- C. Materials showing evidence of damage shall be rejected.

1.06 WARRANTY

- A. **Installer's Warranty:** Contractor and joint sealant applicator shall jointly warranty joint sealant work for two (2) years from date of final acceptance. Warranty shall include replacing joints which fail to perform as airtight; or fail in adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration and stain resistance, general durability or any other form of apparent deterioration (excluding inherent qualities and limitations clearly specified in the manufacturer's submitted product data).
- B. **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 for ten (10) years from date of final acceptance
- C. 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.
- C. Comply with these specifications for repair or replacement of work.

1.07 STONE SEALANT TESTS

- A. Provide test reports per ASTM E575 on the stone and sealant materials and methods proposed for this project which will demonstrate successful behavior of sealant systems under limited design stresses with respect to adhesion, compatibility, migration, stability, cohesion, staining, recovering and any other deleterious effects.
- B. Provide a procedure detailing cleaning, priming, taping, tooling and other steps recommended to ensure satisfactory function and appearance.

- C. Submit documentation of product performance as required per ASTM C920.
- D. Perform the same testing but substitute actual job substrate materials in lieu of standard test materials, e.g., in ASTM C1248, use job stone samples in lieu of white cement mortar. Test long term behavior, under compression.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Definition: The term "sealant" will be understood to be an elastomeric type. The term "caulk" will be understood to be a synthetic resin base of highest quality acrylic latex compound.
- B. General
 - 1. 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.
 - 2. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC contents. See Section 01 81 13.
 - 3. 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.
 - 4. Colors: As selected by Architect from manufacturer's full range; selected colors to match adjacent materials.
 - 5. Where exposed to foot traffic, select materials of sufficient strength and hardness to withstand stiletto heel traffic without damage or deterioration of sealant system.
- C. Manufacturers: BOSTIK; DOW CORNING CORPORATION; EUCLID CHEMICAL; TREMCO MANUFACTURING COMPANY; GENERAL ELECTRIC COMPANY/MOMENTIVE; SIKA CHEMICAL CO.; MAMECO INTERNATIONAL; BASF BUILDING SYSTEMS; VULCHEM.
 - 1. Manufacturer's listed under the following applications are for basis of design. Equal products by above listed manufacturers are acceptable.
- D. Exterior Vertical and Overhead Joints: Single-component neutral curing silicone sealant meeting ASTM C920, Type S, Grade NS, Class 50.
 - 1. DOW 791
 - 2. GE SCS9000 Silpruf NB
 - 3. TREMCO Spectrum 2
 - 4. PECORA 895 NST

- E. Horizontal Wearing Expansion Joints; Interior and Exterior
 - 1. Type: Two-part polyurethane based elastomeric sealant, complying with ASTM C920, Class 25, Type M, Grade P. Self-leveling or gun grade type as recommended by manufacturer for application shown.
 - 2. Location: For joints in exterior concrete pavements, sidewalks and interior floors.
 - a. BOSTIK Chem-Calk 555-SL
 - b. EUCLID Eucolastic II
 - c. SONNEBORN Sonolastic SL 2
 - d. TREMCO THC 900/901

- F. Interior Vertical and Overhead Joints: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
 - 1. DOW 799
 - 2. GE SCS2000 SilPruf
 - 3. TREMCO Spectrum 2
 - 4. PECORA 895 NST

- G. Sealants at Countertops, Backsplashes and Plumbing Fixtures: ASTM C920, Type S, Grade NS, Class 25. Provide with mildew resistive additive.
 - 1. Sealant Colors
 - a. Countertops and Backsplashes: Clear.
 - b. Plumbing Fixtures: white, unless colored fixtures are selected, then sealant color shall match fixture color.
 - 2. Manufacturers/Products
 - a. DOW 786
 - b. GE SCS1700 Sanitary.
 - c. SONNEBORN Sonolastic Omnipus
 - d. TREMCO Tremsil 600
 - e. PECORA 898 Sanitary Sealant

- H. Caulk Joints – Interior, Static - Paintable: High quality acrylic latex compound, non-staining non-bleeding complying with ASTM C834, as supplied by one of the above listed manufacturers.

2.02 ACCESSORIES

- A. Joint Primer/Sealer: Non-staining type, recommended by sealant manufacturer; compatible with joint forming material.

- B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming material.

- C. Bond Breaker Tape: Pressure sensitive polyethylene or plastic tape, recommended by sealant manufacturer, to suit applications where bond to

substrate should be avoided for proper joint sealant performance.

- D. Joint Backing: Compressible rod stock conforming to ASTM C1330, Type B; material 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
- E. Solvents: Cleaning agent recommended by the manufacturer of the sealant in writing to Architect.

PART 3 EXECUTION

3.01 INSPECTION

- A. Pre-Installation Meeting
 - 1. Prior to sealant installation, and at the Contractor's direction, meet at project site to review material selections, joint preparations, installation procedures, weather conditions and coordination with other trades.
 - 2. Include sealant installer, Contractor, Architect, manufacturer's representative and representatives of other trades or subcontractors affected by the sealant installation.
- B. Examine substrates and installation conditions. Do not proceed with joint sealant work until unsatisfactory conditions have been corrected.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Clean, seal and prime surfaces in accordance with manufacturer's recommendations. Confine primer/sealant to areas of sealant bond.
- B. Remove dust, dirt, loose coatings, moisture and other substances which could interfere with sealant bond.
- C. Remove lacquers and protective films from metal surfaces.
- D. Architectural Concrete and Stone: Apply masking around joints to protect adjacent surfaces from defacement and staining during sealing operations. Repair damaged masking until sealant is installed.

3.03 INSTALLATION

- A. Apply joint sealant as late as possible in construction, preceding painting and following cleaning operations. Do not apply sealant during inclement weather conditions or when temperature is above or below manufacturer's limitations for installation.

- B. Install joint sealant materials and accessories in strict accordance with manufacturer's installation instructions.
- C. Set joint filler units at depth or position in joint as indicated to coordinate with other work. Do not leave voids or gaps between ends of joint filler units.
- D. Install sealant backer rod, except where recommended to be omitted by sealant manufacturer for application indicated. Use rod diameter that will cause compression when installed.
- E. Install bond breaker tape and where required by manufacturer's recommendations to ensure that sealants will perform as intended.
- F. Apply joint sealants in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of joint bond surfaces on both sides. Fill sealant rabbet to a slightly concave surface, slightly below adjoining surfaces. At horizontal joints between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt. Hand tool and finish all joints.
- G. Install joint sealants within recommended temperature ranges and to depths indicated or when not indicated, as recommended by sealant manufacturer. For normal moving vertical and horizontal joints, fill joints to a depth equal to 50% of joint width, but not more than 1/2" deep nor less than 1/4" deep, measured at the center section of bead.
- H. Confine materials to joint areas with masking tapes or other acceptable methods. Remove excess sealant materials promptly as work progresses and clean adjoining surfaces.
- I. Masonry Flashing: Where sealant joint is in direct contact with flexible masonry flashing, trim flashing flush with face of masonry after sealant is installed and cured. Verify during this procedure that weep holes have not been compromised during sealing operations.

3.04 CLEANING

- A. Upon completion, remove and dispose of masking materials; remove all excess sealing materials; clean adjacent materials of all soil and stain resulting from sealing operations.
 - 1. Replace damaged material and material which cannot be properly cleaned.

END OF SECTION

SECTION 08 11 13

HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
 - 1. Standard steel doors and frames.
 - 2. Fire rated steel doors and frames.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Wood Doors: Section 08 14 00.
- C. Door Hardware: Section 08 71 10.

1.03 QUALITY ASSURANCE

- A. Provide metal doors and frames fabricated by one manufacturer to ensure uniformity in appearance and construction.
- B. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard.
 - 1. ANSI: American National Standards Institute.
 - 2. ASTM: American Society for Testing and Materials.
 - 3. SDI: Steel Door Institute.
 - 4. DHI: Door and Hardware Institute.
- C. Fire rated doors and frames: Provide units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per ASTM E152, and are labeled and tested by Factory Mutual (FM), Underwriters Laboratories (UL), or other National Recognized testing agency. Units shall bear testing agency labels.
 - 1. Provide UL labels permanently fastened on each door and frame which is within the size limitations established by NFPA and UL for labeling.
 - 2. Provide anchors for UL labeled frames required by the authority having jurisdiction.

- D. Sound transmission class: Provide certificate that door assemblies have been tested in accordance with ASTM E413 and ASTM E1408 to achieve minimum sound transmission class (STC) specified.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of standard metal door and frame required.
- B. Submit shop drawings. Identify doors and frames in accordance with drawing door schedule. Indicate:
 - 1. Elevations of each door design.
 - 2. Hardware locations, installation methods and hardware reinforcements.
 - 3. Dimensions and shapes of materials, anchorage and fastening methods.
 - 4. Door frame types, profile of molding and details.
 - 5. Wall opening construction and connection to other work.
- C. Certificates documenting:
 - 1. Fire testing: Fire-rated units have been successfully tested in accordance with Paragraph 1.03C.
- D. Special Environmental Requirements: Submit the following in accordance with Section 01 81 13.
 - 1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than [25] <Insert value> percent.
 - 2. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
 - 3. Environmental Product Declaration: For each product.
 - 4. Health Product Declaration: For each product.
 - 5. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver metal doors and frames cartoned or crated for protection during transit and job delivery. Provide sealed wrapping for factory.
- B. Store doors and frames inside the building in a dry, well-ventilated area. Protect from damage, wetting and deterioration in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Manufacturer: STEELCRAFT MFG. CO; CECO CORP.; PIONEER INDUSTRIES; REPUBLIC BUILDERS PRODUCTS CORP.; CURRIES; BLACK MOUNTAIN DOOR.

2.02 MATERIALS AND COMPONENTS

A. Materials

1. Metallic-Coated Steel: Commercial quality, hot dipped, A-60 galvanized steel in accordance with ASTM A653, "Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process".
2. Cold-Rolled Steel: Commercial Steel in accordance with ASTM A1008, "Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-Alloy and High Strength with Improved Formability"; Type B; suitable for exposed applications.
3. Hot-Rolled Steel Sheet: Commercial Steel in accordance with ASTM A1011, "Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High Strength Low-Alloy with Improved Formability, and Ultra-High Strength"; Type B; free of scale, pitting, or surface defects; pickled and oiled.
4. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B Comply with SDI 100 material and fabrication recommendations and as specified.

C. Standard Metal Doors

1. Provide flush seamless type doors with seamless faces and edges, 1-3/4" thick, internally reinforced. Top and bottom closed flush.
 - a. Provide glass lites where indicated.
2. Exterior Doors: Provide doors complying with requirements of ANSI 250.8 for Level 3 (extra heavy duty) and Model 2 (seamless design) and ANSI A250.4 for physical endurance Level A.
 - a. Fabricated from metallic-coated (galvanized) steel face sheets, mill phosphatized
 - b. Core: Minimum 1-1/2 lb. density polyurethane or polyisocyanurate; thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu when tested according to ASTM C 1363.
 - c. Tops and bottoms closed with flush galvanized steel caps.
3. Interior Doors: Provide doors complying with requirements of ANSI 250.8 for Level 3 (extra heavy duty) and Model 2 (seamless design) and ANSI A250.4 for physical endurance Level A
 - a. Fabricated from cold rolled steel; stretcher-leveled standard flatness.
 - b. Kraft resin impregnated honeycomb or polystyrene slab core bonded to door face sheets with thermal adhesive.
4. Hardware Reinforcements: Meet or exceed ANSI/SDI A250.6 requirements.

5. Edge Profile: 1/8" bevel in 2" core on hinge and lock edges.
6. Astragals for pairs of doors: Manufacturer's standard for labeled and non-labeled openings. Factory prepare for hardware as scheduled in Section 08 71 10. Mount astragal to overlap on key side of doors.
7. Louvers: Inserted fixed type, minimum free area of 38%.

D. Standard Metal Frames

1. Interior Frames: Fabricated from either commercial grade cold-rolled steel conforming to ASTM A1008 or commercial grade hot-rolled and pickled steel conforming to ASTM A1011, minimum 0.053" thick.
 - a. Non-Rated Type: Knock-down type.
 - b. Rated Type: Set-up and welded type, all miters clean cut, reinforced, fully seam welded with exposed welds ground smooth.
2. Exterior Frames: Fabricated from commercial grade metallic –coated (galvanized) steel conforming to ASTM A653, minimum 0.053" thick, and shall have an A-60 zinc coating (0.30 ounces per square foot per side). Set-up and welded type, all miters clean cut, reinforced, fully seam welded with exposed welds ground smooth.
 - a. Back prime frames with asphaltic emulsion.
3. Profile: Double rabbet, jamb face and depth as indicated.
4. Hardware Reinforcements: Meet SDI 107 requirements.
5. Transoms and Sidelites: Provide for loose glazing stops to be secured with countersunk screws.
 - a. Provide 3/4" stops for sidelites and transoms where the individual glass areas for fire rated openings exceeds the allowable area for 5/8" stops.

D. Fire Doors and Frames

1. Comply with Fire-Rated Door Requirements specified herein before (Paragraph 1.03C).
2. Agency: Underwriter's Laboratories.
3. Classification: As indicated.
4. Conform to requirements of Standard Metal Door and Frames specified herein.

2.03 FABRICATION

- A. Reinforce and prepare doors and frames to receive hardware. Fit for hardware at the factory to template. Do all necessary cutting, drilling and tapping. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.
- B. Provide surfaces smooth and free from defects, warp or buckle with arrises straight and sharp.
- C. Reinforce doors and frames to receive surface applied hardware. Drilling and tapping for surface applied finish hardware may be done at project site.

- D. Locate finish hardware as shown on drawings or, if not shown, in accordance with DHI "Recommended Locations for Builder's Hardware."
- E. Door and Frame Fabrication
 - 1. Provide cutouts for mortised hardware, accurately located and made to fit hardware.
 - 2. Punch frames for door silencers, three on strike side for single doors. Factory install plastic caps. Stick-on silencers are not acceptable.
 - 3. Exterior and Interior Frames: Provide minimum three anchors of suitable design for each jamb. Provide galvanized anchors for units built into exterior walls.
 - 4. Floor Anchors: Provide floor clip on bottom of each jamb. Provide angle spreaders at bottom of each set-up frame.
 - 5. Conduit for Door Frames
 - a. Shop install ¾" electrical conduit within hollow metal door frame where indicated or where required for electric strikes or similar type electrical frame mounted hardware.
 - b. Route conduit in frame in the most direct and simple manner so that pulling wire can be performed with a minimum of bends and obstructions. Route conduit to avoid damage to conduit during field installation of frame and operations to grout frame solid.
 - c. Connect conduit to electrical junction box or conduit embedded in building structure by means of a threaded coupling. The termination point of the conduit within the frame shall be free and have enough slack to make final connection to embedded device.
- F. Shop Painting
 - 1. Clean, bonderize or chemically treat and paint exposed surfaces of steel door and frame units, including galvanized surfaces.
 - 2. Clean steel surfaces of mill scale, rust oil, grease, dirt and other foreign materials before application of paint. Sand free of imperfections.
 - 3. Apply one baked-on shop coat of rust-inhibitive prime paint in accordance with ASNI A224.1. Provide a smooth, uniformly finished surface ready to receive finish paint.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates, rough openings and installation conditions. Do not proceed with metal door and frame work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. Install metal doors and frames in accordance with manufacturer's instructions and recommendations.
- B. Placing Frames
 - 1. General
 - a. Comply with ANSI/SDI A250.11 (SDI 105) "Recommended Erection Instructions for Steel Frames."
 - b. Erect frames in proper position to receive partition work before construction of enclosing walls. Set frames accurately in position, plumbed, aligned with heads level and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders.
 - c. Grout frames as indicated on the drawings. Coordinate grout placement with adjoining materials and door hardware.
 - 2. At Masonry Construction: Locate wall anchors at 16" on center. Building-in of anchors and grouting of frames is specified in Section 04 00 00.
 - 3. Fire-Rated Frames: In accordance with NFPA standard No. 80 and SDI 118.
 - 4. Metal Stud Partitions: Install at least 3 wall anchors per jamb at hinge and strike levels. Attach wall anchors to studs with tapping screws.
- C. Door Installation
 - 1. Install doors plumb and in true alignment in prepared openings. Fit metal doors accurately in frames, within clearances specified in ANSI/SDI A250.8 (SDI100).
 - 2. Install fire-rated doors with clearances as specified in NFPA Standard No. 80 and SDI 118.
- D. Immediately after erection, sand smooth rusted or damaged areas of door and frame coat and apply touch-up prime coat of compatible air-drying primer.

3.03 FIELD QUALITY CONTROL

- A. Final Adjustment: Provide final adjustment as follows:
 - 1. Door Contact with Silencers: Doors shall strike a minimum of two (2) silencers without binding lock or latch bolts in strike plate.
 - 2. Head, Strike and Hinge Jamb Clearance: 1/8".
 - 3. Meeting Edge Clearance, Pairs of Doors: +1/16"
 - 4. Bolts and Screws: Leave tight and firmly seated.

END OF SECTION

SECTION 08 14 00

WOOD DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide the following types of wood doors:

1. Solid core
2. Fire rated

1.02 RELATED SECTIONS

A. Sustainable Design Requirements: Section 01 81 13.

B. Hollow Metal Door Frames: Section 08 11 13.

C. Door Hardware Section 08 71 10.

1.03 QUALITY ASSURANCE

A. Provide wood doors fabricated by one manufacturer to ensure uniformity in appearance and construction.

B. Reference Standards

1. Underwriters' Laboratories - UL 10C (positive pressure) - Fire Tests of Door Assemblies
2. Window and Door Manufacturers Association (WDMA): WDMA IS 1A-04.
3. Architectural Wood Work Institute: AWI "Quality Standards, Guide Specification" requirements.
4. NFPA 80 - Fire Doors and Windows
5. NFPA 252 - Standard Methods of Fire Tests for Door Assemblies

C. Engineered Wood Products

1. Determine formaldehyde concentrations in air from wood products under test conditions of temperature and relative humidity in accordance with ASTM D6007 or E1333.
2. Determine Volatile Organic Compounds (VOC), excluding formaldehyde, emitted from manufactured wood-based panels in accordance with ASTM D6330.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of wood door required.
 - 1. Include details of core and edge construction.
 - 2. Include certification indicating compliance with specification requirements.
- B. Special Environmental Requirements: Submit the following in accordance with Section 01 81 13:
- C. Submit Shop Drawings
 - 1. Indicate location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking and other pertinent data.
 - 2. Identify doors in accordance with drawing door schedule.
- D. Submit sample corner section, 12" square, showing required veneer and edge construction.
- E. Finish Samples
 - 1. Factory Finished Doors: Submit three (3) flitch samples of each species of face veneer with factory applied stain and finish as specified and indicated illustrating expected range of color and grain variation.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Store and protect doors in accordance with manufacturer's recommendations and WDMA.
- B. Following are general guidelines. For more specific information refer to WDMA's Appendix Section "Care and Installation at Job Site."
 - 1. Deliver doors in manufacturer's original unopened protective packaging or wrapper.
 - a. Store doors flat and off the floor on a level surface in a dry, well-ventilated building. Do not store on edge. Protect doors from dirt, water and abuse.
 - b. Do not subject interior doors to extremes in either heat or humidity. HVAC systems should be operational and balanced, providing a temperature range of 50 to 90 degrees Fahrenheit and 30% to 50% relative humidity.
 - c. When handling doors, always lift and carry. Do not drag across other doors or surfaces. Handle with clean hands or gloves.
 - d. Each door will be marked on top rail with opening number.

1.06 LABEL DOOR REQUIREMENTS

- A. Fire Ratings Compliance: Comply with the label requirements of NFPA and applicable local codes. Fabricate doors and frames in accordance with requirements of NFPA Standard No. 80 and U.L. Standards as follows:
 - 1. Positive Pressure Testing UL 10C
- B. Ratings Certifications
 - 1. Provide U.L. labels permanently fastened on each door that is within the size limitations established by NFPA and U.L. for labeling.
 - 2. Provide anchors for U.L. labeled frames required by the authority having jurisdiction.

1.07 WARRANTY

- A. Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 - 2. Warranty Period for Solid-Core Exterior Doors: Two years from date of Substantial Completion.
 - 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 PRODUCTS

2.01 MATERIALS AND COMPONENTS

- A. Interior Flush Doors Solid Core: Meet or exceed WDMA I.S.1A Industry Standard for Wood Flush Doors requirements and as specified. WDMA I.S.1A. Performance Grade – Heavy Duty.
 - 1. Interior Flush Doors Solid Core – Non-Rated and 20 Minute Rated Fire Doors: Provide one of the following cores with hardwood veneers:
 - a. Stave Lumber Core (SLC-5) may be a combination of solid, low-density hardwood lumber blocks or strips not more than 2-1/2" wide of one species of wood between 6% to 9% moisture content. Joints to be tight and staggered in adjacent rows. Lumber density is 25 to 27 lbs. per cubic foot. Formaldehyde free.
 - b. Structural Composite Lumber Core (SCLC-5) is an engineered hardwood composite sometimes referred to as LSL (Laminated Strand Lumber). The material complies with WDMA minimum performance levels for interior applications with screw holding power of 540 lbs., modulus of rupture of 6,500 psi, modulus of elasticity of 1,300,000 psi and density of 38 lbs per cubic foot. Formaldehyde free.

2. Interior Flush Fire Doors – Above 20 Minute Rated: FD solid core with hardwood face veneer.
 - a. Rating as indicated on drawings.
 - b. Provide one of the above cores or the following as required to maintain fire rating:
 - 1) Non-combustible mineral composite material that is necessary for higher hourly ratings per manufacturer's approval
- B. Moldings: Trim louver and glass openings with recessed bead type wood moldings, species matching door face veneer species. Profiles as selected by the Architect from manufacturer's standard profiles.
 1. Glass Lites in Fire Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire rating indicated. Include concealed metal glazing clips where required for opening size and fire rating indicated.

2.02 FABRICATION

- A. Flush Doors: Fabricate doors in accordance with WDMA I.S. 1A, Custom with Grade A faces Grade requirements for transparent stained finish. Formaldehyde free.
 1. Core Construction: Bond stiles and rails to core and sand entire unit prior to assembly of face veneers.
 2. Number of Plies: 5.
 3. Face Veneers: Minimum 1/50" thick before sanding, select white maple hardwood.
 4. Door Thickness: 1-3/4" thick.
 5. Adhesive: Type I, waterproof.
 6. Edge Strips: Stile edges hardwood species matching face veneer; bonded to core; 1-1/8" minimum width after trimming. Top and bottom edges hardwood of mill option.
 7. Match Between Veneer Leaves: Book matched for color and grain.
 8. Assembly of Veneer Leaves on Door Faces: Running match.
 9. Hardware: Factory machine for mortise hardware using template provided by hardware manufacturer.
 10. Reinforcement: Reinforce doors to receive hardware specified.
 - a. Hinge Attachment: Stiles and rails to be continuously glue bonded to the core so that screw stress is transmitted directly to the core.
 - b. Closure, Exit Device and Other Surface Mounted Hardware: Provide top rail 2-1/2" or more in width to hold closer fasteners and solid wood blocking for all other surface applied hardware.
- B. Fire Rated Doors: Conform to "Flush Door" requirements specified above. Provide doors of U.L. classification indicated.

1. Reinforcement: Reinforce doors to receive hardware specified.
 - a. Surface applied hardware that is located where screws cannot penetrate the above mentioned stiles or wood rails shall be through bolted.
- C. Factory Finish
 1. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - a. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
 2. Finish: WDMA TR-4 conversion varnish.
 3. Staining: Color as selected by Architect.
 4. Effect: Filled finish.
 5. Sheen: Satin.
- D. Individually package doors at factory with manufacturer's standard packaging or wrapping for delivery to job site.
- E. Manufacturer: MARSHFIELD-ALGOMA; EGGERS; OSHKOSH; VT INDUSTRIES, LAMBTON DOORS.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substances, rough openings and installation conditions. Do not proceed with wood door installation until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Verify metal frame dimensions and hardware mortises in metal frames with metal frame manufacturer.

3.03 INSTALLATION

- A. Condition doors to average prevailing humidity in installation area before hanging.
- B. Install doors in accordance with manufacturer's installation instructions. Job fit and prepare doors to receive hardware. Bevel 1/8" in 2" at strike edges for clearance in arc of swing. Seal cut surfaces, tops, bottoms and edges with sanding sealer after fitting and machining.
- C. Hang doors straight, plumb and square securely anchored into position. Adjust

doors to provide uniform clearance and to contact stops uniformly. Remove and replace doors that are warped, bowed or otherwise damaged and cannot be properly fit to the opening.

- D. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.

3.04 PROTECTION

- A. Protect installed doors from soiling, staining and damage until final acceptance.
- B. Repair or replace doors damaged beyond acceptable repair as directed by the Architect.

END OF SECTION

SECTION 08 19 00

INTERIOR DOORS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide interior doors as indicated and specified.
 - 1. Interior Unit: Solid core, MDF painted, one panel with pre-hung frames.
 - 2. Unit Entry: Solid fire rated core, MDF painted, two panel.
 - a. Fire rating: 20 minute.

1.02 RELATED SECTIONS

- A. Installation: Section 06 20 00
- B. Hardware: Section 08 71 00.
- C. Hollow Metal Frames: Section 08 11 13.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of wood door required.
 - 1. Include details of core and edge construction.
 - 2. Include certification indicating compliance with specification requirements.

1.04 DELIVERY

- A. Deliver doors in manufacturer's original unopened protective packaging or wrapper.
- B. Store, handle and protect doors in accordance with manufacturer's recommendations to prevent damage, wetting, soiling and deterioration.
- C. Comply with AWI Section 1300-S-8 recommendations for care and handling at the site. Store doors inside the building, flat in a dry well-ventilated area.

1.05 LABEL DOOR REQUIREMENTS

- A. Fire Ratings Compliance: Comply with the label requirements of NFPA and applicable local codes. Fabricate doors and frames in accordance with requirements of NFPA Standard No. 80 and U.L. Standards.

B. Ratings Certifications

1. Provide U.L. labels permanently fastened on each door that is within the size limitations established by NFPA and U.L. for labeling.
2. Provide anchors for U.L. labeled frames required by the authority having jurisdiction.

PART 2 PRODUCTS

2.01 INTERIOR DOORS AND FRAMES – INTERIOR UNIT DOORS

A. Material - **Interior Unit** Frames

1. Provide lumber surfaced four sides (S4S) and worked to profiles and patterns required. Nominal sizes are as shown, except where detailed dimensions are indicated.
2. Moisture Content: Provide materials kiln-dried to moisture content complying with AWI Standards, Section 100-G-3.
3. Softwood Lumber: Comply with PS-20, "American Softwood Lumber Standard", and with applicable rules of grading and inspection agency for species indicated.
 - a. Western Red Cedar, Ponderosa Pine, White Pine: Western Lumber Grading Rules, published by Western Wood Products Association (WWPA), or Standard Grading Rules for West Coast Lumber, No. 16, published by West Coast Lumber Inspection Bureau (WCLIB).

B. Material - Medium Density Fiberboard (MDF): Thickness as specified unless otherwise indicated on Drawings. Maximum moisture content of 8%. Formaldehyde free. Meet the following minimum standards:

1. Internal Bond: 90 psi.
2. Modulus of Rupture: 2,500 psi.
3. Screw Holding Power: 325 pounds.
4. Density: Minimum 40 pounds per cubic foot.
5. Fire Rating: ASTM E84 Class A
 - a. Smoke Developed: 95
 - b. Flame Spread: 15

C. Pre-hung Door Assemblies, Solid core. Fabricate doors in accordance with WDMA I.S. 1A.

1. 1-3/4" thick with solid wood edge and sticking. Rails and stiles cores to be finger jointed wood. Interior unit doors to be pre-hung and pre-fit. Prepare for door hardware.
 - a. Interior Unit: Medium density fiberboard faced doors. 1 panel.
 - b. Unit Entry Doors: Medium density fiberboard faced doors. 2 panel.
 - 1) Fire Rating: Fire rated core - 20 minutes
2. Interior Unit Frames: Filled and primed medium or softwood. See Section 06 20 00 for door casing trim. Door frames to be fabricated assemblies with

swing doors.

a. Unit Entry Doors: Hollow Metal Frames: Section 08 11 13.

3. Finish

a. Interior Unit: Shop primed for field paint. See Section 09 91 00.

b. Unit Entry Doors: Shop primed for field paint. See Section 09 91 00.

4. Style: Shaker sticking/profile.

5. Finish: Smooth.

6. Hardware: Scheduled in 08 71 00.

D. Hinges at Prehung Doors: Unless otherwise indicated, provide the following:

1. Interior Hinges: Steel, with steel pin. Standard weight, five-knuckle.

2. Screws: Phillips flat-head wood screws; screw heads finished to match surface of hinges.

E. Basis of Design

1. Interior Unit: MASONITE Lincoln Park.

2. Unit Entry: MASONITE Le Chateau.

PART 3 EXECUTION

3.01 INSPECTION

A. Examine substances, rough openings and installation conditions. Do not proceed with wood door installation until unsatisfactory conditions have been corrected.

B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

A. Condition doors to average prevailing humidity in installation area before hanging.

B. Install doors in accordance with manufacturer's installation instructions. Job fit doors and prepare to receive hardware. Bevel 1/8" in 2" at strike edges for clearance in arc of swing.

C. Hang doors straight, plumb and square securely anchored into position. Adjust doors to provide uniform clearance and to contact stops uniformly. Remove and replace doors and frames which are warped, bowed or otherwise damaged.

D. Install fire-rated doors in corresponding fire-rated frames in accordance with requirements of NFPA No. 80.

3.03 PROTECTION

A. Protect installed doors from soiling, staining and damage until final acceptance.

- B. Repair or replace doors damaged beyond acceptable repair as directed by the Architect.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work under this section includes the design of the aluminum entrance and window systems and all materials, labor and equipment for the complete installation of the work as shown on the drawings and specified herein. Work includes:
1. Aluminum entrance doors.
 2. Aluminum entrance framing system for entrances, including sidelight and transom frames as indicated.
 5. Glass and glazing of the systems.
 6. Hardware.
 7. Anchors, fasteners, flashings, trim and accessories to complete the work.
 8. Sealants required within entrance and window construction.
 9. All gaskets, sealants and tapes required in final assembly of the work.
 10. Installation of lock cylinders furnished under Section 08 71 10.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Joint Sealants: Section 07 92 00.
- C. Glazing: Section 08 81 00.
- D. Hardware: Section 08 71 10.

1.03 QUALITY ASSURANCE

- A. Provide aluminum doors and framing system manufactured by a single firm specializing in the production of this type of work.
- B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- C. Painted Finishes: Factory painted finish to be performed by an applicator specifically approved by the paint manufacturer. The applicator shall provide written notification of approval by paint manufacturer prior to application of the finish.

1.04 REFERENCES

- A. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.

1.05 SUBMITTALS

- A. Submit the following:
 - 1. Framing system details.
 - 2. Door details.
 - 3. Window details.
 - 4. Installation instructions.
 - 5. Itemized schedule of door hardware.
 - 6. Finish samples.
- B. Tests: Submit two copies of test reports made or witnessed by an independent testing laboratory showing the results of tests conducted on previously manufactured windows of the type used on this project. The reports shall verify conformance to thermal movement, air and water infiltration and structural properties as described herein.
- C. Building Shop Drawings: Include complete evaluations of all systems; details and methods of anchorage; details of construction finishes; methods of assembly; location and installation of hardware and reinforcement for same; size, shape and thickness of materials; joints and connections; details of joining with other work.
 - 1. Scale: Include typical unit elevation of each system at 1/2" scale and details at full scale where practical.
- D. Product Data: Submit manufacturer's specifications for materials and fabrication of work, and instructions and recommendations for installation and maintenance. Include certified test reports showing compliance with requirements where a test method is indicated.
- E. Samples: Submit samples of each type and color and finish required by this Section, on 12" sections of extrusions or formed shapes and on 6" squares of sheet/plate. Include two or more samples in each set.
 - 1. Architect reserves right to require fabrication samples showing prime members, joinery, anchorage, expansion provisions, glazing and similar details, profiles and intersections.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Pack, deliver, handle, store and protect materials from damage in accordance with AAMA Curtain Wall #10, "Care and Handling of Architectural Aluminum" recommendations.

1. Remove paper type wrappings when unloading.
2. Store materials inside the buildings whenever possible in clean, dry ventilated areas free of dust or corrosive fumes.
3. Stack members vertically or on edge, shim between components to provide water drainage and ventilation. Protect with adequate coverings, placed to provide adequate air circulation.
4. During installation, protect materials from lime mortar, run-off from concrete and copper, weld splatter, acids, roofing materials, solvents and abrasive cleaner.

1.06 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

1.07 WARRANTIES

- A. Submit written warranty signed by manufacturer, Contractor, and installer agreeing to repair or replace work which fails in materials or workmanship within three (3) years of the date of project acceptance.
1. Failure of materials or workmanship shall include excessive leakage or air infiltration, excessive deflections and defects in accessories, weather seals and other components of work.
- B. Finish: Provide paint manufacturer's guarantee of paint finish against failure of paint finish. Failure includes blistering, peeling, cracking, flaking, checking, excessive color change and chalking. Color change shall not exceed 5 N.B.S. units (per ASTM D523) and chalking shall not less than a rating of 8 per ASTM D4214.
1. Warranty Period: 20 years.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Drawings and specifications are based on products by KAWNEER CO.
- B. Other Acceptable Manufacturers: Equal products by the following manufacturers are acceptable providing they meet or exceed the requirements specified herein and conform to the design intent indicated on the drawings:
1. CRL – U.S. ALUMINUM
 2. EFCO
 3. OLDCASTLE BUILDING ENVELOPE
 4. TUBELITE DIVISION, INDAL, INC.

5. YKK AMERICA

2.02 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209.
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
 - 4. Structural Profiles: ASTM B 308.

- B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011.

2.03 STOREFRONT, WINDOW FRAMING AND ENTRANCE DOOR SYSTEMS

- A. Type: An integrated system of extruded aluminum sections, glazing devices, sealing devices, doors and hardware and operable windows.

- B. Materials: Provide aluminum alloy and temper for each shape as recommended by manufacturer and processor to comply with requirements of performance, fabrication, and application of finish.
 - 1. Thickness: As required to meet design requirements with a minimum of 1/8" for major sections.

- C. Framing: KAWNEER 451T, framing for 1" insulating glass.
 - 1. Type: Thermally broken, outside glazed, fixed type framing as indicated on drawings.
 - 2. Frame
 - a. Members: Main frame members designated specifically for manufacture of aluminum windows extruded from 6063-T5 aluminum alloy.
 - b. Glazing: Extruded snap-in type bead. Units to accept 1" insulating glass.
 - c. Trim: Provide all trim, sills, flashings and closures to complete installation.
 - d. Size
 - 1) Sightline: Nominal 2".
 - 2) Depth: 4-1/2".

3. Glazing Plane: As indicated
 4. Special Framing Shapes: Provide as detailed or as required to maintain design intent as indicated on building elevations drawings and section drawings. Aluminum extruded shapes and bent aluminum sheet, minimum 0.063", finished after fabrication.
 5. Vestibule Framing: Non-thermally broken; dimensions to match exterior framing. KAWNEER Trifab II 451. Units to accept 1/4" glass.
 6. Interior Framing: Non-thermally broken. KAWNEER Trifab II 451. Units to accept glass thickness indicated.
 - a. Designed to resist a 200 lb/SF concentrated load in any direction where indicated on the drawings.
 - b. Size
 - 1) Sightline: Nominal 2".
 - 2) Sill Sightline: Nominal 4-1/2"
 - 3) Depth: 4-1/2".
 7. Provide extruded solid backed framing shapes where framing abuts solid wall conditions.
- D. Performance Requirements: Exterior window wall system (excluding doors) shall meet or exceed the following performance requirements.
1. Wind loads: Provide storefront system; include anchorage, capable of withstanding wind load design pressures indicated on the drawings.
 2. Thermal Movement: Window framing system shall be designed to provide for expansion and contraction of component materials caused by a surface temperature range of 180° F., without causing buckling, stresses on glass, failure of joint seals, undue stress on structural elements, damaging loads on fasteners, reduction of performance, or other detrimental effects.
 - a. Doors: Function properly over the above specified temperature range.
 3. Air Infiltration: Air leakage shall not exceed 0.06 cfm per square foot of fixed wall area when tested in accordance; with ASTM E283 at test pressure not less than 6.24 psf.
 4. Water Infiltration
 - a. Provide drainage to exterior face of framing any water entering at joints.
 - b. No uncontrolled water penetration shall occur when tested in accordance with ASTM E331, at test pressure not less than 8.0 psf.
 5. Structural Properties - Uniform Load: A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
 6. Thermal Properties
 - a. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than (Glass to Center) 0.44 (low-e) BTU/hr/ft sq./degree F

- b. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than (Glass to Center) 62 frame and 68 glass (low-e)

E. Glazed Aluminum Entrance Doors: Standard duty, wide stile, manufacturer's standard, single acting aluminum entrances. Provide thermally broken units without vestibules

1. **Stiles: Nominal 4 1/4" to 5" wide.**
2. **Rails**
 - a. **Top: 4 1/4" to 5" wide.**
 - b. **Bottom: 10" high.**
3. **Intermediate Rail: Provide if indicated.**
4. **Section Wall Thickness: .125" for major components; 0.05" for glazing moldings.**
5. **Door Thickness: 1-3/4" in vestibules. Provide thermally broken 2 1/4" units without vestibules.**
6. **Corners: Stiles through design, joined by concealed bolts and weld.**
7. **Provide complete with snap-in glazing stops and gaskets.**
8. **Sizes: As indicated. Provide single or pairs of doors as scheduled.**
9. **Exterior Entrance Weatherstripping: Stile with dual pile weathering with polymeric fin and bulb polymeric weatherstripping and pile weathering with polymeric fin in door frame system or equal by other approved manufacturer. Locate weatherstripping at jambs, head and meeting stiles (as applicable). Provide bottom rail with EPDM blade gasket sweep. Size sweep to close against door threshold. Sweep housing finish to match door finish.**
10. **Glazing: 1/4" thick in vestibules, insulated units without vestibules, unless otherwise indicated.**

2.04 FINISHES

- A. Finish: Fluoropolymer baked enamel finish with Kynar 500 (70%) resins by ELF ATOCHEM OF NORTH AMERICA INC.; "Trinar" by AKZO; "Duramar" by PPG; "Fluropon" by VALSPAR. Total dry film thickness not less than 1.0 mils, or coatings meet or exceed the requirements of AAMA 2605.
 1. Color: White - As selected by Architect from paint manufacturer's complete specified line.
 2. Application: Apply coating systems in strict accordance with manufacturer's printed instructions and recommendations. Refer to Quality Assurance in Part 1.
 3. Concealed members may be mill finished, providing they cannot be seen through the glass.

2.05 ENTRANCE DOOR HARDWARE

- A. Prepare and reinforce doors and frames for hardware. Factory fit and install hardware in accordance with Section 08 71 10 and manufacturer's requirements.

2.06 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum components. Finish exposed fasteners to match aluminum work.
- B. Flashing, Trim and Accessories: Provide as required to complete the work. Finish shall match aluminum entrances and storefront finishes. Work includes:
 - 1. Aluminum closure panels, flashing and trim.
 - 2. Concealed Flashing: Dead-soft stainless steel, 26 gauge minimum, type selected by manufacturer for compatibility.
 - 3. All trim materials shall be finished after fabrication, unfinished exposed edges at holes and trim terminations are not acceptable.
- C. Brackets and Reinforcements: Manufacturer's high strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A123.
- D. Bituminous Coatings: Cold applied asphalt mastic complying with SSPC PS 12, compounded for 30 mil thickness per coat.

2.07 FABRICATION

- A. Provide manufacturer's standard fabrication and accessories that comply with indicated requirements. Minor dimension differences will be accepted in order to utilize manufacturer's standard products.
- B. Fit and assemble the work at the shop to the greatest extent possible. Disassemble only as required for shipment and erection. Maintain true continuity of line and accurate relation of planes and angles. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members. Conceal fasteners wherever possible.
- C. Reinforce aluminum work as necessary at points of support or anchorage and at mechanical joints and points of attachment to meet performance requirements and for support of the system. Separate dissimilar metals with bituminous paint or preformed separators that will prevent corrosion. Separate metal surfaces at moving joints with plastic inserts or other non-abrasive concealed inserts.
- D. Coordinate work of this section with other work for proper sequence of construction without delays. Verify dimensions of supporting structure and other elements that precede wall system work before fabrication of required components. Provide for erection tolerances for other work where field measurements cannot be obtained.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates supporting structure, and installation conditions. Do not proceed with aluminum entrances erection until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. General
 - 1. Do not install component parts that are observed to be defective, including warped, bowed, dented, abraded and broken members.
 - 2. Remove and replace members that have been damaged during installation or thereafter before time of acceptance.
 - 3. Do not cut or trim component parts during erection, in a manner which would damage finish, decrease strength or result in a visual imperfection or a failure in performance of the work.
- B. Install components in accordance with the manufacturer's installation instructions and recommendations.
- C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
- D. Assembly and Anchorage: Anchor component parts securely in place, by bolting or other permanent mechanical attachment system, which will comply with performance requirements and permits movements as required.
 - 1. Anchor storefront sill to a continuous interior aluminum anchor.
- E. Apply a bituminous coating or other suitable separator on concealed contact surfaces of dissimilar materials, before assembly or installation to prevent corrosive or electrolytic action.
- F. Set sill members and entrance thresholds in a bed of sealant compound, or with joint fillers or gaskets to provide weathertight requirements.
- G. Install glass and glazing, in accordance with Section 08 81 00 and the manufacturer's requirements.
- H. Install joint sealants specified in Section 07 92 00, in accordance with the manufacturer's requirements.
- I. Coordinate installation of storefront framing with installation of air/vapor barrier transition membrane.

- J. Adjust operating hardware to function properly, without binding, and to provide tight proper fit at contact points and weatherstripping.

3.03 CLEANING AND PROTECTION

- A. Protect glass from breakage immediately upon installation, by attachment of streamers to framing held away from glass. Do not apply markings of any type to surfaces of glass.
- B. Remove protective coating when completion of construction activities no longer require its retention.
- C. Immediately before acceptance of the work, clean the aluminum entrance systems thoroughly, inside and out. Demonstrate proper cleaning methods to Owner's maintenance personnel during final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials used for cleaning, repair and maintenance of work and turn over to Owner upon acceptance of the work.

END OF SECTION

SECTION 08 43 14

INTERIOR ALUMINUM STOREFRONT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide aluminum storefront systems as shown and specified. Work includes:
 - 1. Aluminum framing.
 - 2. Glass and glazing of the systems.
 - 3. Anchors, fasteners, flashings, trim and accessories to complete the work.
 - 4. Sealants required within storefront construction.
 - 5. All gaskets, sealants and tapes required in final assembly of the work.

1.02 RELATED SECTIONS

- A. Joint Sealants: Section 07 92 00.
- B. Aluminum-Framed Entrances and Storefronts: Section 08 41 13.
- C. Glass and Glazing: Section 08 81 00.
- D. Door Hardware: Section 08 71 10.
- E. Sustainable Design Requirements: Section 01 81 13.

1.03 REFERENCES

- A. Architectural Aluminum Manufacturer's Association (AAMA)
- B. American Society for Testing and Materials (ASTM)
- C. American Architectural Manufacturers Association (AAMA): Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing High Performance Organic Coatings on Architectural Extrusions and Panels, AAMA 2605.

1.04 QUALITY ASSURANCE

- A. Provide interior aluminum storefront systems manufactured by a single firm specializing in the production of this type of work.

1.05 SUBMITTALS

- A. Submit the following in accordance with the General Conditions and Section 01 33 23:

1. Framing system details.
 2. Installation instructions.
 3. Finish samples.
- B. Shop Drawings: Include complete evaluations of all systems including doors; details and methods of anchorage; details of construction finishes; methods of assembly; location and installation of hardware and reinforcement for same; size, shape and thickness of materials; joints and connections; details of joining with other work.
- C. Product Data: Submit manufacturer's specifications for materials and fabrication of work, and instructions and recommendations for installation and maintenance. Include certified test reports showing compliance with requirements where a test method is indicated.
- D. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Pack, deliver, handle, store and protect materials from damage in accordance with AAMA Curtain Wall #10, "Care and Handling of Architectural Aluminum" recommendations.
1. Remove paper type wrappings when unloading.
 2. Store materials inside the buildings in clean, dry ventilated areas free of dust or corrosive fumes.
 3. Stack members vertically or on edge, shim between components to provide water drainage and ventilation. Protect with adequate coverings, placed to provide adequate air circulation.
 4. During installation, protect materials from lime mortar, run-off from concrete and copper, weld splatter, acids, roofing materials, solvents and abrasive cleaner.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Sheet and Plate: ASTM B 209.
 2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221.
 3. Extruded Structural Pipe and Tubes: ASTM B 429.

2.02 STOREFRONT SYSTEM

- A. Type: An integrated system of extruded aluminum sections, glazing devices, sealing devices.
- B. Framing:
 - 1. Provide complete with snap-in glazing stops and gaskets for the thicknesses of glass units indicated or specified. Provide rectangular glazing stops; triangular or beveled not permitted.
 - 2. Provide silicone glazed system framing members where indicated.
- C. Provide door frame extrusions as required to fit in storefront framing system or as individual framed opening as scheduled.
- D. Manufacturer: KAWNEER Trifab 450 CG." and "Trifab VG 450", 1-3/4" x 4-1/2" members. Equal products by VISTAWALL; EFCO, YKK AMERICA, RACO INTERIORS or TUBELITE are acceptable provided they comply with requirements stated herein.

2.03 FINISHES

- A. All exposed aluminum surfaces shall receive an Architectural Class 1, anodized coating; AA-M12C22A42, minimum 0.7 mil thickness.

2.04 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel or other materials warranted by manufacturer to be non-corrosive and compatible with aluminum components. Finish exposed fasteners to match aluminum work.
- B. Brackets and Reinforcements: Manufacturer's high strength aluminum units where feasible; otherwise, nonmagnetic stainless steel or hot-dip galvanized steel complying with ASTM A123.
- C. Bituminous Coatings: Cold applied asphalt mastic complying with SSPC PS 12, compounded for 30 mil thickness per coat.
- D. Clear Protective Coatings: Provide aluminum surfaces covered with strippable surfacing designed specifically for protection of aluminum finish.

2.05 FABRICATION

- A. Aluminum Storefronts: Provide manufacturer's standard fabrication and accessories which comply with indicated requirements. Minor dimension differences will be accepted in order to utilize manufacturer's standard products.
- B. Shop fabricate aluminum storefront systems. Fit and assemble the work at the shop to the greatest extent possible. Disassemble only as required for shipment and erection. Maintain true continuity of line and accurate relation of planes and

angles. Provide secure attachment and support at mechanical joints, with hairline fit of contacting members. Conceal fasteners wherever possible.

- C. Reinforce aluminum work as necessary at points of support or anchorage and at mechanical joints and points of attachment to meet performance requirements and for support of the system. Separate dissimilar metals with bituminous paint or preformed separators which will prevent corrosion. Separate metal surfaces at moving joints with plastic inserts or other non-abrasive concealed inserts.
- D. Coordinate aluminum storefront systems work with other work for proper sequence of construction without delays. Verify dimensions of supporting structure and other elements which precede wall system work before fabrication of required components. Provide for erection tolerances for other work where field measurements cannot be obtained.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates supporting structure, and installation conditions. Do not proceed with aluminum storefront erection until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

- A. General
 - 1. Do not install component parts which are observed to be defective, including warped, bowed, dented, abraded and broken members. Remove and replace members which have been damaged during installation or thereafter before time of acceptance.
 - 2. Do not cut or trim component parts during erection, in a manner which would damage finish, decrease strength or result in a visual imperfection or a failure in performance of the work.
- B. Install the aluminum storefront systems in accordance with the manufacturer's installation instructions and recommendations.
- C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers.
- D. Assembly and Anchorage: Anchor component parts securely in place, by bolting or other permanent mechanical attachment system, which will comply with performance requirements and permits movements as required.

- E. Apply a bituminous coating or other suitable separator on concealed contact surfaces of dissimilar materials, before assembly or installation to prevent corrosive or electrolytic action.
- F. Install aluminum storefront system glass and glazing, in accordance with Section 08 81 00 and the manufacturer's requirements.
- G. Install joint sealants within the aluminum storefront systems work with elastomeric joint sealants specified in Section 07 92 00, in accordance with the manufacturer's requirements.

3.03 CLEANING AND PROTECTION

- A. Protect glass from breakage immediately upon installation, by attachment of streamers to framing held away from glass. Do not apply markings of any type to surfaces of glass.
- B. Remove protective coating when completion of construction activities no longer require its retention.
- C. Immediately before acceptance of the work, clean the aluminum storefront systems thoroughly. Demonstrate proper cleaning methods to Owner's maintenance personnel during final cleaning. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials used for cleaning, repair and maintenance of work and turn over to Owner upon acceptance of the work.
- D. Prepare a "Cleaning and Maintenance Manual" listing types of cleaning compounds, cleaning methods, sealants and glazing materials used for cleaning, repair and maintenance of work and turn over to Owner upon acceptance of the work.

END OF SECTION

SECTION 08 53 13

VINYL WINDOWS AND PATIO DOORS

PART 1 GENERAL

1.01 SCOPE

- A. Provide exterior single hung vinyl windows and sliding patio doors.
 - 1. Glass and glazing of the various window systems.
 - 2. Anchors, fasteners, flashings, receptors, trim and accessories to complete the work.

1.02 RELATED SECTIONS

- A. Sealant: Section 07 92 00.
- B. Alternates: Section 01 23 00.

1.03 QUALITY ASSURANCE

- A. Standards: Comply with the applicable provisions of American Architectural Manufacturers Association (AAMA) "Voluntary Specifications for Aluminum and Poly (Vinyl Chloride) (PVC) Prime Windows and Glass Doors, AAMA 101".
- B. Reference Standards: Wherever the following abbreviations are shown herein, they shall refer to the corresponding standard:
 - 1. AAMA: American Architectural Manufacturers Association.
 - 2. ASTM: American Society for Testing and Materials.
- C. Manufacturer: Products to be rated in accordance to NFRC
- D. Windows that require additional opening for egress are to be equipped with an ASTM F2090-10 compliant device, such as a Window Opening Control Device, which initially limits the opening of the window to no more than 4" as defined above, and provides a two-step mechanism allowing further operation to full egress.
 - 1. Verify requirement with Architect.
- E. Installer Qualifications: An installer acceptable to window manufacturer for installation of units required for this Project, not less than five (5) years of successful experience with a minimum of 5 projects similar in scope and complexity to this project.
- F. Manufacturer: Windows to be manufactured by a single firm with minimum five

years experience in fabrication of windows with a minimum of 5 projects similar in scope and complexity to this project.

1.04 SUBMITTALS

- A. Submit the following in accordance with the General Conditions and Section 01 33 23.
 - 1. Submit manufacturer's product data and installation instructions. Submit shop drawings for fabrication and installation of windows. Include elevations and detail sections of every typical member.
 - 2. Submit finish samples.

1.05 SAMPLE INSTALLATION

- A. Provide sample installation of windows and doors to determine acceptability of installation methods. Adjustments may be required by the Architect for compliance with the intent of the Contract Documents.
- B. Once the approval process is complete, the approved sample installation, modified as needed, will represent minimum installation quality for the work.
- C. Sample installation can be used in the finished work, when approved as such by the Architect.
- D. Window and door unit used for sample installation to be selected by Architect.

1.06 DELIVERY AND STORAGE OF MATERIALS

- A. Pack, load, ship, unload, store and protect windows in a manner which will avoid abuse, damage and defacement in accordance with AAMA CW-10.
- B. Store all materials delivered to the site in locations designated by the Architect. Spaces will be located where stored materials will not be exposed to wetting or damage, and will permit easy access to and handling of the materials.
 - 1. Stack vertically or on edge so that water cannot accumulate on or within components.
 - 2. Use nonstaining wood or plastic shims between components to provide water drainage and air circulation.
- C. Deliver other materials, except bulk materials, to project site in manufacturer's unopened containers with name, brand type, grade and color fully indicated thereon. Store bulk materials as required to avoid any deleterious effects of weather, soiling or contamination.

1.07 WARRANTY

- A. Warranty for all work in this Section to operate properly and be weathertight for the standard manufacturer's warranty.

- B. Provide Contractor's guarantee for all work under this Section to be free from defects of workmanship for a period on one year.

PART 2 PRODUCTS

2.01 SINGLE HUNG WINDOW

- A. Manufacturer: Drawings and specifications are based on Series 3000 windows by LINDSAY Windows by other manufacturers must be approved by the Owner, through the Architect, during bidding. Approval process includes submission of product data, catalog cuts, design information and, where requested, a full size sample.
- B. Type: Single hung units complying to AAMA 101 for DH-R40 specifications.
 - 1. Design Pressure (Performance Class): 40 psf.
 - 2. Structural Test Pressure (Design Pressure x 1.5): 45 psf.
 - 3. Water Resistance Test Pressure - ASTM E547: 4.5 psf.
- C. Frame and Window
 - 1. Member: Main frame and window members designed specifically for manufacturers of vinyl windows using hollow extrusions of rigid PVC.
 - 2. Minimum Wall Thickness:
 - a. Main Frame: .062".
 - b. Fixed Meeting Rail: .07".
 - 3. Main Frame Corners: Welded construction.
 - 4. Glazing: Extruded snap-in type PVC bead, allowing exterior glazing. Units to accept 7/8 inch thick insulating glass.
 - 5. Weatherstripping: Provide around entire perimeter of all operating sash.
 - 6. Screens: Fiberglass fabric, roll formed aluminum frame, finish to match window.
- D. Hardware
 - 1. Sash Balance: Stainless steel constant force springs or similar type as approved by Architect.
 - 2. Locks: Two cam-type on each operable sash.
 - 3. Screws, Clips and Other Fasteners: Manufacturer's standard non-corrosive type materials compatible with aluminum.
 - 4. Limit stops?
- E. Color: Custom as selected by Architect.
- F. Muntins:
 - 1. Matching material, located between glass panes within the sealed insulated glass unit.
 - 2. Muntins shall have finish to match color of window frame.

3. Simulated Divided Lite Muntins:
 - a. Exterior applied continuously adhered to surface of glass with a high performance acrylic adhesive system located between glass panes within the sealed insulated glass unit.

2.02 SLIDING PATIO DOORS

- A. Manufacturer: Drawings and specifications are based on **425 Series patio doors by LINDSAY Windows**. Doors by other manufacturers must be approved by the Owner, through the Architect, during bidding. Approval process includes submission of product data, catalog cuts, design information and, where requested, a full size sample.
- B. Frames
 1. Member: Fabricated from extruded aluminum 6063-T5. Provide with polyurethane thermal break. Clad head and jamb frame members with .05" rigid vinyl extrusion. Provide weep slots in sill.
 2. Minimum Wall Thickness
 - a. Sill: .062".
 - b. Head and Jambs: .05".
 3. Sills in Wheelchair Accessible Units: Provide extruded aluminum threshold extension for wheelchair access. Similar to # CM-92033 and CM-92034.
- C. Door Panels: Vinyl extrusions; mechanically fasten at corners using welded construction.
- D. Weatherstripping: Provide around entire perimeter and meeting stiles; interlock endseals are adjustable.
- E. Hardware
 1. Roller Assembly: Corrosive resistant adjustable, ball-bearing type.
 2. Lock: Clam type latch.
 3. Pulls: Manufacturer's standard.
- F. Screen: Rolling type fabricated from roll-formed sections; corners mitered and fitted. Finish to match door.
 1. Fabric: Fiberglass mesh.
 2. Wheels: Adjustable; mounted in top and bottom rails.
- G. Colors: Custom as selected by Architect..
- F. Muntins:
 1. Matching material, located between glass panes within the sealed insulated glass unit.
 2. Muntins shall have finish to match color of window frame.
 3. Simulated Divided Lite Muntins:

- a. Exterior applied continuously adhered to surface of glass with a high performance acrylic adhesive system located between glass panes within the sealed insulated glass unit.

2.03 GLAZING

- A. Factory glaze. Conform with section 08 81 00 for type and performance values.
- B. General: Preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E774 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and desiccant.
- C. Windows - Glass Type: Provide manufacturer's standard insulating glass; Type I, Class 1 for clear glass, Quality q³, conforming to ASTM C1036.
- D. Patio Doors: Provide tempered insulating glass; Kind FT, Condition A, Type I, Class 1 for clear glass, conforming to ASTM C1048.

2.04 FABRICATION

- A. Manufacture each window and door to fit tightly within existing rough opening. Maximum allowable shim space is 1/2" per side jamb and 3/4" at head. Shim at sill to level low side with high side touching at the sill.
- B. Provide window and door members and components with joints neatly made, free of burrs and tight fitting to provide hairline joints with ends capped, mitered, milled or machined as appropriate and approved and develop full structural value of members and provide permanent water tight joints.
- C. Fasteners: Provide manufacturers perimeter nail flange Conceal fasteners wherever possible.
 - 1. No through fasteners short circuiting thermal barrier permitted.
 - 2. No bolts, screws or other components, metallic fastenings, etc., to impair independent frame movement.
 - 3. All bolts, screws, fastenings, fillers, etc. bridging thermal barrier to be reinforced nylon or suitable low conductivity non-metallic materials.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates, supporting structure and installation conditions. Do not proceed with window or door erection until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 INSTALLATION

A. General

1. Do not install component parts which are observed to be defective, including warped, bowed, dented, abraded, and broken members. Remove and replace members which have been damaged during installation or thereafter before time of acceptance.
2. Do not cut or trim component parts during erection, in a manner which would damage finish, decrease strength or result in a visual imperfection of a failure in performance of the work.

B. Install windows and doors in accordance with the manufacturer's instructions and recommendations for the installation of window components.

C. Install component parts level, plumb, true to line and with uniform joints and reveals. Secure to structure with non-staining and non-corrosive shims, anchors, fasteners, spacers and fillers. Use erection equipment which will not mar or stain finished surfaces, and will not damage component parts.

D. Assembly and Anchorage: Anchor component parts securely in place by bolting or other permanent mechanical attachment system which will comply with performance requirements and permit movements as required.

E. Set sill members in a bed of sealant compound or with joint fillers or gaskets to provide weathertight requirements. Do not seal drainage holes (slots).

3.03 CLEANING AND PROTECTION

A. Protect glass from breakage immediately upon installation, by attachment of streamers to framing held away from glass.

1. Do not apply markings of any type on surfaces of glass.

B. Immediately before acceptance of the work, clean the window thoroughly, inside and out.

END OF SECTION

SECTION 08 56 59

PASS-THROUGH WINDOW

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide interior exposure, service counter window consisting of aluminum frame and tempered glass.
- B. Provide all components from the same manufacturer.

1.02 RELATED SECTIONS

- A. Sealants: Section 07 92 00.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and shop drawings on all items specified herein. Include:
 - 1. Window layouts.
 - 2. Anchorage to and integration with adjacent construction.
- B. Submit finish samples for each item, type of metal and finish provided. Include:
 - 1. Window Frame: 6" long.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Store all materials delivered to the site in locations designated by the Architect. Spaces shall be located where the stored materials will not be exposed to wetting or damage, and shall permit easy access to and handling of the materials. Store materials neatly, properly stacked.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: Drawings and Specifications are based on products by C.R. LAURENCE (CRL), Daisy D1042 Series.
- B. Other Acceptable Manufacturers: Products by PEELE, NISSEN AND COMPANY INCORPORATED, QUIKSERVE and CREATIVE INDUSTRIES are acceptable providing they meet the requirements specified herein and conform to the size, layout and design intent indicated on the drawings.

2.02 PRODUCTS/MATERIALS

- A. Type: Horizontal sliding service window.
 - 1. Frames: Aluminum frame modules shall be constructed of 6063-T5 extruded aluminum. Provide with window rolls on top-hung ball bearing rollers and keyed-catch locks. Overall frame sizes are to be in accordance with the contract drawings.
- B. Size: As indicated
- C. Glazing: 1/4" tempered glass. See Section 08 81 00. Provide gasketing.
- D. Finish: Matte black.
- E. Fasteners: Provide all required fasteners and anchorage devices. Types as recommended by manufacturer for substrates encountered.
- F. Provide all glazing compounds, sealants, etc. as required for complete installations.

2.03 FABRICATION

- A. General
 - 1. Provide window members and components with joints neatly made, free of burrs and tight fitting to provide hairline joints with ends capped, mitered, milled or machined as appropriate and approved and develop full structural value of members and provide permanent water tight joints.
 - 2. Provide major framing members factory assembled in basic rectangular units sized for ease of erection and transportation.
 - 3. Fully degrease and clean machined members prior to assembly or application of sealant compounds.
 - 4. Where required, weld by methods recommended by manufacturer and AWS to avoid discoloration at welds. Grind exposed welds smooth.
 - 5. Conceal fasteners wherever possible.
 - 6. Provide tubular or solid extruded members with sharp, well defined corners and flush sight lines.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect substrates to which work of this section adjoins for conditions which may impair or be detrimental to the performance of the windows. Do not proceed with installation until corrections to substrates have been performed by trades involved.
- B. Field check dimensions and elevations on connecting work affecting work of this section to insure proper fit.

3.02 ANCHORAGE

- A. Secure windows to structure as required. Conceal fasteners from view at building completion.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions and recommendations. Install windows level, square, plumb, at proper elevations and in alignment with other work. Attach and secure to structure as required to assure stability of system.
- B. Cutting and Fitting: Accurately cut and fit materials and rigidly secure in place. Cut and machine ends and recesses true, accurate and free of burrs and rough areas.
- C. Sealant
 - 1. Conform to sealant manufacturer's recommendations for cleaning, priming and installation.
 - 2. All joints within system to be sealed under this section.

3.04 GLASS AND GLAZING INSTALLATION

- A. Glaze in accordance with the manufacturer's requirements.

3.05 CLEANING AND PROTECTION

- A. After installation, clean framing members following procedures recommended by manufacturer.
- B. Prior to acceptance of building, clean glass. Remove labels, grease and foreign substances.
- C. Use no solvents detrimental to finish of aluminum framing. Consult with manufacturer of finish to determine solvents and cleaning agents which may be used on the finish, including recommended methods and limitations or procedures.
- D. Protect work as recommended by manufacturer and approved by Architect. Protect system from damage during subsequent construction activities. Remove and replace broken, scratched or otherwise damaged materials at no expense to the Owner.

END OF SECTION

SECTION 08 81 00
GLASS AND GLAZING

PART 1 GENERAL

1.01 SCOPE

- A. Work Included: Provide glass and glazing for all exterior and interior openings as indicated on the drawings and specified herein. Work also includes.
- B. Work Not Included: Glass and glazing not provided under this Section are as follows:
 - 1. Framed Mirrors: Section 10 28 13.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.

1.03 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated or specified are minimums and are for detailing purposes only. Confirm glass thickness by analyzing project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet, as a minimum, the following criteria:
 - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E1300, according to the following requirements:
 - a. Specified Design Wind Loads: 30 psf.
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Probability of Breakage for Sloped Glazing: 1 lite per 1000 lites set more than 15 degrees off vertical and under wind and snow action.
 - 1) Load Duration: 30 days.
 - d. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short

side length or 1", whichever is less.

- 1) For monolithic glass lites, heat treated to resist wind loads.
- 2) For insulating glass.
- 3) For laminated glass lites.

e. Minimum Glass Thickness for Exterior Lites" ¼".

C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120° F, ambient; 180° F, material surfaces.

1.04 REFERENCED STANDARDS

A. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard.

1. AAMA: American Architectural Manufacturers Association.
2. ANSI: American National Standards Institute.
3. ASTM: American Society for Testing and Materials.
4. GANA: Glass Association of North America.
5. IGMA: Insulated Glass Manufacturers Alliance.
6. NFPA: National Fire Protection Association.
7. IGCC: Insulating Glass Certification Council.

B. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations listed below, except where more stringent requirements are indicated herein.

1. Glass Association of North America (GANA) "Glazing Manual."
2. Insulated Glass Manufacturers Alliance (IGMA)
 - a. TM-3000 "Vertical Glazing Guidelines"
 - b. TB-3001 "Sloped Glazing Guidelines".
3. American Architectural Manufacturers Association (AAMA)
 - a. TIR-A7 "Sloped Glazing Guidelines"
 - b. GDSG-1 "Glass Design for Sloped Glazing".

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for this project.

B. Fire-Rated Door Assemblies: Provide assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.

- C. Fire-Rated Window Assemblies: Provide assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- D. Safety Glass Standards: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
 - 1. Each lite shall bear permanent, non-removable label manufacturers designation of safety glazing standard for which it complies.
- E. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or on at least one component lite of unit with appropriate certification label of Insulating Glass Certification Council (IGCC).
- F. Allowable Tolerances: Thicknesses of glass specified are nominal; provide glass manufactured to tolerances listed in GANA Manual.
- G. Fire- Rated Glass: Each lite shall bear permanent, non-removable label of UL certifying it for use in tested and rated fire protective assemblies.

1.05 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of glass, glazing sealants and accessories required.
 - 1. Indicate structural, physical and environmental characteristics, size limitations, special handling requirements, etc.
- B. Submit insulating glass manufacturer's certification indicating units meet or exceed specified requirements.
- C. Shop Drawings: Required data for shop drawings on glazing may be incorporated with shop drawings for framing members. Show thicknesses of glass; proposed "bites" in frames, sizes and locations of blocks, clips, beads, stops edge treatments; note quality, type and strength of each lite.
- D. Samples: Submit and obtain approval of samples before proceeding with glass fabrication. Minimum two 12" x 12" samples of each glass type required, except clear monolithic glass. Submit color samples of exposed sealants and/or gaskets.
- E. Special Environmental Requirements': Submit the following in accordance with Section 01 81 13):

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle glazing materials in accordance with manufacturer's recommendations to prevent damage and deterioration.

- B. Various items to receive glazing as specified elsewhere may be factory-glazed or site-glazed at Contractor's option.
- C. Deliver glazing compounds and sealants in manufacturer's unopened labeled containers.
- D. Deliver glass with manufacturer's labels intact. Do not remove labels until glass has been installed.

1.07 PROJECT CONDITIONS

- A. Field verify measurements and conditions of installations.
- B. Examine all details. Provide proper fitting for details indicated.
- C. Do not perform work under adverse weather or job site conditions. Install liquid sealants when temperatures are within lower or middle third of temperature range recommendations by manufacturer.
- D. Protect work from damage during and after installation until project acceptance.

1.08 WARRANTY

- A. Contractor to guarantee work under this Section against defects of materials, fabrication and installation. Guarantee period is one year, except where specified otherwise. Defects include, but are not necessarily limited to:
 - 1. Weather tightness: Two (2) year warranty.
- B. Insulating Glass: Submit manufacturer's written warranty that for ten (10) years from date of substantial completion, a replacement will be provided (furnished and installed) for any unit which develops edge separation, thermal stress cracks, or other defects which materially obstruct vision through the glass or affect thermal and physical integrity of insulating glass units, except warranty shall not cover glass breakage from other than natural causes. Defective units shall be replaced at no additional cost to the Owner.
- C. Coated Glass: Submit manufacturer's written warranty that for five (5) years from date of substantial completion, a replacement will be provided for defective units. Defects are defined as peeling, cracking or deterioration in coating due to normal conditions and not due to handling or installation contrary to glass manufacturer's published instructions. Defective units shall be replaced at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturers and Fabricators: Specifications herein are based on glass and materials manufactured or fabricated by the following companies. Not all firms listed manufacture or fabricate all the items specified herein. However, to ensure consistent quality of appearance and performance, provide each type or kind of glass or material from a single source. Manufacturers for specialty products are listed within the specification to establish a particular type, color, pattern, etc. Equal products by the manufacturers listed are acceptable providing they meet the type, color, pattern, etc. as approved by the Architect.

1. Manufacturers
 - a. AGC FLOAT GLASS NORTH AMERICA
 - b. VITRO
 - c. GUARDIAN INDUSTRIES
2. Fabricators
 - a. VIRACON
 - b. OLDCASTLE BUILDINGENVELOPE
 - c. ARCH ALUMINUM & GLASS LLC
 - d. TRULITE GLASS AND ALUMINUM

2.02 PRIMARY FLOAT GLASS

- A. Conformance: Type I, Class 1 for clear glass, Class 2-tinted heat-absorbing and light-reducing; Class 3 for tinted, light-reducing glass, Quality q³, conforming to ASTM C1036.
- B. Thickness: 1/4", unless otherwise indicated.
- C. Color: Clear.
1. When used in insulating units, provide color specified under each insulating unit.

2.03 HEAT TREATED FLOAT GLASS

- A. Conformance: Condition A, Kind FT, Type I, Class 1 for clear glass, Class 2-tinted heat-absorbing and light-reducing; Class 3 for tinted, light-reducing glass, conforming to ASTM C1048.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
 2. Roll Wave Maximum Distortion Tolerance: 0.003 inch target with 0.005 inch maximum peak to valley measurement.
 3. Bow and Warp Maximum Tolerance: 50 percent of the maximum allowed in ASTM C 1048.
- B. Thickness: 1/4", unless otherwise indicated.
- C. Color: Clear.

1. When used in insulating units, provide color specified under each insulating unit.

- D. Locations: Safety glazing locations as designated and required by applicable code(s) and where indicated.

2.04 COATED FLOAT GLASS

- A. General: Provide coated glass complying with this article and in schedules at the end of Part 3.
- B. Low E, Sputter Coated Float Glass: Float glass with metallic-oxide or metallic nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), complying with requirements specified in schedules at end of Part 3.

2.05 WIRE GLASS

- A. Wire Glass: USE PROHIBITED.

2.06 INSULATING GLASS

- A. Sealed Insulating Glass: General: Provide preassembled units consisting of organically sealed panes of glass enclosing a hermetically sealed dehydrated air space and complying with ASTM E2190 for performance classification indicated as well as with other requirements specified for glass characteristics, air space, sealing system, sealant, spacer material, corner design and desiccant.
 1. For properties of individual glass making up units, refer to requirements specified in schedule at the end of Part 3 as applicable to types, kinds, classes and conditions.
 2. Provide Kind HS (heat-strengthened) float glass in place of annealed glass where needed to resist thermal stresses induced by differential shading of individual glass lites to comply with glass design requirements. Provide Kind FT (fully tempered) where safety glass is indicated or required.
- B. Edge Construction: Double sealed with a primary seal of polyisobutylene and a secondary seal of silicone. Delete low-E coating prior to fabrication of insulating units according to coated glass manufacturer's instructions.
- C. Coated Spandrel Float Glass:
 1. General: Heat treated with ceramic frit color coating fused to inside surface.
 2. Conformance: Condition B, Kind FT, Type I, Class 1, conforming to ASTM C1048.
 3. Thickness: 1/4", unless otherwise indicated.
 4. Color: As selected by Architect

2.07 MISCELLANEOUS GLASS TYPES

A. Fire-Rated Glass

1. 20 Minute - For use in 20 minute rated doors only. Superlite I manufactured by SAFTI FIRST, PyroEdge-20 by AGC GLASS COMPANY, SGG Pyroswiss US by VETROTECH SAINT GOBAIN or Fireglass 20 by TECHNICAL GLASS PRODUCTS. ¼" thick tempered glass with a 20 minute fire-rating.
2. 45 Minute - For use in 45 minute door and window applications. Superlite II-XL manufactured by SAFTI FIRST, Pyrobel by AGC GLASS COMPANY, SGG Swissflam-45 by VETROTECH SAINT GOBAIN or Pyrostop by PILKINGTON. ¾" thick unit comprised of inboard and outboard tempered lites protecting a fire resistive interlayer.
3. 60, 90 or 120 Minute - For use in 60, 90, or 120 door/window/wall applications, must comply with ASTM E119 requirements as a barrier to radiant heat. Superlite II-XL manufactured by SAFTI FIRST, Pyrobel by AGC GLASS COMPANY, SGG Contraflam by VETROTECH SAINT GOBAIN or Pyrostop by PILKINGTON. 1" to 1-1/2" in thickness depending on rating, unit comprised of inboard and outboard tempered lites protecting a fire resistive interlayer. For use in Fire-Resistive framing from glass manufacturer only, standard hollow metal is not acceptable.
 - a. Framing Basis of Design: SAFTI FIRST GPX Series. See section 08 41 23.
4. All fire-rated glazing to have Logo: Each piece of fire-rated glazing shall be labeled with a permanent logo including name of product, name of manufacturer, testing laboratory, fire rating period, and safety glazing standards.

B. Unframed Mirror

1. Description: Clear float glass conforming with ASTM C1036, Type 1, Class 1, Quality q², with full silver coating, copper coating and protective back coating.
2. Film Backing for Safety Mirrors: Film backing and pressure-sensitive adhesive; both compatible with mirror backing paint as certified by mirror manufacturer.
3. Thickness: 1/4".
4. Size: As indicated on schedule.
5. Adhesive: Type as recommended by mirror manufacturer produced specifically for setting mirrors by spot application on all types of substrates encountered. PALMER PRODUCTS CORPORATION "Mirro-Mastic", SOVEREIGN SPECIALTY CHEMICAL "Nail Power Mirror Mastic, ROYAL ADHESIVES & SEALANTS "Gunther Pro".

2.08 GLAZING MATERIALS AND ACCESSORIES

A. Glazing Sealants and Compounds

1. General: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule #1168, AND all sealants used as fillers must meet or exceed the requirements of the Bay Area Air Quality Management District Regulation 8, Rule 51.
2. Comply with manufacturer's recommendations for selection of hardness. Select materials and variations or modifications for compatibility with surfaces contacted in the installation.
3. Exterior Glazing: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - a. Glazing Sealant: One-part neutral-curing silicone glazing sealant, ASTM C 920 Class A, Type S, Grade NS, Class 100/50, Use NT; for high movement joints at metal-to metal and glass to metal.
 - 1) Dow Corning Corporation; 790
 - 2) GE Advanced Materials - Silicones; SilPruf LM SCS2700
 - 3) Pecora Corporation; 890
 - 4) Tremco Incorporated; Spectrem 1
 - b. Glazing Sealant: One-part neutral-curing silicone glazing sealant, ASTM C 920, Type S, Grade NS, Class 50, Use NT; for general applications in glazing installation subject to high movement including perimeter; use non-staining formula at absorbent perimeter applications
 - 1) DOW CORNING CORPORATION; 795 or 756 SMS
 - 2) GE ADVANCED MATERIALS -SILICONES; SilPruf NB SCS9000 or SilPruf SCS2000
 - 3) PECORA CORPORATION; 864
 - 4) TREMCO INCORPORATED; Spectrem 2
 - c. Glazing Sealant: One-part neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT; for general applications in glazing installation including perimeter; use non-staining formula at absorbent perimeter applications.
 - 1) DOW CORNING CORPORATION; 791
 - 2) GE ADVANCED MATERIALS-SILICONES; UltraGlaze SSG4000 or UltraGlaze SSG4000AC
 - 3) TREMCO INCORPORATED; Proglaze SSG or Tremsil 600
 - d. Structural Glazing Sealant: ASTM C1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in glazing assembly indicated.
 - 1) DOW CORNING CORPORATION; 995.
 - 2) GE ADVANCED MATERIALS -SILICONES; UltraGlaze SSG4000.
 - 3) PECORA CORPORATION; 896.

- 4) TREMCO INCORPORATED; Proglaze SG.
 3. Interior Glazing: Compound of polymerized butyl rubber and inert fillers, with or without polyisobutylene modification, solvent based, 95% solids, formed and coiled on release paper, tack-free in 24 hours, paintable, non-staining.
- B. Miscellaneous Glazing Materials
1. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
 2. Setting Blocks: Neoprene or EPDM, 80-90 durometer hardness, with proven compatibility with sealants used.
 3. Spacers: EPDM, 40-50 durometer hardness with proven compatibility with sealants used.
 4. Compressible Filler (Rod): Closed cell or waterproof jacketed rod stock of synthetic rubber or plastic form, compatible space with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

2.09 FABRICATION

- A. General: Fabricate glass and other glazing products in sizes required to glaze openings indicated, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.
- B. Glass Cutting: Cut glass to accurate sizes and shapes as indicated on drawings. Allow edge clearances and tolerances in accordance with GANA recommendations.
1. Edges: Provide factory-cutting and factory-formed edges for all butt-glazed, heat tempered and insulating glass. Provide ground edges for all drilled holes, notches and other fabrication or finishing techniques.
 2. Butt-Glazed Systems: All work in accordance with manufacturer's recommendations.
 - a. Edges Exposed to Air: Polished finish.
 - b. Edges Receiving Sealant: "Suede" finish.
 - c. Concealed Edges: Factory option.
- C. Heat Strengthened and Tempered Glass
1. Heat Strengthened: Heat treated to strengthen glass in bending to not less than 2.0 times annealed strength for the strengthened glass.
 2. Tempered: Heat treated to strengthen glass in bending to not less than 4 to 5 times annealed glass strength for the strengthened glass.
 3. Cut glass to required size before tempering. Comply with Glass Tempering Association recommendations.
 4. Provide tongless tempered glass. When size limitations require tong edges, support each piece during tempering process so that tong marks will be concealed in the glazed system.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates, substructure and installation conditions. Do not proceed with glazing work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PROTECTION AND PREPARATION

- A. Protect glass from edge damage during handling and installation. Remove and legally dispose damaged glass off of the project site. Damaged glass is defined as glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and/or appearance.
- B. Do not cut, seam, nip or abrade tempered glass.
- C. Inspect each piece of glass immediately before installation and eliminate any which have observable edge damage or face imperfections.
- D. Unify appearance of each series of lights by setting each piece to match other pieces, as nearly as possible. Inspect each piece and set with pattern, draw, and bow oriented in same direction as other pieces.
- E. Clean glazing channels and other framing members to receive glass immediately before glazing. Remove loose coatings. Apply primer to joint surfaces receiving sealants when recommended by sealant manufacturer.

3.03 INSTALLATION - GENERAL

- A. Comply with combined recommendations and technical reports of manufacturer's of glass and glazing materials used with GANA "Glazing Manual", except when more stringent requirements are indicated.
- B. Install insulating units to comply with recommendations by IGMA, except as otherwise specifically indicated or recommended by glass and sealant manufacturers.
- C. Glazing channel dimensions shown are intended to provide for necessary bite on glass, minimum edge clearance and adequate sealant thickness, with reasonable tolerance. Adjust as required by job conditions at time of installation.
- D. Install setting blocks in sill rabbets, properly sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

- E. Install primers, sealants, tapes, and gaskets in accordance with manufacturer's recommendations. Set glass without springing and install securely to prevent rattling or breakage.
- F. Where wedge-shaped gaskets are driven into one side of the channel to pressurize the sealant or gasket on the opposite side, provide adequate anchorage to ensure gasket will not "walk" out when subjected to dynamic movement. Anchor gasket to stop with matching ribs, or by proved adhesives, including embedment of gasket tail in cured heal bead.
 - 1. Miter cut and bond gasket ends together at corners where gaskets will not pull away from corners and result in voids or leaks in the glazing system.
- G. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

3.04 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes edge-to-edge, but not necessarily in one continuous length. Do not stretch tapes to make them fit openings.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

3.05 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

- C. Center glass lites in openings on setting blocks and press firmly against soft compression gaskets by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealant to provide a substantial wash away from glass.

3.07 PROTECTION AND CLEANING

- A. Protect glass from breakage immediately upon installation by attachment of streamers to framing held away from glass. Do not apply markers of any type to surfaces of glass. Remove non-permanent labels and clean surfaces.
- B. Maintain glass in a reasonable clean condition during construction so that it will not be damaged by corrosive action, and will not contribute (by wash off) to the deterioration of glazing materials and other work. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during construction period, including natural causes, accidents and vandalism.
- C. Wash and polish on both faces not more than four days before acceptance of the work. Comply with glass manufacturer's recommendations for final cleaning.

3.08 GLAZING SCHEDULE

- A. Insulating Glass – IG-1 and IG-2
 - 1. Type: Two thicknesses of float or tempered glass, as required by code.
 - 2. Glass/Color
 - a. Interior Pane
 - 1) IG-1
 - a) Type I (transparent, flat)
 - b) Class 1 (clear)
 - c) Quality q3 (select)

- 2) IG-2
 - a) Type 1 (transparent, flat)
 - b) Kind: FT (fully tempered)
 - c) Class 1 (clear)
 - d) Quality q3 (select)
- b. Exterior Pane: VIRACON Solarscreen 2000 Low E VRE 1-65
 - 1) IG-1
 - a) Type I (transparent, flat)
 - b) Class 1 (clear)
 - c) Quality q3 (select)
 - d) Low-Emissivity Coating: Sputtered on #2 surface.
 - 2) IG-2
 - a) Type 1 (transparent, flat)
 - b) Kind: FT (fully tempered)
 - c) Class 1 (clear)
 - d) Quality q3 (select)
 - e) Low-Emissivity Coating: Sputtered on #2 surface.
3. Unit Thickness: 1" (two 1/4" panes and 1/2" air space).
4. Thermal Conductance (U-Value): 0.26 Summer Daytime.
5. Transmittance
 - a. Ultraviolet %: 16.
 - b. Visible %: 59.
6. Solar Factor (SHGC): 0.37.

B. Insulating Spandrel Glass

1. Description: Spandrel/clear.
2. Outer Pane: Low E coated glass as specified herein.
3. Inner Pane: Clear with spandrel coating as specified herein, on 4th surface.
4. Thickness: 1/4" each pane.
5. Air Space: 1/2".
6. Unit Thickness: 1".

END OF SECTION

SECTION 09 21 16
GYP SUM BOARD SYSTEMS

PART 1 GENERAL

1.01 SCOPE

- A. Provide gypsum board systems consisting of wall board and framing as indicated and specified. Work includes:
1. Gypsum board on wood framing.
 2. Fire-rated gypsum board construction where indicated.
 3. Edge trim, corner beads, control joints, accent reveals, fasteners, joint treatment materials and other accessories required for a complete installation.
 4. Includes installation of acoustical insulation specified in Section 07 21 00.
 5. Installation of metal access doors, including those provided by Plumbing and HVAC Contractors. See Section 08 31 13 and Divisions 22 and 23.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Tile Backer Board: Section 09 30 00.
- C. Cold-Formed Metal Framing: Section 05 40 00.
- D. Acoustical Insulation: Section 07 21 00.
- E. Sealant: Section 07 92 00.
- F. Firestopping: Section 07 84 00.
- G. Wood Blocking: Section 06 10 50.
- H. Wood framing: Section 06 10 00.

1.03 QUALITY ASSURANCE

- A. Gypsum Board Systems: Comply with ASTM C840 "Application and Finishing of Gypsum Board", and as specified.
- B. Reference Standards: Wherever the following abbreviations are used herein they shall refer to the corresponding standard:
1. ASTM: American Society for Testing and Materials.

2. GA: Gypsum Association.
- C. Fire-Rated Construction: Comply with fire resistance ratings indicated on drawings and as required by governing authorities and codes. Provide materials, accessories and application procedures that have been listed by Underwriters Laboratories or tested in accordance with ASTM E119 for the type of construction shown.
- D. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- E. Guarantee: Submit written guarantee stating that cracks, delaminations or other imperfections in the drywall work which may develop within a period of 2 years from date of acceptance will be repaired at no cost to the Owner.
- F. Job Mock-Up: Prior to start of finishing operations a job standard mock-up will be prepared. A unit room will be completely finished, including joint and screw taping and spackling, sanding, surface preparation and painting. Repair or redo mock-up until accepted by Architect. Job mock-up must be acceptable to Architect before beginning gypsum board finishing operations. Retain and maintain mock-up throughout remainder of project as a minimum workmanship standard. Gypsum board finishing quality must meet or exceed the quality of job mock-up. See Section 09 91 00 for mock-up painting.
- G. Pre-Installation Conference: Conduct a pre-installation conference at Project site to review manufacturer's recommendations and referenced requirements for locating control joints in gypsum board walls and ceilings a minimum of one (1) week prior to beginning this portion of the Work. Have manufacturer's representative, contractor's representative and Architect present at this meeting. Conduct this conference to comply with requirements of Section 01 31 19, Project Meetings. See paragraph 3.08A for additional pre-installation conference requirements.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each gypsum board system component.
- B. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.
 2. All products to be compliant with CA Section 01350
- C. Submit manufacturer's certification that fire-rated assemblies proposed meet project requirements, including evidence of approved test reports acceptable to governing building code enforcing authorities, that assemblies when installed with

proposed materials, will meet or exceed fire ratings required.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened labeled containers.
- B. Store, protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling and deterioration. Protect cold-formed metal framing from corrosion, deformation and other damage during delivery, storage and handling per requirements of AISI's "Code of Standard Practice".
- C. Protect adjoining surfaces against damage and soiling.

1.06 JOB CONDITIONS

- A. Coordinate installation sequencing with work of other trades.
 - 1. Verify completion of other work, including that of other trades, which will be concealed by gypsum drywall construction before installation of wallboard.

1.07 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Gypsum Board: U.S. GYPSUM CO.; CERTAINTEED CORP.; GEORGIA-PACIFIC CORP.; NATIONAL GYPSUM COMPANY; CONTINENTAL BUILDING PRODUCTS.
- B. Others as listed for specific products.

2.02 METAL FURRING

- A. Material
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: Coating with equivalent corrosion resistance of ASTM A653, G40, hot-dip galvanized, unless otherwise indicated.
- B. Rigid Furring Channels: Hat-shaped; minimum 0.022 inch uncoated metal thickness; 7/8" deep, unless otherwise indicated.

- C. Resilient Furring Channels: Minimum 0.0188" uncoated metal thickness; ½" deep; asymmetrical or hat-shaped members designed to reduce sound transmission.

2.05 GYPSUM BOARD

- A. General: Comply with ASTM C1396.
 - 1. Recycled Content of gypsum board: Synthetic drywall must be at least 95% recycled content; non-synthetic drywall it must be at least 10% post-consumer recycled content.
- B. Fire Rated Gypsum Wallboard: Type "C" or "X" (special fire retardant) to meet fire ratings for construction shown. Tapered edges. Thickness 5/8" unless otherwise indicated. Use at all locations indicated as meeting a specific fire resistance rating.
 - 1. Provide 5/8", Type X board at all locations not indicated to receive a specific type board.
- C. Moisture and Mold Resistant Gypsum Wallboard:
 - 1. ASTM C1278.
 - 2. Type X.
 - 2. Edges: Tapered.
 - 3. Thickness: 5/8 inch.
 - 4. Acceptable Products: Basis of design is USG Fiberock Brand Aqua-Tough AR.
 - 5. Resistance to Mold Growth: ASTM D3273, "Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber," the panel score was 10.
 - 6. Use moisture resistant paperless gypsum board on all vertical and horizontal surfaces that are within four feet of any water sources where the drywall can be splashed, including but not limited to kitchen sink, bath ceilings & walls, laundry rooms, utility / mech closets, etc. Maintain ratings where wall is required to be rated. When used on ceilings must be rated for the span.
- D. Tile Backer Board: See Section 09 30 00.

2.06 ACCESSORIES

- A. Fasteners: Drywall screws and metal framing screws per manufacturer's instructions and recommendations for type and size, based on construction and conditions involved.
 - 1. Steel Drill Screws: ASTM C1002.
 - 2. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick specified in Section 05 40 00.
- B. Trim: ASTM C1047.

1. Manufacturers
 - a. Metal: BEADEX MANUFACTURING; CLARK DIETRICH BUILDING SYSTEMS; listed gypsum board manufacturers
 - b. Vinyl: VINYL TECH; VINYL CORP.; TRIM TEX
 2. Corner Beads - Outside, Square Corners: 1-1/4 inch x 1-1/4 inch heavy gauge galvanized steel or vinyl, perforated.
 3. Corner Beads - Outside, Non-square Corners: BEADEX B-1 Splay Flexible Corner or equal. Concealed metal; two galvanized continuous strips laminated with paper trim; for application without mechanical fasteners.
 4. Curved Edge Cornerbead: Notched or flexible edge.
 5. Exposed Edges (Casing Beads): L-bead or LC-bead; exposed long flange receives joint compound. Size to suit wallboard. J-shaped bead that does not receive joint compound is not permitted.
 6. Expansion (Control) Joints: Tape protected 1/4" wide x nominal 7/16" deep control slot.
- C. Joint Treatment Materials: ASTM C475.
1. Joint Tape. Width to adequately cover joint.
 - a. Interior Gypsum Board: Paper.
 - b. Exterior Gypsum Soffit Board: Paper.
 - c. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
 2. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - a. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 - b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - 1) Use setting-type compound for installing paper-faced metal trim accessories.
 - c. Fill Coat: For second coat, use setting-type, sandable topping compound.
 - d. Finish Coat: For third coat, use setting-type, sandable topping compound.
 - e. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.
 3. Joint Compound for Tile Backing Panels:
 - a. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
 - b. Cementitious Backer Units: Section 09 30 00.
- D. Additional Item: All additional accessories to complete work including nails and anchors to secure frames to walls and floors.
- E. Acoustic Materials

1. Insulation: See Section 07 21 00.
2. Sealant: Nonsag, paintable, nonstaining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90.
 - a. Manufacturers
 - 1) USG Acoustical Sealant
 - 2) TREMCO Acoustical Sealant
 - 3) PECORA BA-98
 - b. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
3. Neoprene impregnated sealant tape.
4. Head of Wall Insulation: Pre-manufactured, high-density mineral fiber acoustical insulation shaped to fit the trapezoidal flutes, typical of metal decking and complying with ASTM E119 as safining insulation.

PART 3 EXECUTION

3.01 PREPARATION

- A. Provide adequate lighting and ventilation during installation and joint finishing treatment.
- B. Coordination with Sprayed Fire-Resistive Materials
 1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
 2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.02 INSPECTION

- A. Examine substrates and installation conditions. Do not proceed with gypsum wallboard work until unsatisfactory conditions have been corrected.
 1. Protrusions of framing, twisted framing members, or unaligned members must be repaired before installation of wallboard is started.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.03 FRAMING INSTALLATION

- A. See Section 06 10 00.
- B. Install all framing plumb and square with spacing as indicated.
- C. Provide supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with United States Gypsum Company's "Gypsum Construction Handbook".
- D. Provide a minimum of two (2) screws per connection.

3.04 FURRING INSTALLATION

- A. Wall Application
 - 1. Attach to masonry with expansion anchors or at mortar joints with concrete nails or expansion anchors.
 - 2. Spacing shall be 16 in. o.c., unless otherwise indicated.
 - 3. Run vertically or horizontally for maximum efficiency.

3.05 GYPSUM BOARD INSTALLATION

- A. Gypsum Board Systems: Comply with ASTM C840.
- B. General
 - 1. Pre-installation Conference: Before start of gypsum board installation, meet at the project site with the Architect and installers of related work, including work requiring openings, chases, frames, access panels, support, similar integrated requirements and mechanical and electrical trades. Review potential interferences and conflicts and coordinate layout and sequencing requirements for proper installation and integration of the work.
 - a. Do not proceed with gypsum board installation until blocking, framing, bracing and other supports for subsequently applied work have been installed, reviewed and accepted by the Architect.
 - b. Do not install gypsum board until work concealed by gypsum board has been installed.
- C. Application
 - 1. Install gypsum board face side out. Do not install imperfect, damaged or damp boards.
 - 2. Butt boards together for a light contact at edges and ends with not more than 1/16" open space between boards. Do not force into place.
 - 3. Locate either edges or end joints over supports. Position boards so that

both tapered edge joints abut. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions.

4. Attach gypsum board to framing and blocking as required for additional support at openings and cutouts.
5. Floating Construction: Install gypsum board with "floating" internal corner construction, unless isolation of the intersecting board is indicated.
6. In addition to compliance with the standards, comply with specific requirements indicated for each type of arrangement of gypsum wallboard system shown. Space fasteners in accordance with manufacturer's recommendations and complying with referenced standards.
 - a. Walls and Partitions: Apply sheets horizontally or vertically. Provide maximum sheet lengths to minimize end joints with edges or ends over supports. In two layer applications, stagger joints of second layer from joints of first layer.
 - b. Cut and install panels to eliminate vertical joints in corners of door frames to ceiling.
 - c. Make cutouts to fit within wall plate, register and grille flanged. All cutouts made by knife or saw.
 - d. Make angles and corners clean, true, plumb and square; walls plumb, flat and straight and ceilings flat and level.
 - e. Ceilings: Apply gypsum board on ceilings, before application on walls and partitions. Install in direction and manner to minimize end joints. Stagger end joints over supports. In two layer applications, stagger joints of second layer from joints of first layer.
7. Provide drywall metal corner clips per sustainable design requirements.

3.07 INSTALLATION OF SOUND RATED PARTITIONS

- A. Provide sound-rated construction where indicated.
- B. Acoustic Insulation: Install single layer of acoustic batt insulation in designated partitions after one side of gypsum board is installed, filling width and height of partition completely. Attach to gypsum board with adhesive spots to prevent subsequent displacement.
- C. Extend partition stud system through acoustical ceilings to substrate. Apply gypsum board base panels full height, both sides of partition.
- D. 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 C919 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.
- E. Seal partition perimeters. Provide continuous beads of acoustical sealant at juncture of both faces of runners or plates with floor and ceiling construction and wherever work abuts dissimilar materials. Seal prior to installation of sound

attenuation insulation and gypsum board panels.

- F. Provide continuous beads of sealant at juncture of gypsum board and abutting surface. Install gypsum board with 1/8" relief for sealant. Sealants to be contained within depth of gypsum board, not as a fillet.
- G. At openings and cutouts, fill open spaces between edges of gypsum board and fixtures, cabinets, ducts, and other flush or penetrating items, with continuous bead of acoustical sealant.
- H. If sound-rated partitions intersect non-sound-rated partitions, extend sound construction to completely close-off sound flanking paths through non-rated construction. Seal joints between face layers at vertical interior angles of intersecting partitions.
- I. Exercise particular care at walls surrounding toilet areas and walls and ceilings surrounding mechanical spaces to provide properly constructed sound-rated gypsum board partition and ceiling systems.
- J. Verify that electrical boxes are not located back-to-back; back-to back boxes to be offset at least one stud space. Do not close off non-complying conditions before notifying and receiving direction from Architect.

3.08 TRIM AND ACCESSORIES

- A. Install corner beads at external corners of gypsum wallboard and sheathing work. Use longest practical lengths.
- B. Install edge trim wherever edge of gypsum board or sheathing would be exposed or semi-exposed.
 - 1. Provide beaded trim to receive joint compound at all gypsum wallboard work.
 - 2. Provide L-type trim where work is abutted to other work and Kerf-type where work is kerfed to receive kerf leg.
 - 3. Provide U-type trim where edge is exposed, revealed, gasketed or sealant filled, including expansion joints.
- C. Attach to framing with steel drill screws. Clinch attachment to wallboard not acceptable.
- D. Control Joints
 - 1. Install control joints to isolate gypsum board surfaces as recommended by ASTM C840. Verify locations with Architect prior to installation. Generally locate joints as follows when:
 - a. Partition, furring or column fireproofing abuts a structural element (except floor) or dissimilar wall or ceiling.
 - b. Ceiling abuts a structural element, dissimilar wall or partition or

- other vertical penetration.
 - c. Construction changes within the plane of the partition or ceiling.
 - d. Partition or furring run exceeds 30'.
 - e. Ceiling dimensions exceed 50' in either direction with perimeter relief; 30' without relief.
 - f. Exterior ceilings and soffits exceed 20' in either direction; align with window mullions, when applicable.
 - g. Wings of "L", "U", and "T"-shaped ceiling areas are joined.
 - h. Expansion or control joints occur in the base exterior wall.
 - i. Differential Deflection Conditions: All locations where partitions are supported by two or more structural members and subject to differential deflection by live or dead loading:
 - 1) Typical Framing Floor to Structure: Provide "Ceiling Deflection Track".
 - 2) Framing over One Floor (stairs, shafts, etc.): Provide control joints where studs are interrupted by structure.
2. Provide framing immediately on both sides of joint and back with 2"+/- gypsum board strips as required to maintain fire resistance rating.

3.09 FINISHING

- A. Comply with manufacturer's instructions for mixing, handling and application of materials. Apply treatment at joints both directions, at flanges of trim accessories, penetrations of gypsum board (electrical boxes, piping and similar work), fastener heads, surface defects and elsewhere indicated. Apply in manner that will result in each of these items being concealed when applied decoration has been completed.
- B. Prefill open joints of more than 1/16" with special chemical-hardening type bedding compound, before bedding joint tape.
- C. Apply joint tape at joints between gypsum boards, except where trim accessories are indicated.
- D. Do not use topping compound for bedding joint tape.
- E. Apply joint compound for the final coat of joint treatment, unless specifically recommended by the manufacturer for that use.
- F. Walls Above Acoustical Ceiling Systems: Tape and fill joints with two coats of joint compound, sanding not required.
- G. Leave all exposed surfaces smooth and even, ready for painting.
- H. Provide where indicated on the drawings levels of finish as specified in ASTM C840, "Recommended Specification on Levels of Gypsum Board Finish". Levels of finish consist of:
 - 1. Level 1 - **Areas Above Ceilings:** All joints and interior angles shall have

tape embedded in joint compound. Provide surface free of excess joint compound. Tool marks and ridges are acceptable.

2. Level 2 – **As a Substrate for Ceramic Tile**: All joints and interior angles to have tape embedded in joint compound and one separate coat of joint compound applied over all joints, angles, fastener heads, and accessories. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
3. Level 4 – **All Areas Not Indicated to Receive Levels 1, 2 or 5**: All joints and interior angles to have tape embedded in joint compound and three separate coats of joint compound applied over all joints, angles, fastener heads, and accessories. All joint compound shall be smooth and free of tool marks and ridges.

3.10 ADJUST AND CLEAN

- A. Remove any screw which does not engage into a framing member or spins freely.
- B. When paper face is punctured, drive new screw approximately 1-1/2" from defective fastener and remove defective fastener. Fill damaged surface with compound.
- C. Ridging
 1. Do not repair ridging until condition has fully developed: approximately 6 months after installation or one heating season.
 2. Sand ridges to reinforcing tape without cutting through tape.
 3. Fill concave areas on both sides of ridge with topping compound.
 4. After fill is dry, blend in topping compound over repaired area.
- D. Fill cracks with compound and finish smooth and flush.
- E. 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.

3.11 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.

END OF SECTION

SECTION 09 30 00

TILE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Extent of tile work is shown on drawings and schedules, and as specified herein.
- B. Types of tile work required including the following:
 - 1. Porcelain wall tile.
- C. Section also includes:
 - 1. Metal edge/transition strips installed as part of tile installations.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.
- B. Sealant: Section 07 92 00.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Provide tile of each type produced by a single manufacturer. Provide materials obtained from one source for each type and color of tile, grout, and setting materials.
- B. Installer: A firm with not less than 5 years experience in installing tile in applications similar to those required for this work.
- C. Ceramic Tile Manufacturing Standard: TCA 137.1. Furnish tile complying with Standard Grade requirements unless indicated otherwise.
- D. Proprietary Materials: Handle, store, mix and apply proprietary setting and grouting materials in compliance with manufacturer's instructions.
- E. Installer to verify locations of all flexible joints required by the provisions of this section, by the recommendations of TCA, and by the recommendations of the related manufacturers. See Article 3.06.
 - 1. Joint locations may or may not be indicated on the drawings.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's technical information and installation instructions for materials required. Include certifications and other data to show compliance with these specifications.
- B. Special Environmental Requirements: Submit the following in accordance with Section 01 81 13:
 - 1. Adhesives shall have a VOC content of 65 > g/L or less.
 - 2. Product Data: For adhesives, indicating VOC content.
 - 3. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 4. Products shall comply with the 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."
 - 5. Laboratory Test Reports: For sealers, indicating compliance with requirements for low-emitting materials.
 - 6. Regional Materials: Stone shall be fabricated within 100 miles of Project site from materials that have been extracted, harvested, or recovered within 100 miles of Project site.
 - 7. Product Certificates: For materials manufactured within 100 miles of Project, indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include distance to Project and cost for each raw material.
- C. Samples: Submit manufacturer's color charts consisting of actual tiles or sections of tiles showing full range of colors available, for each type of tile specified. Include samples of grout and accessories requiring color selection. Submit full size sample for each type of trim, accessory and color. Submit samples of metal edge strip.
- D. Certification: Furnish Master Grade Certificate for each type of tile, signed by manufacturer and Installer.

1.06 PRODUCT HANDLING

- A. Deliver packaged materials and store in original containers with seals unbroken and labels intact until time of use, in accordance with manufacturer's instructions.

1.07 JOB CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation in accordance with referenced standards and manufacturer's printed recommendations.

PART 2 PRODUCTS

2.01 CERAMIC TILE

- A. Ceramic Wall Tile, Floor Tile and Base: Standard grade, impervious porcelain ceramic tile conforming to ANSI 137.1. Provide trim pieces as required.
- B. Manufacturer
 - 1. Basis of Design: Manufacturer, Styles and Colors: As indicated on the drawings.
 - 2. Other Acceptable Manufacturers: Ceramic tile manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design and the sizes and colors are an acceptable match as approved by the Architect.

2.04 MORTAR, GROUT AND ACCESSORIES

- A. See Tile Installation Systems in Part 3 of this Section. Setting mortar and grout to be from same manufacturer.
- B. General - All Adhesives, Grouts and Epoxies: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the current VOC content limits of the South Coast Air Quality Management District (SCAQMD) Rule #1168 ; VOC limits effective July 1, 2005 and rule amendment date of January 7, 2005.
- C. Modified Dry Set Cement Mortar - Thin Set: Factory mixed mortar of Portland cement/sand, field gauged with undiluted latex admixture. Conform to ANSI A118.4, Latex-Portland Cement Mortar. Provide type suitable for "medium-set" for tiles with a dimension larger than 15".
 - 1. Provide one of the following:
 - a. BOSTIK, Durabond D-50 or D-60.
 - b. MAPEI, Ultraflex 3.
 - d. LATICRETE, 255 MultiMax.
- D. Dry-Set Mortar - Thin Set: Mixture of Portland cement with sand and latex, water imparting additive. Conform to ANSI A118.1, Standard Dry-Set Cement Mortar.
 - 1. May be used in lieu of Modified Dry Set Cement Mortar for ceramic floor and wall tile.
- E. Grout - Ceramic Tile (ANSI A118.7): Integrally colored, sanded (unless otherwise indicated), polymer modified cement type, factory prepared (premixed) grout. Color as selected by Architect.
 - 1. Provide one of the following:
 - a. BOSTIC, Ceramic Tile Grout with BOSTIK 425 Acrylic-Latex Admixture.
 - b. TEC (H.B. FULLER), TEC Power Grout.
 - c. MAPEI, Ultracolor.
 - d. LATICRETE, Permacolor Grout.

2. Colors: As selected by Architect.
 3. Provide unsanded grout for glass tile and tile joints less than 1/8" wide.
- F. Metal Edge Trim: L-shape, height to match tile and setting-bed thickness; stainless steel, ASTM A666, 300 Series. SCHLUTER, CERAMIC TOOL COMPANY, BLANKE
- G. Grout Sealer: Low VOC, penetrating type as recommended by grout manufacturer that does not change color or appearance of grout.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine surfaces to receive tile, setting beds and accessories before tile installation for the following:
1. Defects or conditions adversely affecting quality and execution of the installation.
 2. Deviations beyond allowable tolerances of surfaces to receive tile.
 3. Do not proceed with installation work until unsatisfactory conditions are corrected.
- B. Conditions of surfaces to receive tile.
1. Surfaces to be firm, dry, clean, and free of oily or waxy films or curing compounds.
 2. Grounds, anchors, plugs, hangers, bucks, electrical, plumbing and HVAC work in or behind tile to be installed prior to proceeding with tile work.

3.02 PREPARATION

- A. Prepare surfaces to receive tile as required to achieve proper bond and as recommended by the Tile Council of America.
1. See Section 01 73 00 for additional floor preparation requirements.
- B. Fill cracks, low areas and pits in concrete with self-leveling fill of type recommended by tile manufacturer for substrate conditions encountered.
- C. Lightly grind concrete subfloors with a terrazzo grinder to remove trowel marks, slab curl at saw cut joints or other surface irregularities or high spots which will telegraph to the flooring surface.
- D. Sawcut or grind transition areas to install tile flush with adjacent finished floor materials.
- E. Clean surfaces in a manner suitable for proper installation. Verify that slabs are

free of curing membranes, oil, grease, wax, dust and other materials deleterious to tile installation.

- F. Primers or other preparations required or recommended in accordance with manufacturer's instructions.

3.03 INTERIOR WALL TILE INSTALLATION - SYSTEMS

- A. Prepare surfaces, fit, set or bond, grout, and clean in accordance with Tile Council of America, "Handbook for Ceramic Tile Installation", 2011 Edition; and as follows:
- C. Thin Set - Stud Walls - Over Gypsum Board: TCA W243, dry-set mortar bond coat or latex Portland cement bond coat and grout.
 - 1. Tile: ANSI A108.5.
 - 2. Grout: ANSI A108.10.

3.06 TILE INSTALLATION - PROCEDURES

- 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.
- B. Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise shown. 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 that plates, collars or covers overlap tile.
- D. Placement Methods: Install tile using the hereinbefore specified setting beds and grouts.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are same size. Layout tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting.
 - 1. Avoid tile layout with less than half width tiles at room/area perimeters, unless otherwise indicated on the floor layout drawings. Notify Construction Manager if layout not achievable per layout indicated on the drawings. Do not continue in room/area in question until approved by the Associate.

3.07 FLEXIBLE JOINTS

- A. Locate flexible joints (expansion, control and isolation joints) prior to tile installation. See Quality Assurance in Part 1 herein.
- B. Provide flexible joints as specified herein, unless more stringent requirements are indicated on drawings. Provide as specified, regardless if not indicated on drawings.
- C. Joint to be continuous from face of tile to bottom of setting bed or leveling bed. Reinforcing to be discontinued at joint. Install continuous joint filler material in joint from setting or leveling bed to a point below face of tile adequate for proper placement of backing rod and sealant.
- D. Joint Design: TCA design EJ171 as applicable. See Section 07 92 00 for sealant. Provide at the following locations:
 - 1. Vertical Surfaces
 - a. Directly over joints in wall substrate including cold joints, construction joints, control joints and expansion joints.
 - b. At changes in substrate material.
 - c. Where tile work abuts restraining surfaces such as perimeter walls, curbs, columns, pipes, etc.
 - d. Where indicated.
- E. Curing: Cure tile floor, base, and wall installations in accordance with manufacturer's recommendations, TCA recommendations, and in accordance with ANSI requirements.
- F. Metal Edge Strips: Provide metal edge strips at openings without thresholds, and where exposed edges of tile floors meet other materials.
 - 1. Except as otherwise indicated, where trim is located across door openings, locate trim on the door side in line with the edge of the door stop, terminating at the rabbet.

3.07 REPAIR, CLEAN AND PROTECT

- A. Repair, or remove and replace chipped, damaged or otherwise defective work to the satisfaction of the Architect.
- B. Cleaning: Upon completion of placement and grouting, clean all tile surfaces so that they are free of foreign matter.
 - 1. Use methods and materials as recommended by tile manufacturer.
 - 2. Replace tiles that cannot be satisfactorily cleaned.
- C. Grout Sealer: Apply silicone grout sealer to grout joints according to grout sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout

joints, remove excess sealer from joints and from tile faces by wiping with soft cloth.

- D. Protection: When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls and floors. Protect installed tile work with Kraft paper or other heavy covering during construction period to prevent damage and wear.
1. Prohibit foot and wheel traffic from using tiled floors for at least 3 days after grouting is completed.
 2. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide acoustical lay-in panel ceiling system as shown and specified.

1.02 RELATED SECTIONS

- A. Gypsum Board Ceiling: Section 09 21 16.
- B. Sustainable Design Requirements: Section 01 81 13.

1.03 QUALITY ASSURANCE

- A. Workmanship: Comply with Ceilings & Interior Systems Contractors Association (CISCA) "Ceiling Systems Handbook".
- B. Installation: Performed by an experienced authorized installer approved by acoustical material manufacturer.
- C. Fire Hazard Classification: Provide acoustical materials which have been UL tested, listed and labeled Class 0-25, when tested in accordance with ASTM E84, Class A flame spread rating in accordance with ASTM E1264 requirements.
- D. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standards.
 - 1. AIMA: Acoustical and Insulating Materials Association.
 - 2. ASTM: American Society for Testing and Materials.
 - 3. CISCA: Ceilings and Interior Systems Contractors Association.
- E. Coordination Between Trades: Quality assurance includes the cooperation with HVAC, Plumbing and Electrical Contractors in regards to ceiling grid layout.
 - 1. Procedures for submitting coordination drawings for ceiling work is included in Section 01 33 23 - Shop Drawings, Product Data and Samples.

1.04 SUBMITTALS

- A. Product Data
 - 1. Submit manufacturer's product data and installation instructions for each type of acoustical material and suspension system required.

2. Submit manufacturer's written instructions for recommended maintenance practices for each type of acoustical ceiling system required. Include recommendations for cleaning and refinishing acoustical units and precautions against materials and methods that may be detrimental to finishes and acoustical performances.
- B. Samples: Submit 12" square acoustical panel samples for each type of acoustical unit required. Provide 12" long suspension system and edge molding samples.
 - C. Certification: Submit manufacturer's certification of acoustical units fire hazard classification rating and performance requirements.
 - D. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.
 2. All products to be compliant with CA Section 01350
- 1.05 PRODUCT DELIVERY, STORAGE AND HANDLING
- A. Deliver materials in original, unopened protective packaging, with manufacturer's labels indicating brand name, pattern size, thickness and fire rating as applicable, legible and intact.
 - B. Store materials in original protective packaging to prevent soiling, physical damage or wetting.
 - C. Store cartons open at each end to stabilize moisture content and temperature.
 - D. Do not begin installation until sufficient materials to complete a room are received.
- 1.06 PROJECT CONDITIONS
- A. Environmental Limitations: Do not install acoustical panel 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.
- 1.07 EXTRA MATERIALS
- A. Maintenance Stock: Under this Section furnish to the Owner prior to final acceptance, extra maintenance stock of acoustical materials, consisting of a minimum of one percent of area of each size, type, thickness installed on the job, and 4% if the area is under 5,000 sq. ft. This extra stock is for the Owner's use after completion of the Project and is not to be used for repair or replacement required during the construction period. Properly package, seal, and identify extra stock material.

PART 2 PRODUCTS

2.01 SUSPENSION SYSTEM

A. Exposed "Tee" Grid System

1. Description: Cold-rolled electrogalvanized steel, factory applied white finish paint to match ceiling tile.
 - a. 15/16" exposed face; DONN (USG INTERIORS) Model DX; ROCKFON Chicago Metallic 200 Snap Grid System; ARMSTRONG Prelude.
 - b. 9/16" exposed face; ARMSTRONG Suprafine; DONN (USG INTERIORS) Fineline; ROCKFON Chicago Metallic Tempra 4000.
2. Description: Comply with ASTM C635. Provide systems adequate to support light fixtures, ceiling diffusers, and other normal accessories. Maximum deflection 1/360 of the span. All components of system from one manufacturer, die cut, and interlocking.
 - a. Structural Class: Intermediate duty.
 - b. Type of System: Direct Hung.
 - c. Attachment Devices: Size for five times design load indicated in ASTM C635, Table 1 direct hung.
 - d. Hanger Wires: ASTM A641 galvanized carbon steel, soft temper, prestretched not less than 12 gauge.
 - e. Carrying Channels: 1-1/2" steel channels, hot-rolled or cold-rolled, not less than 0.475 lbs per linear foot, standard finish.
 - f. Members: Provide manufacturer's standard exposed runners, cross runners and accessories of type and profiles indicated, with exposed cross runners coped to lay flush with main runners.
3. Edge Moldings: Hemmed edge wall angles, cold-rolled electrogalvanized steel, factory applied finish to match grid system. Provide width, configuration and profile indicated.

2.02 ACOUSTICAL UNITS

A. General

1. Cellulose Base
 - a. Toxicity/IEQ: Panel based anti-microbial treatment to inhibit growth of mold and mildew:
 - 1) Coating-Based Antimicrobial Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment; and showing no mold or mildew growth when tested in accordance with ASTM D3273.
 - 2) Panel-Based Antimicrobial Treatment: Provide acoustical panels manufactured with antimicrobial treatment in the panels.
2. Mineral Base
 - a. Toxicity/IEQ: Panel based anti-microbial treatment to inhibit growth of mold and mildew:

- 1) Coating-Based Antimicrobial Treatment: Provide acoustical panels with face and back surfaces coated with antimicrobial treatment; and showing no mold or mildew growth when tested in accordance with ASTM D3273.
 - 2) Panel-Based Antimicrobial Treatment: Provide acoustical panels manufactured with antimicrobial treatment in the panels.
- B. Acceptable Manufacturers: The product indicated are by ARMSTRONG. Equal comparable design and performing products by CERTAINTEED, ROCKFON or U.S. GYPSUM are acceptable.
- C. Type ACT-1: Ultima #1912, 24" x 24" x 3/4", beveled tegular edge, NRC .70, CAC 35, light reflectance LR-.90, with white, washable finish; 9/16" grid.
- D. Type ACT-2: Ledges # 8013, 24" x 24" x 9/16", flush tegular edge, CAC 35, light reflectance LR-.80, with white, washable finish; 9/16" grid.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates, structure and installation conditions. Do not proceed with acoustical ceiling systems work until unsatisfactory conditions have been corrected.
- B. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling.
 1. Avoid use of less than half widths units at borders.
- B. Coordinate with ceiling layout on drawings.
- C. Notify Architect of discrepancies between ceiling layout on drawings and ceiling layout proposed. Do not proceed until approved by Architect.

3.03 INSTALLATION

- A. Suspension System: Comply with ASTM C636 requirements and be water or laser leveled, maximum deflection of 1/360 of span and maximum surface leveling tolerance 1/8" in 12'-0".
- B. Rough Suspension

1. Hangers: Ceiling suspension systems shall not be supported from ductwork, electrical conduit, heating or plumbing lines or any other utility lines. Each utility and the ceiling suspension system shall be a separate installation and each shall be independently supported from the building structure. Where interferences occur, employ trapeze hangers or supports to avoid interferences with appurtenances requiring servicing. Support all four corners of suspension systems at fluorescent light fixtures.
2. Wall Molding
 - a. Provide edge trim molding at perimeter of acoustical ceiling installation and intermediate vertical surfaces. Use maximum lengths. Miter trim corners to provide tight, accurate joint. Connect moldings securely to substrate surfaces.
 - b. Connect moldings to substrate at intervals not over 16" on center and not more than 3" from ends, leveling with ceiling suspension system to tolerance of 1/8" in 12'-0".

C. Acoustical Units

1. Install acoustical lay-in panels level, in uniform plane, with joints accurately cut to ensure a snug and square fit. All panel faces and edges to be free from damage or soiling.
 - a. Fit border units accurately at borders and penetrations.
 - b. Recreate tegular and decorative edges at wall cuts and other cuts.
 - c. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and perimeter moldings.
 - d. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
 - e. For reveal-edged panels on suspension-system members with box-shaped flanges, install panels with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
 - f. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
2. Coordinate suspension systems grid layout with electrical lighting fixture lay-out and installation.

3.04 CLEANING

- A. After installation, clean soiled or discolored surfaces of acoustical units and exposed suspension members. Comply with manufacturer's recommendations for cleaning and touch-up of minor finish damage.
- B. Adjust all sags and twists which develop in ceiling systems. Remove and replace units which are improperly installed and damaged units which cannot be successfully cleaned and repaired to eliminate evidence of damage.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide resilient flooring as shown and specified. Work includes:

1. Base.
2. Luxury vinyl tile
3. Stair tread
4. Sheet vinyl flooring.
5. Adhesives and accessories to complete the work.

1.02 RELATED SECTIONS

A. Sustainable Design Requirements: Section 01 81 13.

1.03 QUALITY ASSURANCE

A. Provide each type of resilient flooring and base material produced by one manufacturer, including recommended adhesives and leveling compounds.

B. Provide each type resilient flooring and base material from same production run. Colors shall be uniform throughout.

C. 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.

D. Reference Standards: Wherever the following abbreviations are used herein, they shall refer to the corresponding standard.

1. ASTM: American Society for Testing and Materials.
2. FS: Federal Specifications as established by the U.S. Government, General Services Administration.
3. U.L.: Underwriter's Laboratories.
4. ADA: Americans with Disabilities Act Accessibility Guidelines.

E. Slip Retardant Performance: Unless a greater performance is specified under a specific product, all floor materials must have a minimum static coefficient of friction of 0.6.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of resilient flooring, base and accessory required.
- B. Samples
 - 1. Tiles: Submit full sized samples of each type, color and pattern required to illustrate the full range of color variations.
 - 2. Base: Provide 6" lengths of each type and color.
 - 3. Sheet Flooring: Manufacturer's standard sample size, but not less than 6" x 9" of each type, color and pattern required to illustrate the full range of color variations.
 - a. Heat Welding Bead: Manufacturer's standard sample size, but not less than 9" long of each color.
- C. Submit manufacturer's certification that resilient flooring furnished complies with required fire test performance and has been tested and meets indicated requirements.
- D. Submit manufacturer's written instructions for recommended maintenance practices for each type of resilient flooring, base and accessory material required.
- E. Extra Stock: Furnish extra materials in the following quantities:
 - 1. Tiles and Base: Furnish 2% of the total quantity (but not less than 2 full sealed cartons) of each type, pattern and color. Provide 5% of colors with less than 5000 square feet. Properly package and identify each material.
 - 2. Sheet Goods: Furnish 10 linear feet in roll form for each 500 linear feet or fraction thereof, of each product, color and pattern. Package each roll with protective covering and identification labels describing contents.
 - 3. Stair Accessories: Furnish 5% of the total quantity of each type, pattern and color. Properly package and identify each material.
- F. Special Environmental Requirements': Submit the following in accordance with Section 01 81 13):
 - 1. Laboratory Test Reports: For floor covering products, indicating compliance with requirements for low-emitting materials.
 - 2. Adhesives shall have a VOC content of 60> g/L or less.
 - 3. Product Data: For adhesives, indicating VOC content.
 - 4. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.
 - 5. Chemical-Bonding Compound shall have a VOC content of 510 > g/L or less.
 - 6. Product Data: For chemical-bonding compounds, indicating VOC content.
 - 7. Laboratory Test Reports: For chemical-bonding compounds, indicating compliance with requirements for low-emitting materials.
 - 8. Product Data: For sealants, indicating VOC content.
 - 9. Laboratory Test Reports: For sealants, indicating compliance with requirements for low-emitting materials.

10. Environmental Product Declaration: For each product.
11. Health Product Declaration: For each product.
12. Sourcing of Raw Materials: Corporate sustainability report for each manufacturer.
13. All products to be compliant with CA Section 01350

1.05 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original, unopened labeled containers.
- B. Store, protect, and handle resilient flooring materials in accordance with manufacturer's recommendations to prevent damage, soiling and deterioration.
- C. Store materials in areas to receive resilient flooring for a minimum of 48 hours before installation.

1.06 PROJECT CONDITIONS

- A. Maintain uniform room temperature range not less than 70 degrees F., in areas to receive resilient flooring for minimum 48 hours before installation and 48 hours after installation.
- B. Provide adequate lighting and ventilation during installation and clean-up.
- C. Protect adjoining surfaces from damage and soiling.

PART 2 PRODUCTS

2.01 RESILIENT FLOORING MATERIALS

- A. Luxury Vinyl Strip and Tile Flooring
 1. Type: Meets Reference Specification ASTM F1700, Type B, Class III
 2. Thickness: 2.5 mm total with 20 mil urethane wearlayer
 3. Sizes: As indicated.
 4. Properties:
 - a. Static Load: ASTM F970 Meets Requirements
 - b. Indentation – Residual (75 Lbs): Meets Requirements
 - c. Coefficient Of Friction: ASTM D2047 0.65 (Dry)
 - d. Fire Rating: ASTM E648 Class I
 - e. Smoke Density ASTM E662: Meets Requirements
 5. Colors, Patterns and Manufacturers
 - a. Basis of Design: As indicated on the drawings.
 - b. Other Acceptable Manufacturers: Vinyl flooring manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design and the sizes and colors are an acceptable match as approved by the Architect.

- B. Sheet Vinyl: Comply with ASTM F1303 Type 1 Grade 3 Class C
 - 1. Type: Commercial quality flooring composed of solid vinyl wear layer and a cushion backing composition.
 - 2. Manufacturer and Model: As indicated
 - 3. Vinyl wear layer designs/pattern and color shall extend uniformly throughout the wear thickness.
 - 4. Seams: Chemically bonded.
 - 5. Smoke Development: 450 or less (ASTM E662).
 - 6. Critical Radiant Flux: 0.45 watts/cm² or more (ASTM E648).
 - 7. Size: 6 ft. wide roll stock.
 - 8. Gage: .055" gage with 10 mil wear layer.
 - 9. Colors: As selected by Architect.

2.02 BASE

- A. Rubber Base: Complying with ASTM F1861, Type TP, Group 1, 4" high, 1/8" gage. Provide long length rolls and job formed corners. Standard top set cove (Style B) at resilient and other hard surface flooring and straight toeless (Style A) at all carpeted floors.
 - 1. Colors and Manufacturers
 - a. Basis of Design: As indicated on the drawings.
 - b. Other Acceptable Manufacturers: Vinyl base manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design and the colors are an acceptable match as approved by the Architect.
- B. Rubber Base, Millwork Type: Thermoplastic rubber formulation designed specifically to meet the performance the performance and dimensional tolerance requirements of ASTM F1861, Type TP, Group 1 (solid) Standard Specification for Resilient Wall Base. Base shall contain a minimum of 90 percent recycled material.
 - 1. Hardness - ASTMD 2240: 85 Shore A
 - 2. Corners: Field miter cut.

2.03 STAIR ACCESSORY MATERIALS

- A. Stair Treads: Homogeneous, rubber treads with textured finish complying with ASTM F2169.
 - 1. Colors and Manufacturers
 - a. Basis of Design: As indicated on the drawings.
 - b. Other Acceptable Manufacturers: Treads manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design and the colors are an acceptable match as approved by the Architect.

2.04 ACCESSORIES

- A. Leveling Compound: Non-staining latex modified, Portland cement based type, compatible with flooring, as provided or recommended by the flooring manufacturer.
- B. Adhesives: Waterproof, stabilized type as recommended by the resilient flooring and base manufacturer to suit material and substrate conditions.
 - 1. VOC Content: The volatile organic compound (VOC) content of adhesives shall not exceed the limits defined in Section 01 81 13.
- C. Resilient Edge/Transition Strips: Provide rubber or stainless steel transition strips by the following manufacturers.
 - 1. Resilient-to-Carpet: Rubber. Colors as selected by Architect.
 - a. ROPPE, #56
 - b. JOHNSONITE/TARKETT, CTA-XX-H
 - c. VPI FLOORING, ACC12
 - 2. Resilient-to-Concrete: Stainless steel
 - a. SCHLUTER Reno U; stainless steel
 - b. GREAT LAKES TILE PRODUCTS; Reducer.
 - c. BLANKE CORP.; Reducer Trim.
 - 3. Where transition types are required for conditions other than those listed above, provide rubber type from the manufacturers listed to create a smooth transition or termination.
- D. Cleaning and Polishing Materials: Polish and neutral cleaner as recommended by the floor material manufacturer.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates and installation condition. Do not proceed with resilient flooring work until unsatisfactory conditions have been corrected.
- B. Subfloor surfaces shall be smooth, level, at the required finish elevation, and within the tolerances specified in Section 03 30 00.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 PREPARATION

- A. Prepare substrates according to floor 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 floor tile manufacturer. Do not use solvents.
 - 3. Perform tests recommended by flooring manufacturer. Proceed with installation only after satisfying manufacturer's recommendations for test results.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install flooring until it is the same temperature as the space where it is to be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by flooring.

3.03 INSTALLATION

- A. Install resilient flooring and accessories with adhesive in strict compliance with the manufacturer's recommendations. Butt tightly to vertical surfaces, thresholds, nosings and edgings. Scribe around obstructions and to produce neat joints, laid tight, even and straight. Extend flooring into toe spaces, door reveals and into closets and similar openings.
- B. Tile Flooring
 - 1. Lay tile flooring with joints tight, in true alignment and parallel to walls of rooms and corridors.
 - 2. Lay tile symmetrically about centerlines of space, without pattern or borders. Adjust layout to avoid use of cut widths less than one-half tile at room perimeter.
 - 3. Match tile for color by using manufactured and packaged sequence.
 - 4. Broken, cracked, or deformed tiles are not acceptable.
 - 5. Immediately after installation, thoroughly roll tile with a 150 lb. sectional roller until a firm, uniform bond has been obtained.
- C. Base
 - 1. Install at walls, column, casework and other permanent fixtures as scheduled. Install in as long of lengths as practicable. Tightly bond base to backing throughout length of each piece, with continuous contact at horizontal and vertical surfaces.

2. Provide terminal base ends beveled and toes rounded.
 3. On masonry surfaces or other similar irregular surface, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
- D. Edge Strips: Place tightly butted to flooring and secure with adhesive. Install at edges of flooring which would otherwise be exposed.
- E. Stair Treads and Accessories
1. Tightly fit tread nose against face of stair riser or nosing. Fill open spaces at the nosing between the stair and the rubber tread with manufacturer's approved caulk or similar material.
 2. Roll surfaces until a firm bond is obtained.
- F. Sheet Flooring
1. Install sheet flooring in accordance with latest edition of manufacturers' instructions.
 2. Spread only enough adhesive to permit installation of sheet flooring before initial set.
 3. Install flooring wall to wall before installation of floor-set cabinets, casework and similar moveable items.
 4. Extend flooring into door recesses, closets, and similar openings as indicated on drawings.
 5. Where adjacent floor finish is dissimilar, terminate sheet flooring at centerline of doors.
 6. Scribe, cut, and fit to walls, columns, cabinets, pipes, built-in-furniture and cabinets to produce tight joints. Lay flooring to provide a minimum number of seams. Avoid cross seams, filler pieces, and strips.
 7. Sheet flooring shall be installed over covers for telephone conduits, electrical conduits and other similar items which occur within the finished floor areas.
 8. Sheet flooring MUST be cut sharp and clean around these covers so that the covers can be removed when required.
 9. Sheet flooring must be applied to covers in a solid application of adhesive.

3.04 CLEANING AND PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.
- B. After flooring has set, clean thoroughly. Remove excess adhesive or other surface blemishes from flooring, using neutral type cleaners as recommended by the flooring manufacturer.
- C. Perform initial maintenance according to latest edition of manufacturer's maintenance manual and the following:
- D. Protect installed flooring from damage and staining with heavy duty non-staining

Kraft paper or other covering at all traffic lanes. Protect completed work from traffic and damage until final acceptance.

END OF SECTION

SECTION 09 65 66

RESILIENT ATHLETIC FLOORING – TILES/SHEETS

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide rubber athletic flooring as indicated. Include all trim, accessories and adhesives for a complete installation.

1.02 RELATED SECTIONS

- A. Concrete Tolerance: See Section 03 30 00.
- B. Sustainable Design Requirements: Section 01 81 13.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications
 - 1. Firm experienced in the flooring field and approved by the flooring manufacturer.
 - 2. Must have completed a minimum of three projects of similar magnitude and complexity.
- 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.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product data that includes Physical Properties and installation instructions.
- B. Color Selection Chart: Submit to Architect for selection. Submit actual sample of color material if so requested by Architect.
- C. Samples
 - 1. Tiles: Submit full sized samples of each type, color and pattern required to illustrate the full range of color variations.
 - 2. Sheet Flooring: Manufacturer's standard sample size, but not less than 9" x 9" of each type, color and pattern required to illustrate the full range of color variations.

- D. Maintenance Literature: Submit three copies of manufacturer's recommended maintenance instructions.
- E. Extra Stock
 - 1. Tiles: Furnish 2% of the total quantity (but not less than 2 full sealed cartons) of each type, pattern and color. Provide 5% of colors with less than 5000 square feet. Properly package and identify each material.
- F. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.
 - 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.
 - 2. All products to be compliant with CA Section 01350

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials until masonry and painting work is completed and all overhead mechanical and electrical work is installed.
- B. Maintain room temperatures at minimum 55 degrees F. in storage areas and during installation.

1.06 JOB CONDITIONS

- A. Proper Surfaces
 - 1. Even, sound, thoroughly clean and dry and free of all defects that might adversely affect the flooring work.
 - 2. Floor tolerances are specified in Section 03 30 00.
 - 3. All floors to receive resilient flooring shall be wet cured only. No curing compound permitted.
- B. Related Work: Work which passes through, beneath or behind flooring must be completed prior to starting any flooring work.
- C. Temperature Requirements
 - 1. Temporary Heat: Provide as required to maintain the minimum temperature during flooring installation and for at least one week after installation.
 - 2. Minimum Temperature: 70° F for a minimum two weeks prior to and during application.
 - 3. Humidity: Do not apply flooring when relative humidity exceeds 70% or to damp or wet surfaces.
- D. Ventilation: Provide adequate ventilation to prevent accumulation of hazardous

fumes during application of solvent-based products in enclosed spaces, and maintain until flooring and finish has cured.

PART 2 PRODUCTS

2.01 RUBBER FLOORING TILES

- A. Description: Dual durometer construction, vulcanized into a single prefabricated resilient athletic flooring, with a base of natural and synthetic rubbers, stabilizing agents and pigmentation
- B. Thickness: 0.236" (6 mm).
- C. Properties:
 - 1. Elongation at Break ASTM D412 $\geq 100\%$ $\geq 100\%$
 - 2. Tensile Strength ASTM D412 ≥ 300 psi ≥ 650 psi
 - 3. Static Coefficient of Friction (neolite heel) ASTM D2047 ≥ 0.50 (dry) ≥ 0.80 (dry)
 - 4. Hardness of Top Layer (Shore A) ASTM D2240 80 ± 5 80
 - 5. Hardness of Bottom Layer (Shore A) ASTM D2240 70 ± 8 78 Abrasion Resistance (H18 wheel, 1000 g, 1000 cycles) ASTM D3389 ≤ 1.0 g ≤ 0.4 g
 - 6. Critical Radiant Flux ASTM E648 ≥ 0.22 W/cm² (Class 2) ≥ 0.45 W/cm² (Class 1)
 - 7. Reduction of Bacterial Activity - MRSA (ATC 43300) ASTM E2180 - $\geq 99,99\%$ reduction
- D. Manufacturer
 - 1. Basis of Design: Specifications and drawings are based on Sports Impact Flooring manufactured by MONDO.
 - 2. Other Acceptable Manufacturers: Products manufactured by other rubber sports flooring manufacturers are acceptable providing they meet the requirements specified herein and are an acceptable color match as approved by the Architect. Products should be submitted to the Architect during bidding for inclusion by an Addendum.

2.02 ACCESSORIES

- A. Concrete Slab Prime: Non-staining type, compatible with adhesive, as recommended by flooring manufacturer.
 - 1. Moisture Emissions Sealer: Type specifically formulated for moisture emission control.
- B. Leveling Compound: Non-staining latex modified, Portland cement based type, compatible with flooring, as provided or recommended by the flooring manufacturer.

- C. Adhesives: Water resistant, stabilized type as recommended by the resilient flooring and base manufacturer to suit material and substrate conditions.
 - 1. Low-VOC, FS MMM-A-125C, Type II, water- and mold-resistant. Use ASTM D3110, dry-use type for laminated and finger-jointed members, certified in accordance with ASTM C557.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrates and installation condition. Do not proceed with flooring work until unsatisfactory conditions have been corrected.
- B. Subfloor surfaces shall be smooth, level, at the required finish elevation, and within the tolerances specified in Section 03 30 00.
- C. Installation constitutes acceptance of existing conditions and responsibility for satisfactory performance.

3.02 SUBSTRATE PREPARATION

- A. Prepare substrates according to floor manufacturer's written instructions to ensure adhesion of flooring products.
- B. Concrete Substrates
 - 1. Verify that substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
 - 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 floor tile manufacturer. Do not use solvents.
 - 3. Perform moisture and pH tests recommended by flooring manufacturer. Proceed with installation only after satisfying manufacturer's recommendations for test results.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install flooring until it is the same temperature as the space where it is to be installed.
- E. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.03 INSTALLATION

- A. Install flooring in accordance with manufacturer's instructions and recommendations.

3.04 CLEANING AND PROTECTION

- A. Protect resilient flooring from damage and wear during construction operations. Where temporary cover is required for this purpose, comply with manufacturer's recommendations for protective materials and the method of their application. Remove temporary covering just prior to cleaning for final inspection.
- B. Clean flooring just prior to final inspections. Use materials and procedures recommended by flooring manufacturer.

END OF SECTION

SECTION 09 68 00

CARPETING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Carpet, installation and all adhesive, edge guards, and accessories necessary for the installation of:
 - 1. Carpet tile
 - 2. Walk off carpet
- B. Work includes preparation of subsurfaces, cleaning, and protection of finished carpet.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.

1.03 QUALITY ASSURANCE

- A. Installer: Firm with not less than 5 years of carpeting experience similar to work of this Section.
 - 1. Work not in compliance with the manufacturer's recommended standards and procedures shall be promptly corrected at the Contractor's expense.
- B. Manufacturer: Firm (carpet mill) with not less than 5 years of production experience with similar types specified in this section; and whose published product data clearly indicates compliance of product with requirements of this Section.
- C. General Standard: "Carpet Specifiers Handbook" by The Carpet and Rug Institute; for definitions of terminology not otherwise defined herein, and for general recommendations and information.
- D. Fire Performance Characteristics: Provide carpet that is identical to that tested for the following fire performance requirements, according to test method indicated, by UL or other testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Flammability - ASTM D2859: Passing Methanine Pill Test.
 - 2. Critical Radiant Flux - ASTM E684: Not less than 0.45 watts per square centimeter.
 - 3. Smoke Density - ASTM E84: 450 or less.

1.04 REFERENCE STANDARDS

- A. Carpet: Comply with the OBC for flame spread and smoke contribution requirements and tested in accordance with ASTM E84.

1.05 SUBMITTALS

A. Samples

- 1. Tiles: Submit full size tiles (samples) of each color and pattern selected.
- 2. Accessories: 12" long sample of each type exposed edge stripping and accessory item.

- B. Product Data: Provide for all items. Include, product data covering carpet construction, physical characteristics, durability, resistance to fading, and flame resistance characteristics.

C. Shop Drawings

- 1. Broadloom: Submit seam diagram drawings and edge treatments.
- 2. Tiles: Submit drawings showing layout. Indicate pile or pattern direction and locations and types of edge strips.

D. Certifications: Contractor shall provide the following:

- 1. Manufacturer: Before carpet materials are ordered, submit 4 copies of test results from a recognized laboratory and 4 copies of a notarized statement, signed by an officer of the manufacturer, confirming that the carpet products proposed for use are those which have passed the required tests indicated under "Performance Standards" for the carpet and comply with the requirements of State and local fire authorities.
- 2. Installer: Submit 4 copies attesting that materials actually installed were the same as those certified as meeting specified requirements.

E. Sustainable Design Documentation Submittals: Comply with Section 01 81 13.

- 1. VOC Limits: Include documentation verifying product Low Emitting Material Building Product Disclosures and Optimization.
- 2. All products to be compliant with CA Section 01350

1.06 PRODUCT DELIVERY AND STORAGE

- A. Deliver carpeting materials in original mill protective wrapping, and store inside protected from weather, moisture and soiling.
- B. Investigate and resolve access restrictions, including elevator capacity, entrances

and accessibility, to assure proper delivery and installation of materials.

- C. Protect materials against damage of any kind. Damaged products, including soiled fabrics, will be rejected.

1.07 MAINTENANCE

- A. Manufacturers: Provide three (3) copies of maintenance schedules, describing programmed maintenance procedures, including general maintenance, preventative maintenance, spot removal, traffic lane maintenance and overall cleaning.
- B. Operational Service: Provide manufacturer's take-back program service for carpet installed in project. Service shall reclaim materials for recycling and/or reuse. Service shall not landfill or burn reclaimed materials.

1.08 WARRANTY

- A. Special Project Warranty: Submit a written warranty, executed by the Contractor, Installer and the Manufacturer, agreeing to repair or replace carpeting which fails in materials or workmanship within the specified warranty period. This warranty shall be in addition to and not a limitation of other rights the Owner may have against the Contractor under the Contract Documents.
 - 1. Warranty period is two years after date of substantial completion.
- B. Carpet manufacturer's material wear warranty: Ten years.

1.09 EXTRA MATERIALS

- A. Tiles: Provide quantity of full tiles for each type of material equal to 5 percent of amount installed.
- B. Deliver extra carpet materials to Owner's designated storage space, properly packaged with protective covering and identified with labels describing contents.

PART 2 PRODUCTS

2.01 CARPET

- A. Manufacturers, Styles and Colors
 - 1. Basis of Design: Manufacturers, styles and colors as indicated on the drawings.
 - 2. Other Acceptable Manufacturers: Carpet manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design performance and physical characteristics including but not limited to:
 - a. Color, pattern, style

- b. Size, weight and gage
- c. Fiber characteristics, type and content.
- d. Density, yarn count, twist, stitches, pile weight and characteristics
- e. Primary and secondary backing
- f. Treatments

B. Types, Patterns and Colors: As indicated on Drawings

2.02 WALK-OFF CARPET TILE MAT

A. Manufacturers, Styles and Colors

- 1. Basis of Design: Manufacturers, styles and colors as indicated on the drawings.
- 2. Other Acceptable Manufacturers: Walk off carpet manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design performance and physical characteristics including but not limited to:
 - a. Color, pattern, style
 - b. Size, weight and gage
 - c. Fiber characteristics, type and content.
 - d. Density, count, weight and characteristics
 - e. Backing
 - f. Treatments

B. Types, Patterns and Colors: As indicated on Drawings.

2.03 ACCESSORIES

A. Carpet Edge Guard: Non-metallic type. Extruded or molded vinyl or rubber of size and profile indicated. Color as selected by Architect.

B. Adhesive: Non-toxic, waterproof, white latex base cement formulated for the installation of the manufactured materials. Type as recommended by carpet manufacturer.

- 1. VOC Content: The volatile organic compound (VOC) content of adhesives shall not exceed the limits defined in Section 01 81 13.

C. Miscellaneous Materials: As recommended by manufacturer of carpet and other carpeting accessory products; selected by installer to meet project circumstances and requirements.

D. Leveling Materials and Crack Fill: Non-staining latex cementitious type, compatible with carpet adhesive, as recommended by the flooring manufacturer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Installer must examine substrates for moisture content and other conditions under which carpeting is to be installed, and notify Contractor in writing of conditions detrimental to proper completion of the work.
 - 1. Do not proceed until unsatisfactory conditions have been corrected.
- B. Comply with CRI 2011 and with carpet manufacturer's written installation instructions for preparing substrates indicated to receive carpet installation.
- C. Concrete Substrates
 - 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 flooring manufacturer. Do not use solvents.
 - 3. Perform tests recommended by flooring manufacturer. Proceed with installation only after satisfying manufacturer's recommendations for test results.
- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- E. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.
- F. Sequence carpeting with other work so as to minimize possibility of damage and soiling of carpet during remainder of construction period.

3.02 INSTALLATION

- A. Install in accordance with recommendations of the manufacturers of materials and Carpet and Rug Institute's methods specified in CRI 2011. Carpet manufacturer's current installation instructions shall be kept at job site and be followed explicitly.
 - 1. Comply with manufacturer's recommendations for installation of carpet; maintain uniformity of carpet direction and lay of pile, unless otherwise indicated.
- B. Use modular carpet from the same dye lot in each room.
- C. Lay carpet in accordance with the final shop drawings. No reversing of carpet direction shall be permitted.

- D. Install modular carpet by trimming, cutting and prefitting units. Then apply adhesive in strict accordance with manufacturer's instructions, and place the carpet modules with the pile inclination in the direction as recommended by the manufacturer, or as otherwise indicated on the final layout drawings.
 - 1. Application shall be full spread. Sprayed on adhesive is not permitted.
 - 2. Install using a notched trowel.
- E. Trim protruding ends of open loops so slightly below surrounding pile height.
- F. Use edge molding where carpet terminates under doors and along edge of carpet where it abuts another floor material. Fasten edge moldings securely to the floor with glue manufactured for this specific purpose.
- G. Roll entire area lightly to eliminate air pockets and ensure uniform bond.

3.03 CLEANING AND PROTECTION

- A. Protect installed carpet to comply with CRI 2011 and carpet manufacturer recommendations.
- B. Remove debris, sorting pieces to be saved from scraps to be disposed. Keep premises free and clear of waste material in connection with carpet work.
- C. Vacuum carpet using commercial machine with face-beater element. Remove spots and replace carpet where spots cannot be removed.
- D. Advise Contractor of protection methods and materials needed to ensure that carpeting will be without deterioration or damage at time of substantial completion.
- E. Provide adequate protection for adjacent equipment, furnishings and materials.
- F. When entering, passing through, or working in any space in the building that contains finished materials, maintain proper protection for floors, walls, ceilings, fixtures, etc. Repair or replace damaged adjoining work as directed by the Architect at no additional cost to the Owner.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 GENERAL

1.01 SCOPE

A. Work Included

1. Surface preparation and painting or finishing of all interior and exterior exposed items and surfaces except as otherwise indicated. Work includes, but is not necessarily limited to, the following:
 - a. Walls, ceilings and soffits.
 - 1) Gypsum board
 - b. Concrete masonry walls.
 - c. Hollow metal doors and frames.
 - d. Wood trim, casework and millwork as required.
 - e. Exposed structure including deck and all framing.
 - f. Exposed ferrous metal of any type, interior and exterior, including galvanized items.
 - g. Exposed sheet metal, ductwork, conduit and piping in finished spaces; not mechanical equipment or electrical equipment rooms.
 - h. Exposed prime coated or unfinished mechanical or electrical items outside of mechanical equipment rooms. Repaint factory finished mechanical or electrical items where specified.
 - i. Stenciling of fire walls above ceilings.
 - j. Other items noted or specified.
2. Surface preparation, priming and coats of paint specified are in addition to shop priming and surface treatment specified under other sections of the work.

B. Mechanical Equipment Rooms: Painting subject to the following requirements:

1. Paint finish on walls and ceiling, when scheduled on drawings, to be applied prior to installation of mechanical/electrical work as much as possible.
2. Spray painting not permitted after electric motors have been installed.

C. Work Excluded: Do not paint the following items unless specifically called for on the drawings or specified herein:

1. Concrete floors.
2. Shop or prime coats on items to which shop or prime coats have been applied by the fabricator, unless noted otherwise.
3. Exterior concrete.
4. Items with factory finish or natural finish (brick, stone, stainless steel,

aluminum, and others) unless noted or indicated elsewhere.

5. Colored concrete masonry units.
6. Wall areas permanently concealed by fixed equipment or accessories.
8. Equipment, sheet metal, ductwork and equipment in mechanical and electrical rooms; painting of these items, if required, provided under Divisions 23 and 26 as applicable.
9. Piping in mechanical rooms, except exposed gas and fire protection piping.
10. Concealed, miscellaneous metal, except for shop prime coat touch-up.
11. Factory finished equipment, except for touch-up, unless otherwise specified herein.
12. Concealed piping.
13. Communication and data wiring in cable trays
14. Items permanently concealed above ceilings.

D. Surface Preparation

1. It is the intention of this specification that new substrates will be ready for decoration as specified herein except for normal construction dust and soiling.
2. Surfaces and materials installed by other trades are required to be acceptable for work specified under Part 3, Surface Preparation. Specifically, new surfaces to be clean, sound, free from loose particles, dirt, loose mortar and grease.
3. Existing Surfaces: Unless otherwise specified, provide all surface preparation required for decoration.

1.02 RELATED SECTIONS

- A. Sustainable Design Requirements: Section 01 81 13.

1.03 DEFINITIONS

- A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct shafts, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawl spaces, and tunnels.
- B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.
- C. Exposed, Exterior Installations: Exposed to view outdoors, or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.
- D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in duct shafts.
- E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants, but subject to

outdoor ambient temperatures. Examples include installations within unheated shelters.

1.04 QUALITY ASSURANCE

- A. Application: Performed only by skilled, experienced painters.
- B. Provide lead free prime and finish coatings. All top coatings shall be mold and mildew resistant.
- C. Coordination: Provide finish coats compatible with prime paints used. Review other specification sections to ensure compatibility of total coating system with prime paints provided for the various substrates. Provide barrier coats over non-compatible primers or remove primer and reprime as required. Notify the Architect of anticipated problems using coating systems specified on substrates primed in accordance with other section requirements.

D. Reference Specifications

- 1. The following Society for Protective Coatings (SSPC) specifications are referenced by code number within this Section.

<u>Code</u>	<u>Method</u>
SP-1	Solvent Cleaning
SP-2	Hand Tool Cleaning
SP-3	Power Tool Cleaning
SP-6	Commercial Blast Cleaning
SP-11	Power Tool Cleaning to Bare Metal
SP-16	Brush-off Blast Cleaning of Non-Ferrous Metals

- E. Job Mock-Ups: Mock-ups will serve as standard for acceptance of work. Leave approved mock-ups in place as part of completed project. Manufacturers' representatives shall be available to advise applicator on proper application techniques and procedures. Locate mock-up areas as directed by Architect. Provide the following mock-ups of spaces or areas indicated:
 - 1. Concrete Masonry, Painted Finish: 50 square feet.
 - 2. Gypsum Board, Painted Finish: Mock-up room walls complete as specified in Section 09 21 16.
 - 3. Ductwork: 6 linear feet of each paint type and ductwork material.

F. Paint walls prior to installing wall mounted signage.

1.05 SUBMITTALS

- A. Submit a complete selection of manufacturer's color chips indicating color, texture

and sheen for approval for each finish specified herein.

- B. Submit a complete schedule for identifying manufacturer and specific brand name or number of products proposed for finishing specified surfaces.
 - 1. Provide percent of solids by volume content data for each paint material.
 - 2. Provide paint label analysis and application instructions for each type paint.
- C. Provide one (1) unopened gallon of each type and color of paint and stain required for maintenance purposes. Provide original, unopened, labeled containers with color samples and a list of project use. Extra materials are not to be used for touch-up by Contractor.
- D. Color/Finish Samples
 - 1. After receiving color chips from the Contractor, the Architect will provide a complete schedule of colors and sheens desired.
 - 2. Obtain schedule well in advance of commencing work and submit samples of specified finishes for approval.
 - 3. Submit duplicate samples on the same kind of materials to which finishes will be applied. One half of the sample shall show the completed treatment and the other half shall show the successive steps, taken in producing the finish. When approved, samples will be so marked; one set will be retained by the Architect and one set will be returned for the painter's use.
 - 4. No finishes shall be applied on the work until samples are approved. Approved samples shall be strictly duplicated in the work. Additional coatings, if required to reproduce approved samples, shall be applied without additional cost to the Owner.
 - 5. Use representative colors when preparing samples for Architect's review.
- E. Special Environmental Requirements': Submit the following in accordance with Section 01 81 13:
 - 1. All products to be compliant with CA Section 01350
- F. Statement From Manufacturer
 - 1. Contractor, in submitting the list of proposed subcontractors, shall include for approval, along with the name of the painting subcontractor, the names of the manufacturers whose materials the subcontractor proposes to use in the work.
 - 2. Following tentative approval of the subcontractor and the materials manufacturers, notify the manufacturers, in writing, that the specifications require the manufacturers to submit to the Architect, a statement by a corporate officer of the manufacturer that coatings scheduled by the Architect are proper for the intended use and that the manufacturer's representative will be available to advise the Architect and the Contractor regarding applications of all coatings.

- G. Close-Out Material List: Provide a list of all paint and coating materials used on the project. Include manufacturer, product number, color and room/location where used.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials on the job site in original, new, unopened packages and containers bearing the manufacturer's name and label, and the following information:
 - 1. Name or title of material.
 - 2. Manufacturer's stock number and date of manufacture.
 - 3. Manufacturer's name.
 - 4. Contents by volume, for major pigment and vehicle constituents.
 - 5. Thinning instructions.
 - 6. Application instructions.
 - 7. Color name and number.
- B. Store, protect and handle materials in accordance with manufacturer's recommendations to prevent damage and deterioration. Store paint materials at minimum of 50° F.
- C. Maintain paint material storage space as clean, non-hazardous and orderly. Place waste and soiled paint rags in tightly covered metal containers; safely dispose of at end of each working day. Take every precaution to avoid fire hazards and spontaneous combustion. Provide acceptable type of fire extinguisher immediately adjacent to paint storage area.

1.07 PROJECT CONDITIONS

- A. Coordinate painting and finishing work with other trades to ensure adequate illumination, ventilation and dust-free environment during application and drying of paint and finish treatments.
- B. Maintain uniform interior building temperature of minimum 50° F for 24 hours before, during and continuously for 48 hours after painting.
- C. Do not apply coatings when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Provide adequate ventilation as required for specified paint and finish treatment materials in spaces scheduled. Maintain for time periods recommended by material manufacturer to provide proper drying.
- E. Provide adequate illumination on surfaces to be finished. Maintain a minimum 80 foot candle lighting level measured mid-height at substrate surface.
- F. Protect adjoining surfaces against damage or soiling.

- G. Maintain work in neat and orderly condition, promptly removing empty containers, wrappings, soiled rags, waste and rubbish from site.
- H. Material Safety Data Sheets (MSDS): Provide documents available to Owner's Representative and construction personnel at the job site. Comply with MSDS requirements.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Paint: Brands of paint and stain are specified in "Paint and Material Finish Schedule," only to establish a standard of quality. Other paint brands and manufacturers such as BENJAMIN MOORE; GLIDDEN PROFESSIONAL; MARTIN SENOUR; PPG PAINTS; PRATT AND LAMBERT; CORONADO PAINT COMPANY, SHERWIN WILLIAMS are acceptable upon proof of satisfactory experience records for the intended use and compliance with specified VOC content.
 - 1. Colors: As indicated on drawing; colors not indicated to be as selected by Architect.

2.02 MATERIAL GENERAL

- A. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site.
- B. 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.

2.03 ACCESSORY MATERIAL

- A. Application Equipment: Not required to be new, but shall be adequate for the work and workmanship required herein.
- B. Accessories: Provide all required ladders, scaffolding, drop cloths, masking, scrapers, tools, dusters and cleaning solvents as required to perform the work and achieve the results specified herein.
- C. Secondary products not specified by name (i.e. turpentine, thinners, mineral spirits, fillers, linseed oils, etc.) shall be "best grade" or "first line" products.

1. Filler material shall be woodworker's option of material that can be tinted and worked so as to match adjacent wood surfaces.

2.04 EXTERIOR PAINT AND FINISH MATERIAL SCHEDULE

- A. Apply paint and finish materials to substrate surfaces indicated. Apply touch-up prime coats in addition to shop-applied prime coats. Provide additional job site prime coats when indicated.
- B. Metals - Ferrous: Galvanized and Shop Primed (Semi-Gloss).
 1. SW
 - a. Finish: S-W Direct-to-Metal DTM Acrylic Semi-Gloss Coating, B66-200. Two (2) coats.
- C. Metal – Ferrous: Unprimed (Semi-Gloss).
 1. SW
 - a. Primer: DTM Acrylic Primer B66W1. One (1) coat.
 - b. Finish: S-W Direct-to-Metal DTM Acrylic Semi-Gloss Coating, B66-200. Two (2) coats.
- C. Mineral Fiber Cement Siding:
 1. SW
 - a. Primer: Preprimed.
 - b. Finish: SW A-100 Exterior Latex Flat. Two coats.
 2. PPG
 - a. Primer: Preprimed.
 - b. Finish: Speedhide Exterior 100% Acrylic Latex Flat 6-610XI Series. Two (2) coats.

2.05 INTERIOR PAINT AND FINISH MATERIALS SCHEDULE

- A. Apply paint and finish materials to substrate surfaces indicated. Apply touch-up prime coats in addition to shop-applied prime coats. Provide additional job site prime coats when indicated.
- B. Gypsum Board and Plaster – Walls.
 1. SW
 - a. Primer: ProMar 200 Zero VOC Interior Latex Primer B28W2600 Series.
 - b. Finish: ProMar 200 Zero VOC Interior Latex Eg-shel B20 Series Two (2) coats.
 2. PPG
 - a. Primer: SpeedHide Interior Latex Primer 6-2 Series.

- b. Finish: Speedhide Zero 6-4310XI Series; latex eggshell. Two (2) coats.
 - 3. Surfaces: Gypsum board wall surfaces.
 - C. Gypsum Board and Plaster – Ceilings/Soffits.
 - 1. SW
 - a. Primer: ProMar 200 Zero VOC Interior Latex Primer B28W2600 Series.
 - b. Finish: ProMar 200 Zero VOC Interior Latex Flat B30 Series . Two (2) coats.
 - 2. PPG
 - a. Primer: SpeedHide Interior Latex Primer 6-2 Series.
 - b. Finish: Speedhide Zero 6-4110XI Series; latex flat. Two (2) coats.
 - 3. Surfaces: Ceilings, soffits, bulkheads
 - D. Concrete Masonry Surfaces (Semi-Gloss).
 - 1. SW
 - a. Filler: Conflex Block Filler CF01W50 Minimum 8 mil dft to pin hole free.
 - b. Finish: ProMar 200 Zero VOC Interior Latex Semi Gloss B31 Series. Two (2) coats.
 - 2. PPG
 - a. Filler: Speedhide Block Filler Latex 6-7 Series. Minimum 8.5 mil dft to pin hole free.
 - b. Finish: Speedhide Zero 6-4510XI Semi-Gloss Latex Enamel, Two coats.
 - 3. Surfaces: New masonry walls, graphics (do not use in high humidity areas).
 - E. Metals - Ferrous: Shop Primed and Unprimed.
 - 1. SW
 - a. Primer: S-W Pro Industrial Pro-Cryl Primer, B66-310 Series
 - b. Finish: S-W Direct-to-Metal DTM Acrylic Semi-Gloss Coating, B66-200. Two (2) coats.
 - 2. Surfaces: Hollow metal doors, frames, door mullions, railings, ferrous metal surfaces.
 - F. Metals - Ferrous: Galvanized.
 - 1. SW
 - a. Primer: ProCryl Universal Metal Primer B66-310 Series
 - b. Finish: Pro Industrial Acrylic Semi-Gloss B66-650 Series. Two (2) coats.
 - 2. Surfaces: Hollow metal doors, frames, door mullions, galvanized metal surfaces.

G. Wood - Painted.

1. SW
 - a. Primer: Premium Wall & Wood Primer B28W8111. One (1).
 - b. Finish: ProMar 200 Zero VOC Interior Latex Semi Gloss B31 Series Two (2) coats.
2. PPG
 - a. Primer: Seal Grip Interior/Exterior 100% Acrylic Universal Primer/Sealer 17-921 Series. One (1) coat.
 - b. Finish: Speedhide 6-500 Series Interior EnamelLatex Semi-Gloss. Two (2) coats.

H. Steel Stairs and Railings: Steel and Iron Finish

1. SW
 - a. Prime Coat: Procryl Primer B66-310. One coat.
 - b. Finish Coat (All steel exposed to view): Water Based Acrolon 100 Urethane B65-720 Series. Two coats.
2. PPG
 - a. Prime Coat: Multiprime Low VOC Quick Dry Universal Primer 97-680 Series. One (1) coat.
 - b. Finish: Pitthane Ultra Gloss Urethane Enamel 95-812 Series. Two (2) coats.

I. Exposed Structure - Ferrous (Eg-Shel): Dryfall

1. SW
 - a. Primer: ProCryl Universal Primer, B66-310 Series
 - b. Finish: Low VOC Waterborne Acrylic Dry Fall, B42W82 Two coats.
2. PPG
 - a. Primer: Pitt-Tech Int/Ext Primer Finish DTM Industrial Enamel 90-712.
 - b. Finish: Speedhide Interior Super Tech WB Acrylic Dry Fog Latex, 6-725 two coats.
3. Surfaces: Exposed metal decking, trusses, structural steel, metal joists.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine substrate surfaces and installation condition. Report condition(s) that might affect proper application.
- B. Do not proceed with painting work until unsatisfactory conditions have been corrected.
- C. Initial application of paint to a surface constitutes acceptance of existing conditions and responsibility for satisfactory performance.

- D. Examine specification sections of other trades and their provisions regarding painting. Surfaces left unfinished shall be painted or finished as part of the work of this Section unless specifically noted otherwise.

3.02 SURFACE PREPARATION

A. General

1. Broom clean and remove excess dust before painting is started in any area.
2. Broom cleaning is not permitted after operations have begun in a specific area.
3. Surfaces shall be clean, dry and adequately protected from dampness.
4. Surfaces shall be free of any foreign materials that will adversely affect adhesion or appearance of applied coating.
5. Remove any mildew and neutralize the surface prior to applying coating.

B. Concrete Masonry and Concrete

1. Remove splatters, dust and dirt by brushing or water washing with clear water.
2. Remove misplaced mortar.
3. Cracks, abrasions and other defects shall be cut out, patched flush, and sanded smooth and sealed before applying prime coat.
4. Existing Surfaces
 - a. Surfaces with minor loose or blistered paint: Remove loose, flaking, and blistered paint; clean as specified. Fill surface cracks with approved latex base filler. Apply primer-sealer over bare substrate and filled cracks.
 - b. Multi-coated surfaces with major loose or blistered paint requiring complete paint removal: Remove paint down to bare substrate using chemicals, pressure methods, or other acceptable methods. Fill contraction and structural cracks with self-bonding filler or elastomeric sealant worked well into the cracks to prevent leaks, then wipe excess materials from the surface. Apply a latex base or other acceptable prime and fill material to fill all defects and holes, wipe excess material off surface; let filler material dry for 24 hours minimum before applying primer.
5. All Surfaces
 - a. Clean all cementitious substrates pursuant to the requirements of SSPC-SP 13.

C. Wood - Painted

1. Prime and backprime interior finish wood products, before their installation, with interior wood prime paint.
2. Sandpaper to smooth and even surface, dust off.
3. Countersink nails.

4. Remove resin with scrapers, sandpaper, mineral spirits or turpentine.
5. Apply shellac or knot sealer to all knots, pitch and resinous sapwood, allow to dry thoroughly prior to priming.
6. After priming, putty all nail holes, cracks, open joints and other defects, sand smooth and dust off. Color putty to match primer; if putty is not compatible with finish, spot prime puttied areas.

D. Structural Steel and Miscellaneous Ferrous Metal

1. Bare Metal Surfaces
 - a. Remove grease, oil, dirt and other foreign material prior to prime coat application where necessary according to SP-1, SP-2 and/or SP-3.
 - b. Power tool clean remove rust prior to prime coat application according to SP-11.
 - c. Include all hangers and miscellaneous fabricated items.
2. Shop Primed Surfaces
 - a. Fill open joints or abrasions in shop prime coat with filler; feather edges, sand smooth, and touch-up with primer compatible with shop primer. Extend primer beyond treated area.
 - b. Remove grease, oil, dirt and other foreign material prior to prime coat touch-up where necessary according to SP-1, SP-2 and/or SP-3.
 - c. Include all hangers and miscellaneous fabricated items.

E. Galvanized or Zinc-Coated Items

1. Pretreat surfaces prior to application of prime coat with phosphate pretreatment, similar to Great Lakes Labs, "Clean and Etch", Dupont's Metal Conditioner #5717 or PPG DX 579, unless prime coat material to be used is recommended by its manufacturer for direct application over zinc treated surfaces of the type at hand. Follow manufacturer's directions.
2. Remove dirt or grease on surfaces scheduled for paint finish according to SP-1. Wipe dry with clean cloths.
3. Roughen surface with steel wool as necessary to remove gloss.

F. Gypsum Board

1. Fill minor irregularities with spackling paste.
2. Sand to smooth level surface and dust off.
3. Avoid raising nap of paper.

3.03 APPLICATION

A. General

1. Only skilled mechanics shall be used.
2. Apply all paint in strict accordance with the manufacturer's instructions. Data sheets take precedence over these specifications if more restrictive.

3. Do not apply until preceding coat is dry to manufacturer's recommendations.
4. Do not apply to any surface unless it is thoroughly dry.
5. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes if moisture content of surface is greater than recommended by manufacturer.
6. Do not use material that has exceeded the pot life stated by the manufacturer.
7. Apply to the following workmanship requirements:
 - a. Neat appearance of finished surfaces.
 - b. Absence of ridges, sags, runs, drops, laps, unnecessary brush marks, holidays, air bubbles and excessive roller stipple.
 - c. Thorough mixing of paint and limited use of thinners.
 - d. Uniformity of film thickness.
 - e. Proper drying time between coats.
 - f. Protection of unpainted and finished surfaces.
8. Coverage and hide shall be complete. When color or undercoats show through final coat, recoat until the paint film is of uniform finish, color, appearance, and coverage, at no additional cost to Owner.
9. Edges of paint or finish adjoining other materials or colors shall be sharp and clean without overlapping.

B. Methods

1. Application may be by roller, brush, spray or other approved means.
2. When utilizing spraying, be careful not to use methods which will affect other trades work in adjacent areas.

C. Mixing

1. Mechanically mix before use.
2. Agitate during application as required.
3. Do not tint or shade in field unless permitted by Architect.

D. Thinning

1. Dilute only as required to achieve suitable application viscosity.
2. Use only type and amount recommended by manufacturer.

E. Approvals: Do not apply succeeding coat of paint until previous coat has been inspected and written approval is given.

F. Electrical Conduits

1. Do not paint any electrical conduit or boxes unless they are exposed and abutting a surface that is to be painted or stained.
2. Conduits and boxes to be painted shall be given a coat of galvanizing pretreatment followed by the paint system for the adjoining surface.

G. Protection of Surfaces

1. Provide covers, drop cloths and masking to protect unpainted surfaces previously finish painted. Use special care in protecting electrical and mechanical items which may be damaged by the painting operations (i.e., overspray and solvents that might damage the internals of the item).
2. If possible, remove items not to be painted such as hardware, accessories, electrical plates, lighting fixtures and/or trim, mechanical grilles and louvers and similar items in contact with painted surfaces.
3. Use caution when painting exterior work to avoid wind carrying overspray, drippings, etc., onto adjacent structures, facilities and vehicles.
4. Following completion of painting, reinstall removed items by workmen skilled in the trade involved and remove all covers, masking and drop cloths.

H. Fire and Smoke Partitions: Conform to OBC 703.7.

1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 3 inches high with a minimum 3/8 inch stroke in contrasting color.
2. Stenciled message: "SMOKE PARTITION or X HOUR FIRE PARTITION – PROTECT ALL OPENINGS" as applicable.
3. Locate within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall or partition
4. Use semi-gloss paint of color that contrasts with color of substrate.
5. Locate approximately 12" above ceiling tile.

END OF SECTION

SECTION 10 14 10
INTERIOR SIGNAGE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide the following interior signs:
1. Room numbers with room identification.
 - a. Permanent room locations
 - b. Changeable copy at non-permanent.
 2. Accessible Restrooms
 - a. Men
 - b. Women
 - c. Unisex or Family
 3. Stairwell identification.
 4. Floor level identification (stairwell).
 5. Directional/Informational signs.
 6. Elevator door jamb plate (floor numbering).
 7. Emergency escape directories.
 8. Maximum occupancy limit.
 9. Elevator fire emergency plaque.
 10. Tactile (ADA) exit signs
- B. Work also includes exterior signage at:
1. Exterior stairwell egress locations
 2. Applied vinyl lettering at main entrance(s) glass door(s).
 - a. No smoking icon and copy
 - b. Weapons free icon and copy
- C. All signs which identify permanent facilities/accommodations shall be tactile and braille and limited minimally to room numbers, restrooms, stairways, floor identification, elevators, exit and room names as deemed appropriate by the Owner, local jurisdictions, codes, and Fire Marshall.
- D. Intent of this specification is to establish required signage for project occupancy and for bidding purposes. Final design material intent is to be established with Owner staff and their consultants.
- E. All signage types and quantities are to be submitted and approved per local jurisdictions, codes and Fire Marshall before fabrication.

1.02 SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Submit manufacturer's product data, where applicable, and complete drawings showing all identifying devices and installation details.
 - 1. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 2. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign.
- C. Samples: Submit samples for materials, finishes, colors, letter styles, etc., as required for selection and approval by Architect prior to fabrication of identifying devices.
 - 1. Sample for Verification: Full-size sample.
- D. Final signage schedule must be approved by Owner prior to fabrication. Submittal to Owner should be made through the Architect.

1.03 QUALITY ASSURANCE

- A. Signage Standards: Conform to the Americans with Disabilities Act (ADA) Standards and ANSI A117.1 where applicable and to the extent as indicated.
- B. Acceptable Manufacturers: All units are to be custom fabricated; manufacturer's products meeting the specifications will be acceptable. Manufacturers must be regularly engaged in fabrication and installation of signage units and related identifying devices.
 - 1. Fabricator shall make at least one visit to the site before production begins to review all sign locations and installation conditions with Architect and Owner's representative.
 - 2. Fabricator must review all dimensional changes with Architect.
- C. Approvals: All identifying devices shall be approved at the fabricator's shop by the Architect prior to shipment and installation.
- D. Spelling and Braille Accuracy: Responsibility of sign manufacturer.
- E. The Owner has the right to renumber the room numbers during construction. Manufacturer must not begin fabrication of room number plates until room numbers have been approved by the Owner, in writing, through the Architect.
- F. Room identifications will be provided to the Contractor by the Owner during construction.

1.04 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in manufacturer's original shipping cartons with seals unbroken.

- B. Protect materials from physical damage.
- C. Store materials in clean, dry area.
- D. Inspect all materials prior to installation to assure proper function and condition of all items.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Locations, Quantities, Graphics and Copy: As indicated on drawings and/or specified (scheduled) herein.
- B. Sign System: Provide with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles

2.02 MATERIALS

- A. Acrylic Plates: ASTM D 4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
 - 1. Colors: As selected by Architect.
 - 2. Thickness: 1/4"
 - 3. Vinyl Film: UV-resistant vinyl film with pressure-sensitive, permanent adhesive; die cut to form characters or images as required.
 - 4. Backer: 1/8" thick white PVC adhered to backside and not visible from front.
- B. Aluminum Sheet and Plate: ASTM B 209 alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Changeable Copy: Provide back-up plate laminated to back of face plate to create slot for removable nameplates.
- D. Provide an integral method to create tactile and Braille signs; producing a unitary component. Glued on or laminated letters or Braille cells are not acceptable.

2.03 DESIGN GUIDELINES

- A. Plate Shape: Square cornered; do not bevel edges.
- B. Letter Style: Font as indicated or selected.
 - 1. ADA Signs: All capital letters.
 - 2. All Other Signs: Mixed upper and lower case.
 - 3. Copy Position: 3/4" from left or as indicated.

- C. Tactile Letters and Braille: Grade II braille; raised 1/32" above background surface. Provide Braille clear dome topped. Sign manufacturer shall be responsible for verifying accuracy of spelling, both tactile and Braille.
- D. Letter Size
 - 1. Tactile Signs: Minimum letter size is 3/4" for capital letters. Room numbers to be 1".
 - 2. Non-tactile Signs: Between 3/8" and 1" capital letter height. Larger letters are permitted on directional signs or on signs where reading distance is greater than 15'-0".
 - 3. Overhead Signs: Minimum 3" copy. Mixed upper and lower case is permissible. Non-tactile is permissible.

2.04 SIGNS REQUIRED FOR TACTILE/BRILLE

- A. Room Numbers and Identification: 6" x 6" plate with 1" numerals on plate with Braille directly below numerals.
 - 1. Permanent Room Identification: Size determined by copy requirements, laid out flush left with 3/4" margin on left, room name.
 - 2. Non - Permanent Room Insert Window: P95 clear acrylic in bottom portion joined together by PVC backer plate. Size to be determined.
- C. Restrooms - Wheel Chair Accessible: Approximately 6" wide x 8" high plate with 3/4" capital letters (MEN or WOMEN), on plate with Braille centered directly below the word. Provide a wheel chair access symbol and a universal man or woman symbol located above the word. No border.
 - 1. Unisex and/or Family: Similar to above.
- D. Stairwell Identification: 7" x 7" plate with 3/4" capital letters centered on plate with stair symbol. Braille centered directly below the type copy.
- E. Floor Level Identification - Inside Stairwells: 10" x 12h" plate with 5" floor level numeral and capital letters (STAIR 1 FLOOR, STAIR 2 FLOOR, etc.) and (1 LEVEL ABOVE EXIT DISCHARGE, 2 LEVEL ABOVE EXIT DISCHARGE, ETC), centered on plate above and below floor level numeral. Braille centered directly below the floor level numeral.
- G. Directional/Informational Signs: Sign and content as selected or indicated. Wall mounted; non-tactile; in upper and lower case. Letter height shall be at least 1" cap height for directional signs. Letter sizes for informational signs may be less than 1".
- H. Elevator Door Jamb Plate: 3-3/4" x 3-3/4" plate with 2" numerals centered horizontally on plate with Braille centered directly below numerals.
- I. Tactile (ADA) Exit Signs: Approximately 6w" x 4" plate with 1" high capital letters on plate. Braille centered directly below the type copy.

2.05 SIGNS REQUIRED FOR NON-TACTILE/BRAILLE SIGNAGE

- A. Plate Shape: Square cornered; do not bevel edges.
- B. Emergency Escape Directory: Provide upper and lower materials and content joined together by PVC backer plate.
 - 1. Upper Description: Brushed aluminum sheet approximately 11" x 4". Text to read, "In Case of Fire Do Not Use Elevators Please Use Stairs" in 1" letters with Braille centered below. Graphics to include stair symbols with running person and red fire symbol.
 - 2. Lower Description: Acrylic plate with 1/8" thick clear acrylic lense with spacers and first surface white vinyl top and bottom masks to hide spacers. Provide with window inserted acetate printed building map. Coordinate with Architect.
- C. Maximum Occupancy Limit: 6" x 6" plate with 3/4" letters indicating "Maximum Occupancy of this space is: (EXAMPLE - 250 People).
 - 1. Occupancy number height: 1"
- D. Exterior Stairwell Identification: 6" x 6" painted aluminum plate with applied vinyl 1" letters. Provide at each egress door.
- E. Exterior Applied vinyl lettering at main entrance(s) glass door(s). White glazing film.
 - 1. No smoking 6" icon and approved copy.
 - 2. Weapons free 6" icon and 1" approved copy

2.06 COPY POSITION

- A. Lines of copy laid out flush left with a margin of 3/4" along the left edge of plate. Exceptions as indicated.
- B. Left hand, right hand and bottom margins are 3/4". Vertical spacing measured between lower case letters is 3/8". Overall width and height of a plate is achieved with multiples of 3/4".
- C. Locate directional arrows in upper left hand corner of plate. Arrows count as one line of copy.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Mount signs plumb and level.

- B. Mount all interior identification devices with 3/4" foam tape on all four edges.
- C. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.02 SIGNAGE SCHEDULE

- A. Room Identification Signs: Each sign will contain 20 symbols/characters arranged in one or two lines. Provide room numbers and identification (permanent or non - permanent as directed) at all door locations.
- B. Restrooms:
 - 1. Women, handicap symbol and international symbol, as applicable, at each restroom.
 - 2. Men, handicap symbol and international symbol, as applicable, at each restroom.
 - 3. Provide baby changing symbol if rooms contains.
- C. Stairwell Identification: Provide at all stair doors.
- D. Floor Identification: Provide inside stairwell at all stair doors.
- E. Elevator Fire Emergency Plaque: Provide at each elevator stop.
- F. Elevator Door Jamb Plates: Two plates required per elevator door, one on each side of the jamb.
- G. Emergency Escape Directory: Provide at each floor. Locations to be determined and approved by local codes and jurisdiction authorities.
- F. Directional/Informational Signs: For bidding purposes, provide one per stair door on each floor and an additional one per lobby and vestibules on the entry floor. Each sign will contain 25 symbols/characters arranged in two lines. Locate as directed by Architect.
- G. Posted Occupancy Limit: Provide at all rooms exceeding 49 occupants.
- H. Tactile (ADA) Exit Signs: Locations to be determined and approved by local codes and jurisdiction authorities.
- I. Sign Locations
 - 1. Single Doors: Locate signs on the wall next to the latch side of the door, 1" from the outside edge of the door frame and with the top edge of the uppermost sign 61-1/2" A.F.F.
 - 2. Pairs of Doors: Locate signs as specified above for single doors, except Architect will direct in field if sign occurs on right or left jamb of opening.
 - 3. Doors with Borrowed Lights: Locate as directed by Architect.

3.03 CLEAN UP

- A. After completion of work remove all debris and tools from the premises, clean all adhesive spatter and run-over from finished surfaces and wash all plated clean of fingermarks and soil. Polish sign surfaces with a soft cotton rag.

END OF SECTION

SECTION 10 14 19

DIMENSIONAL LETTER SIGNAGE

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide wall mounted building identification letters.

1.02 SUBMITTALS

- A. Layout Drawings: Provide full size layout drawing indicating letter style, size and spacing.
- B. Product Data: Submit for each cast dimensional character specified, including details of construction relative to materials, dimensions, gages, profiles, method of mounting, specified options, and finishes.

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver in manufacturer's original unopened protective covering.
- B. Store in original packing.
- C. Handle so as to prevent damage.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Material: Cast aluminum; alloy and temper as recommended by sign manufacturer for the casting process used and for the use and finish indicated.
- B. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.
- C. Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Furnish inserts, as required, to be set into masonry work.

2.02 DIMENSIONAL LETTERS

- A. Cast Letters: Form individual letters by casting. Produce characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into the back of characters and tap to receive threaded mounting studs. Comply with requirements specified for finish, style and size.

- B. Text: As indicated.
- C. Letter Style: TBD
- D. Size: As indicated.
- E. Thickness: 1".

2.03 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. 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
- C. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.04 FINISH

- A. General: Comply with NAAMA "Metal Finishes Manual" for finish designations and applications recommendations.
- B. All exposed aluminum surfaces: Baked-enamel finish; color as selected by Architect.

2.05 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, letters manufactured by A.R.K. RAMOS, ANDCO INDUSTRIES CORP., ASI SIGN SYSTEMS or VOMAR PRODUCTS, INC. are acceptable

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

3.02 INSTALLATION

- A. Securely install in location indicated on the drawings in accordance with manufacturer's written instructions and recommendations.
 - 1. Install letters level, plumb, true to line and at heights and locations indicated, with surfaces free from distortion or other defects in appearance.
 - 2. Mount letters with 1" projection from wall surface.

3.03 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 10 26 00

WALL PROTECTION

PART 1 GENERAL

1.01 WORK INCLUDED

A. Work under this section includes the following:

1. Resilient wall guards.
 - a. Wall guards/handrail
2. Resilient corner guards
3. Door protection sheet

1.02 RELATED SECTIONS

A. Sustainable Design Requirements: Section 01 81 13.

1.02 REFERENCE STANDARDS

1. ADA 4.4, 4.26 - Americans with Disabilities Act.
2. ASTM E84 - Surface Burning Characteristics of Building Materials.
3. UL - Underwriters Laboratories Classifications.

1.03 QUALITY ASSURANCE

- A. Manufacturer: Firm with minimum five years experience in successfully producing wall guards and wall panels similar to that indicated for this project.
- B. Installer qualifications: Engage an installer who has no less than 3 years experience in installation of systems similar in complexity to those required for this project.
- C. Fire performance characteristics: Provide engineered PETG wall protection system components with UL label indicating that they are identical to those tested in accordance with ASTM E84 for Class 1 characteristics listed below:
1. Flame spread: 25 or less
 2. Smoke developed: 450 or less
- D. Impact Strength: Provide assembled wall protection units that have been tested in accordance with the applicable provisions of ASTM F476.
- E. Chemical and stain resistance: Provide wall protection system components with chemical and stain resistance in accordance with ASTM D543.

- F. Single source responsibility: Provide all components of the wall protection system manufactured by the same company to ensure compatibility of color, texture and physical properties.

1.04 SUBMITTALS

- A. Submit the following in accordance with Section 01 33 23.
- B. Shop Drawings: Clearly indicate the following for each type of wall protector:
 - 1. Type of wall protector identified by manufacturer's model numbers including profiles, sizes, accessories and finish.
 - 2. Types and sizes of wall anchors for each type of wall construction.
- C. Samples: 6" long full size samples representative of each type of wall protector specified.
- D. Manufacturer's certification indicating compliance with ADA Accessibility Guidelines for Protruding Objects.

1.05 DELIVERY, HANDLING AND STORAGE

- A. Products shall be delivered to job-site in original unopened packages bearing manufacturer's labels.
- B. Store and protect products in accordance with manufacturer's recommendations.

PART 2 PRODUCTS

2.01 RESILIENT WALL GUARD/HANDRAIL

- A. Material
 - 1. Cover: High-impact textured extruded vinyl/acrylic (.080").
 - 2. Retainer: Extruded aluminum (.080"), continuous. Anchored to wall through mounting brackets. Mill finish.
 - 3. Wall Mounting Brackets: Aluminum, spaced at maximum 32" on center. Clear anodized finish.
- B. Size: Approximately 4-1/4" high with 1-5/8" wide grip, 3" total depth.
- C. Provide end closure caps and wall brackets of same material as cover.
- D. Color: As selected by Architect.
- E. Manufacturer: 1000 Handrail by IPC or equal by, CONSTRUCTION SPECIALTIES (C/S), KOROSEAL, PAWLING.

2.02 RESILIENT DOOR PANEL

- A. Description: Vinyl/acrylic sheet (.040") with beveled edges
 - 1. Color: As selected by Architect.
 - 2. Mounting: Adhesive.
- B. Manufacturer: As indicated. Equal by DECOGARD PRODUCTS or equal by BALCO METALINES, KOROSEAL, PAWLING or IPC CONSTRUCTION SPECIALTIES, INC

2.03 **RESILIENT CORNER GUARDS**

- A. Description: Assembly consists of extruded aluminum retainer (0.063") and textured high impact snap-in acrylic cover (0.11").
- B. Vinyl/Acrylic Cover: U.L. classified. Tested in accordance with ASTM E84 meeting both flame spread and smoke development requirements for Class 1 rating.
 - 1. Flame Spread: 20.
 - 2. Smoke Developed: 250 - 450.
- C. Wing Width: 2".
- D. Angle: 90 degrees.
- [E. Length: 6'-0".]
- F. Manufacturer: FS-20 by CONSTRUCTION SPECIALTIES, INC.
- G. Color: As selected by Architect.

2.04 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.
- B. Adhesives: As recommended by protection product manufacturer. Provide and comply with project VOC and sustainability requirements.

2.09 FABRICATION

- A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible

to minimize field assembly. Disassemble only as necessary for shipping and handling.

- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Surface preparation: Prior to installation, clean substrate to remove dirt, debris and loose particles. Perform additional preparation procedures as required by manufacturer's instructions.
- B. Protection: Take all necessary steps to prevent damage to material during installation as required in manufacturer's installation instructions.

3.03 INSTALLATION

- A. Install items in accordance with manufacturer's instructions and directions.
- B. General: Install impact-resistant wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
 - 1. Provide splices, mounting hardware, anchors, and other accessories required for a complete installation.
 - 2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches.
 - 3. Adjust termination caps as required to ensure tight seams.
- C. Impact-Resistant Wall Covering: Install top and edge moldings, corners, and divider bars as required for a complete installation.

3.04 CLEANING

- A. Remove protective material from all wall protectors and clean in accordance with manufacturer's recommendations.

- B. Remove surplus materials, rubbish and debris resulting from installation as work progresses and upon completion of work.

3.05 PROTECTION

- A. Protect installed materials to prevent damage by other trades. Use materials that may be easily removed without leaving residue or permanent stains.

END OF SECTION

SECTION 10 28 13
TOILET ACCESSORIES

PART 1 GENERAL

1.01 SCOPE

- A. This section covers all toilet accessories. Extent of each type of accessory is indicated on the drawing and specified herein.
- B. Included are accessories for:
 - 1. Public toilet rooms.
 - 2. Unit bath rooms.

1.02 WORK SPECIFIED IN OTHER SECTION

- A. Unframed Mirrors (Units): Section 08 81 00.

1.03 QUALITY ASSURANCE

- A. Provide each type of products of one manufacturer. Provide locks with same keying for all accessory units in the project.
- B. Stamped names or labels on exposed faces of units not permitted.

1.04 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions for each type of toilet accessory required.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Delivery accessory items in manufacturer's original, unopened packaging.
- B. Store and handle materials in accordance with manufacturer's recommendations. Protect against soiling, damage and wetting.

1.06 PROJECT CONDITIONS

- A. Furnish anchoring devices and inserts for installation of toilet accessories. Coordinate delivery of items which must be set or built into other work.
- B. Provide setting drawings, templates and instructions for installation of anchorage devices.

1.07 WARRANTY

- A. Submit mirror manufacturer's written ten year warranty against silver spoilage.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Public Items Basis of Design: ASI and BRADLEY as indicated below.
1. Other Acceptable Manufacturers: Similar products by BOBRICK, A & J WASHROOM ACCESSORIES, AMERICAN SPECIALTIES are acceptable if materials meet the requirements of the Basis of Design and the types and styles are acceptable matches as approved by the Architect.
- B. Unit Items Basis of Design: As indicated below.
1. Other Acceptable Manufacturers: Similar products by others are acceptable if materials meet the requirements of the Basis of Design and the types and styles are acceptable matches as approved by the Architect.

2.02 PUBLIC ITEMS

A. 2.02 PUBLIC ITEMS

- A. Toilet Paper Holder: ADA compliant, open controlled.

1. Double Roll: BOBRICK Model Classic Series B-265.
 - a. Type: Surface Mount.
 - b. Finish: Chrome plated.

- B. Soap Dispenser - Tank Type: BOBRICK Model ConturaSeries 818615

1. Type: Surface mounted, liquid dispenser.
2. Material: Stainless Steel, 20 ga., type 304.
3. Finish: Satin.
4. Capacity: 40 oz.

- C. Handicap Bars: MOEN Series 8900

1. Diameter: 1-1/2 inch.
2. Material: Stainless steel, standard satin finish.
3. Fasteners: Concealed.
4. Style and Length
 - a. As indicated; where not indicated provide 42" long horizontal and 18" vertical bars.
 - b. Provide both horizontal and vertical bars in conformance with ANSI A117.1, 604, 608 and 609.

- D. Paper Towel Dispenser: BOBRICK Model ClassicSeries B-262
 - 1. Type: Dispenses C-fold and multifold paper towels 3-1/8" to 3-13/16" deep. Slots in sides of cabinet indicate refill time.
 - 2. Capacity: 400 C-fold or 525 multifold paper towels.
 - 3. Material: 22-gauge (0.8mm) stainless steel.

- E. Robe/Towel Hook: BOBRICK Model B-211
 - 1. Type: Wall mounted, exposed fastener.
 - 2. Material: Plated brass. Satin nickel finish.

- F. Mirrors
 - 1. Standard Framed Type: BOBRICK Model B-290
 - a. Frame: Stainless steel angle, theft resistant concealed fasteners.
 - b. Glass: Tempered 1/4" thick with full silver coating, copper coating and organic coating. Warranted by manufacturer 10 years against silver spoilage.
 - c. Size: 18" wide x 36" high, unless otherwise indicated or scheduled on the drawings.

- G. Mop Strip/Shelf: BOBRICK Model B-224 x 36.
 - 1. Description: Stainless steel, satin finish back plate with four spring activated rubber cam mop holders and hooks.
 - 2. Location: Provide at each janitors sink. Coordinate height with Architect.

- H. Sanitary Napkin Disposal: BOBRICK Model ConturaSeries B-270
 - 1. Type: Surface mounted. Hinged bottom for disposable liner removal.
 - 2. Material: Stainless steel, satin finish.

- J. Infant Changing Table: Stainless Steel
 - 1. Description: Surface mount, fold down type. Concave molded polyethylene changing surface with safety strap. Folds up flat against wall when not in use. Provide with integral sanitary liner holder.
 - a. Sanitary Liners: Provide 2 cases (approximately 2,800) disposable liners.
 - 2. Manufacturer: KB110-SSWM Koala Bear Kare Horizontal Baby Changing Station by KOALA CORPORATION or equal by BROCAR PRODUCTS, FOUR D, INC. or other manufacturers listed in Article 2.01.

2.03 UNIT ITEMS

- A. Toilet Paper Holder: MOEN Mason Models: YB8000CH (Mounting Posts) & YB8099CH (Roller)

1. Single Roll - post
 2. Finish: Selected
- B. Towel Bar: MOEN Models: YB8000CH (Mounting Posts), YB8098CH (18" Towel Bar), YB8094CH (24" Towel Bar)
1. Finish: Selected
 2. Size: 18 and 24"
- C. Towel Ring: MOEN Model: Mason YB8086CH
1. Finish: Selected
 2. Size: 6.4 wide"
- D. Shower Curtain Rod: 5' Decorative Curved MOEN Model: CSR2165CH.
1. Material: 22 gauge stainless steel
 2. Rod Dimension: Rod 1" thick, 5.8" curve.
- E. Handicap Bars: MOEN Series 8900
1. Diameter: 1-1/2 inch.
 2. Material: Stainless steel, standard satin finish.
 3. Fasteners: Concealed.
 4. Style and Length
 - a. As indicated; where not indicated provide 42" long horizontal.
 - b. Provide both horizontal and vertical bars in conformance with ANSI A117.1, 604.5.
- F. Medicine Cabinet: JENSEN / AMERICAN PRIDE AP Horizon: 940M22R Mirrored, Finish: Frameless, Material: Plasti
- G. Robe Hook: MOEN Model: Mason YB8003CH
1. Finish: Selected
 2. Location: Back of all full bathroom doors
- H. Mirrors: Unframed, see section 08 81 00.

2.04 FABRICATION

- A. Edges: All throat openings and similar type exposed edges of towel dispensers, seat cover dispensers, waste receptacles and similar type accessories to be hemmed or sufficiently rounded to preclude accidental cuts to users.
- B. Miters: Provide one-piece seamless beveled or return flange; open miters, if not welded, must be worked to eliminate sharp edges; edges which may cut or snag are not acceptable.

2.05 SCHEDULE OF ACCESSORIES

- A. Location, quantity and mounting height of accessories as indicated on drawings.
- B. Keyed Units: Key all similar types of units alike. Provide two keys per unit.

PART 3 EXECUTION

3.01 INSPECTION

- A. Installer: Examine substrates, previously installed inserts anchorages necessary for mounting of accessories and other conditions under which installation is to occur.
 - 1. Notify Contractor in writing of conditions detrimental to proper and time completion of the work.
 - 2. Do not proceed with work until satisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install in accordance with manufacturer's instructions using fasteners which are appropriate for substrate and recommended by manufacturer of unit. Install units and plumb and level, firmly anchored in positions indicated.
- B. Provide concealed fasteners wherever possible of types required for substrate conditions encountered.
 - 1. Stud and Gypsum Board: Screws or bolts anchored to 16 gage (minimum) metal plate blocking or wood blocking located within stud space. See Section 09 21 16 or 06 10 50.
- C. Lead, plastic or fiber plugs are not acceptable.
- D. Grab Bars: Coordinate grab bar locations as to right hand or left hand installations with field conditions.
 - 1. Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F446.
- E. Upon completion of installation, adjust each accessory unit for proper operation and clean exposed surfaces. Turn over keys to designated Owner's personnel.

END OF SECTION

SECTION 10 31 00
FIREPLACE COMPONENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Section includes fireplace components. Fireplace descriptions are as follows:
 - 1. Vent free gas see through.

1.02 RELATED SECTIONS

- A. Plumbing: Division 22.

1.03 REFERENCES

- A. American National Standards Institute (ANSI):
 - 1. ANSI Z21.88 – 2014 CSA 2.33-2005
- B. International Conference of Building Officials (ICBO):
 - 1. ICBO ER-2031 Evaluation Report.
 - 2. ICBO ER-5159 Evaluation Report.
- C. Underwriters Laboratories, Inc. (UL):
 - 1. UL-29-915173A
 - 2. UL-127/UL-CS610 Standards - Factory-Built Fireplaces.
 - 3. UL-MH8988
 - 4. UL-MH8988-127

1.04 QUALITY ASSURANCE

- A. Variations from the manufacturer's installation instructions are subject to approval by the manufacturer's technical support department in writing and submitted to the Associate prior to submitting a bid.
- B. Fireplace Products: Comply with all local building codes and regulations; in addition, products shall have approvals and meet the specifications noted.

1.05 SUBMITTALS

- A. Shop Drawings and Product Data: Submit for all items in accordance with the requirements of the General Conditions.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect all materials from damage by other trades as well as damage from inclement weather and other unforeseen job site hazards.

PART 2 PRODUCTS

2.01 VENT FREE GAS FIREPLACES

- A. Manufacturers
 - 1. Basis of Design: Drawings and Specifications are based on OUTDOOR LIFESTYLES Fortress.
 - 2. Other Manufacturers: Fireplaces manufactured by others are acceptable providing they meet the requirements and design intent indicated or specified herein and conform to the dimensional layout indicated on the drawings. Minor dimensional changes are acceptable. However, the resulting finish modifications are the responsibility of the Contractor.
- B. Description: Single sided vent free.
 - 1. Rating: 56,000 Btu/hr input; natural gas maximum.
 - 2. Gas type: Natural Gas
 - 3. Size: 39 1/2" x 34 1/2"
 - 4. Efficiency: 99.9%
 - 5. Face: As selected

PART 3 EXECUTION

3.01 COORDINATION

- A. Coordinate installation of concealed utilities with construction of fireplace.

3.02 INSTALLATION

- A. Install manufactured fireplaces in accordance with manufacturer's recommendations and approved Shop Drawings, and with requirements of authorities having jurisdiction.
- B. Upon completion of installation, visually inspect all exposed surfaces. Touch up scratches and abrasions with touch up paint recommended by the manufacturer; make imperfections invisible to the unaided eye from a distance of one feet.

3.03 ADJUSTING AND CLEANING

- A. Adjust and clean for proper operation.

END OF SECTION

SECTION 10 41 16
EMERGENCY KEY CABINETS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide recessed cabinets for emergency access as shown.

1. Knox box

1.02 QUALITY ASSURANCE

- A. Reference Standards: Comply with the current edition of applicable provisions of the following published specifications and standards unless noted otherwise. Key boxes shall bear UL label.

1.03 SUBMITTALS

- A. Submit manufacturer's product data and installation instructions.

1. Include roughing-in dimensions, details showing attachment-mounting methods, relationships of box and trim to surrounding construction, door hardware, and cabinet type and style.

1.04 DELIVERY STORAGE AND HANDLING

- A. Deliver key boxes to site in good condition, in original unopened packaging, and with labels intact. Inspect materials upon delivery and replace damaged or contaminated materials.

1. Key boxes shall be shipped to contractor for installation. Coordinate with Owner shipping of keys and delivery.

PART 2 PRODUCTS

2.01 KNOX BOX

- A. Recessed mount, plate steel housing, 1/2 inch thick steel door with interior gasket seal and stainless steel hinge, flange, and tamper-resistant fasteners; finish to be selected by Architect. Coordinate location with local Fire Department authority and Architect.

1. Key Capacity: 10. Verify with Fire Marshall

2.02 CABINET FABRICATION

- A. General: Materials shall be free from defects impairing strength, durability or appearance.
- B. Sections and shapes shall be rolled, formed, drawn or extruded as required for respective functions.
- C. Molded work shall have sharply defined profile and shall be clean and straight. Plain work shall be leveled, straight and surfaces true and smooth. Edges, angles, and corners shall be square, clean and sharp, unless otherwise detailed.
- D. Fastenings, exposed metal fastenings, and accessories, unless Underwriters' prohibit for safety, shall be of same materials, texture, color and finish as the base metal to which applied.
- E. Molds, trim, frames and other metalwork shall be proper dimensions to receive masonry block and tile, plaster, ceramic tile, etc.

PART 3 EXECUTION

3.01 COORDINATION

- A. Coordinate location of cabinets prior to construction of concrete masonry walls. Verify recessed type installations and coordinate these locations with the masonry construction.
 - 1. Provide mason with rough opening size of cabinets.

3.02 INSTALLATION

- A. Install cabinets where indicated or as directed by Architect in accordance with manufacturer's recommendations for wall substrate type encountered

END OF SECTION

SECTION 10 44 00

FIRE EXTINGUISHERS AND CABINETS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide fire extinguishers and cabinets as shown and specified.
 - 1. Provide fire extinguishers with wall brackets in non-finished areas (i.e. mechanical rooms, electrical rooms, etc.).

1.02 RELATED SECTIONS

- A. Masonry (coordination for recessed cabinets): Section 04 00 00

1.03 QUALITY ASSURANCE

- A. Provide fire extinguishers complying with Fire Protection Association (NFPA) Pamphlet No. 10.
- B. Provide only new portable fire extinguishers fully loaded, tested and approved by Underwriter's Laboratories (UL), and ready for use.
- C. Fire-Rated, Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

1.04 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. 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. Samples: Submit 6" x 6" sample for each type of exposed finish required.

1.05 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 recessed fire protection cabinets with wall depths.

1. Coordinate location of fire extinguisher cabinets prior to construction of concrete masonry walls. Verify recessed type installations and coordinate these locations with the masonry construction.
 - a. Provide mason with rough opening size of cabinets.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Portable Fire Extinguishers

1. AMEREX CORP.
2. ANSUL INC.
3. BUCKEYE FIRE EQUIPMENT COMPANY
4. WALTER KIDDE, THE FIRE EXTINGUISHER CO.
5. J. L. INDUSTRIES
6. LARSEN'S MANUFACTURING COMPANY
7. POTTER-ROEMER
8. WATROUS

B. Fire Extinguisher Cabinets

1. J.L. INDUSTRIES
2. LARSEN'S MANUFACTURING COMPANY
3. POTTER-ROEMER
4. WATROUS
5. THE WILLIAMS BROTHERS CORP.

- B. Where a specific manufacturer's product is specified herein it is to establish a level of quality. Products by the other manufacturers listed are acceptable providing they meet these specifications.

2.02 FIRE EXTINGUISHERS

- A. Multipurpose Dry-Chemical Type: Fabricate in accordance with NFPA No.10, 10A, and 10L and UL Standards, except hose, gauge face cover, and horn cone parts shall be metal. No plastic or nylon valves, trigger/handle, casing, or gauge will be acceptable. Fire extinguishers, unless indicated otherwise, shall be 10 lb. multi-purpose dry chemical type for use on A, B, and C fires (4A-60BC), with hose and horn.

1. Provide this type throughout facility, unless noted otherwise.

- C. Size: 21-1/2" high x 8-1/2" wide x 5" deep.

2.03 FIRE EXTINGUISHER CABINETS

- A. Provide steel construction,

- B. Basis of Design: Drawings and specifications are based on LARSEN Architectural Line with full glass door. LARSEN catalog numbers are listed to establish a standard of quality and mounting type. Equal products may be provided from the listed acceptable manufacturers. Provide the following wall mounting types where a specific type of cabinet is indicated on the drawings. Where no type is indicated, provide semi recessed units.
1. Recessed - Steel: 2409-R, Flat Trim.
 2. Surface Mount - Steel: 2409-SM.
 3. Semi-Recessed - Steel: 2409-6R.
 4. Doors: Full glass
- C. Coordinate final model size with fire extinguisher.
- D. Finish
1. Steel: Baked enamel or powder-coat.
- E. Mounting Brackets: Provide manufacturer's standard plated finish, heavy duty mounting brackets for surface mounted fire extinguishers. Provide proper size and type for capacity of extinguishers indicated.
- F. Fire Rated Cabinets: Listed and labeled to meet requirements of ASTM E814 for fire resistance rating of wall where it is installed.
1. Construct fire rated cabinets with double walls fabricated from 0.0478 inch thick, cold rolled steel sheet lined with minimum 5/8 inch thick, fire barrier material.
- G. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate the words "FIRE EXTINGUISHER" vertically on cabinet door.
1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

2.04 CABINET FABRICATION

- A. Provide standard steel box with trim, frame, door and hardware to suit cabinet type, trim style and door indicated. Weld all joints and grind smooth; miter and weld door frames. Fabricate trim in one piece with corners mitered, welded and ground smooth. Open miters are not acceptable.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where

recessed and semirecessed cabinets will be installed.

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

3.02 PREPARATION

- A. Prepare recesses for recessed and semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.02 INSTALLATION

- A. Install fire extinguishers and fire extinguisher cabinets where indicated or as directed by Architect in accordance with manufacturer's instructions and recommendations. Mount at heights indicated, when not indicated as directed by Architect.
- B. Securely anchor brackets and cabinets to substrate construction with toggle bolts or expansion anchors. Lead, wood or plastic plugs and fasteners are not acceptable.
- C. Fire extinguishers are to be fully charged and ready for use when building is turned over to the Owner. Extinguishers shall be certified as fully charged by an approved fire extinguisher service company and shall be tagged or labeled as such.

3.03 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust cabinet doors that do not swing or operate freely.
- B. On completion of installation, clean interior and exterior surfaces as recommended by manufacturer.
- C. 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.
- D. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- E. Provide final protection and maintain conditions that ensure that cabinets and doors are without damage or deterioration at the time of Substantial Completion.

END OF SECTION

SECTION 10 55 23

MAILBOXES

PART 1 GENERAL

1.01 SCOPE

- A. Provide front loading, lockable mailboxes.
- B. Provide rent drop box.
- C. Provide arrangements, layouts, box sizes and quantities as indicated on drawings.

1.02 SUBMITTALS

- A. Submit manufacturer's product data, layout drawings and installation instructions in accordance with the General Conditions.

PART 2 PRODUCTS

2.01 FRONT LOADING MAILBOXES

- A. Description: USPS STD-4C Approved front load, horizontal type. Fabricated from extruded aluminum, with powder coat finish
 - 1. Size: As indicated on drawings.
 - 2. Door Locks: 5 pin cylinder cam type. Provide 2 keys per mailbox.
- B. Fabrication: Provide units completely factory assembled, requiring no field assembly.
- C. Trim and Attachments: Provide all required trim surrounds and connections to adjacent mailbox modules for complete installation.
- D. Compartment doors to have engraved numbers, backfilled with contrasting paint color. Owner will provide direction on numbering of mailbox doors.
- E. Manufacturer: FLORENCE MANUFACTURING 4CTFT-20 or equal products by SALSBURY INDUSTRIES; CUTLER MANUFACTURING CORPORATION; BOMMER INDUSTRIES; AMERICAN DEVICE.
- F. Location: MU Lobby

2.02 RENT DROP BOX

- A. PROTEX WDD-311 DD or equal.

1. Dimensions: 14" (W) x 15" (H) x 8-3/4" (D)
2. Door Clearance: 11-1/4" (W) x 5-1/4" (H)
3. Drop Opening: 12-3/8" (W) x 1/2" (H)
4. Door Thickness: 1/8"
5. Drop slot opening (12-3/8") long enough to drop legal size paper or large envelopes.
6. Metal baffle to protect drop opening.
7. Reinforced double steel door.
8. Engrave: RENT on door.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install mailbox assembly in accordance with the manufacturer's recommendations. Anchor units securely to wall structure. Trim opening with flanged trim provided by mailbox manufacturer, finished to match mailboxes.
- B. Mail box units are to be installed with door lock cylinders and bottom of compartments at the maximum and minimum heights above finish floor established by USPS.
- C. Contractor to have completed mailbox installation inspected by USPS And to obtain letter of acceptance from USPS postmaster authorizing mail collection and delivery.

END OF SECTION

SECTION 10 56 23

WIRE SHELVING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Provide wall mounted wire shelving as specified herein and indicated on the drawings.

1.02 SUBMITTALS

- A. Submit manufacturer's product data and layout drawings.

1.03 DELIVERY, STORAGE AND HANDLING

- A. Deliver shelving items in manufacturer's original unopened shipping cartons.
- B. Protect materials from damage during storage and handling and after installation.

PART 2 PRODUCTS

2.01 WIRE SHELVING

- A. Material: All ventilated wire storage shelving shall be constructed of Grade C-1008 bright, basic, cold-drawn steel wire with average tensile strength of 100,000 psi. All steel wire shall be resistance welded at intersections of cross deck wires spaced at 1" increments and trimmed smooth.
- B. Finish:
 - 1. Material shall be cleaned and covered with an iron phosphate coating to ensure proper bond with finish coat.
 - 2. Finish all ventilated wire shelving with baked-on non-toxic and epoxy coating. Finish coat shall consist of a continuous 3-5 mil epoxy-polyester
 - 3. Spacing: Typical 1"
 - a. Pantry ½".
- C. Size and Quantity: As indicated on drawings.
- D. Provide all required wall uprights, shelf brackets, shelves, hardware and fasteners to achieve the following capacities:

Open to open
length total weight lbs.

1 ft.	75
2 ft.	130
3 ft.	135
4 ft.	160
5 ft.	175

Wall to wall

<u>length</u>	<u>total weight lbs.</u>
1 ft.	105
2 ft.	150
3 ft.	180
4 ft.	220
5 ft.	250

- E. Surface Mount Shelf Supports: Heavy duty double slotted supports.
 - 1. Standards: Unless otherwise indicated 72 inches high, maximum 30 inch spacing.
 - 2. Brackets: Unless otherwise indicated, 4 per standard.

- F. Basis of Design: RUBBERMAID Ventilated Wire Shelving System
 - 1. Linen: Linen and clothing shelves
 - 2. Closet: Shelf with clothes hanger

- G. Other Acceptable Manufacturers: Wire shelving manufactured by other manufacturers will be considered if materials meet the requirements of the Basis of Design and the types and sizes are an acceptable match as approved by the Architect.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Locate as indicated on drawings.

- B. Clean and adjust before acceptance.

END OF SECTION

SECTION 10 75 00

FLAGPOLES

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 ground-mounted flagpoles made from aluminum.
- B. Owner-Furnished Material: 5' X 8' Flag.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Flagpole assemblies, including anchorages and supports, shall withstand the effects of gravity loads, and the following loads and stresses within limits and under conditions indicated according to the following design criteria:
 - 1. Seismic Loads: according to SEI/ASCE 7.
 - 2. Wind Loads: according to NAAMM FP 1001, "Guide Specifications for Design of Metal Flagpoles".
 - 3. Base flagpole design on polyester flags of maximum standard size suitable for use with flagpole or flag size indicated, whichever is more stringent.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Qualification Data: For qualified professional engineer.
- C. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain flagpole as complete unit, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. General: Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Admiral Flag Poles, Inc.
 - 2. Baartol Company.
 - 3. Morgan-Francis; Division of Original Tractor Cab Co., Inc.
 - 4. U.S. Flag & Flagpole Supply, LP.

2.2 FLAGPOLES

- A. Flagpole Construction, General: Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:
 - 1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
 - 2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.
 - 3. Provide self-aligning, snug-fitting joints.
- B. Exposed Height: 30 feet.
- C. Aluminum Flagpoles: Provide cone-tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B 241/B 241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.
- D. Sleeve for Aluminum Flagpole: PVC pipe foundation sleeve, made to fit flagpole, for casting into concrete foundation.
 - 1. Provide flashing collar of same material and finish as flagpole.

2.3 FITTINGS

- A. Finial Ball: Manufacturer's standard beacon ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
 - 1. Gold Anodized finish, to match existing flagpole finial ball.
- B. External Halyard: Ball-bearing, nonfouling, revolving truck assembly of cast metal with continuous 5/16-inch diameter, braided polypropylene halyard and 9-inch cast-metal cleats with fasteners. Finish exposed metal surfaces to match flagpole.
 - 1. Provide one halyard and one cleat at each flagpole.

2. Provide cast-metal cleat covers, finished to match flagpole, secured with cylinder locks.
3. Provide halyard covers consisting of a 2-inch channel, 60 inches long, finished to match flagpole.
4. Halyard Flag Snaps: Provide two stainless-steel swivel snap hooks per halyard.
 - a. Provide with neoprene or vinyl covers.
5. Plastic Halyard Flag Clips: Made from injection-molded, UV-stabilized, acetal resin (Delrin). Clips attach to flag and have two eyes for inserting both runs of halyards. Provide two flag clips per halyard.
 - a. Product: Subject to compliance with requirements, provide "Quiet Halyard" flag clasp by Lingo

2.4 MISCELLANEOUS MATERIALS

- A. Sand: ASTM C 33, fine aggregate.
- B. Elastomeric Joint Sealant: Multicomponent nonsag urethane joint sealant complying with requirements in Division 07 Section "Joint Sealants" for Use NT (nontraffic) and for Use M, G, A, and, as applicable to joint substrates indicated, for Use O.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. 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, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, including foundation; accurate placement, pattern, orientation of anchor bolts, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
- D. Place concrete, as specified in Division 03 Section "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days or use nonstaining curing compound.
- E. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.3 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where shown and according to manufacturer's written instructions.
- B. Ground Set: Place sleeve, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level sleeve and allow concrete to cure. Install flagpole, plumb, in sleeve.
 - 1. Foundation Tube: Place tube seated on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of elastomeric joint sealant and cover with flashing collar.
- C. Baseplate: Cast anchor bolts in concrete foundation. Install baseplate on washers placed over leveling nuts on anchor bolts and adjust until flagpole is plumb. After flagpole is plumb, tighten retaining nuts and fill space under baseplate solidly with nonshrink, nonmetallic grout. Finish exposed grout surfaces smooth and slope 45 degrees away from edges of baseplate.
- D. Mounting Brackets and Bases: Anchor brackets and bases securely through to structural support with fasteners as indicated on Shop Drawings.

END OF SECTION

SECTION 11 31 00

APPLIANCES

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide the following appliances where indicated on drawings for following areas:

1. Public Community Room

Refrigerator/Freezer
Dishwasher
Countertop Microwave
Range

2. Residential Typical Units

Washer / Dryer stacked
Refrigerator/Freezer
Range
Dishwasher
Microwave/Hood

3. Residential Type A Units

Washer
Dryer
Refrigerator/Freezer
Range
Dishwasher
Countertop Microwave
Range Hood

1.02 RELATED SECTIONS

A. Electrical Rough-In: Included under Electrical Contract, Division 26.

1.03 SUBMITTALS

A. Manufacturer's Product Data: Submit for all items in accordance with the General Conditions.

B. Documentation of Energy Star rated appliances for all items as required.

PART 2 PRODUCTS

2.01 GENERAL

- A. Rating: All dishwashers, hoods, refrigerators, washers and dryers shall be Energy Star-rated.
- B. Refrigerators in ANSI Type A units, ADA common areas must be vertical side-by-side type; or of the over under type and meet the following requirements: Have at least 50 percent of the freezer space below 54 inches AFF; and, have 100 percent of the freezer controls below 54 inches AFF. Freezers with less than 100 percent of the storage within an accessible reach range must be self-defrosting.
- C. Manufacturers listed are to establish a standard of acceptable quality and basis of design. Dimensions of basis of design products are critical for compliance with ADA/ANSI and UFAS requirements and casework layouts as indicated in drawings. Except where no substitution is indicated, similar products by other manufacturers listed below are acceptable provided they are an acceptable match in performance, characteristics and exact dimensions. All proposed substitutions to be approved by Architect.
 - 1. KENMORE
 - 2. KITCHEN AID
 - 3. AMANA
 - 4. WHIRLPOOL
 - 5. MAYTAG
 - 6. FRIGIDAIRE
 - 7. GENERAL ELECTRIC (GE)

PUBLIC

COMMUNITY ROOM

APPLIANCE	MFR	MODEL #	FINISH	ADA COMPLIANT	ENERGY STAR RATED	SIZE/TYPE
REFRIGERATOR/ FREEZER	GE	GTE18GTNRBB	Black		Yes	Top freezer, 17.5 cu. ft., No icemaker kit
DISHWASHER	GE	GDT225SGLBB	Black	Yes	Yes	24" Built-in
COUNTERTOP MICROWAVE	GE	PES7227DLBB	Black	Yes		Countertop model, 2.2 cu. ft.
Range	GE	JBS460DMBB				

- ADA-COMPLIANT CONTROLS REQUIRED
- ADA-COMPLIANT WHEN INSTALLED WITH CONTROLS <48" MAX HEIGHT AND PROPER PARALLEL-APPROACH CLEARANCES

RESIDENTIAL UNITS

TYPICAL UNIT

APPLIANCE	MFR	MODEL #	FINISH	ADA COMPLIANT	ENERGY STAR RATED	SIZE/TYPE
REFRIGERATOR/ FREEZER	GE	GTE18GTNRBB	Black		Yes	Top freezer, 17.5 cu. ft., No icemaker kit
RANGE	GE	JBS60DKBB	Black			5.3 cu. ft., Electric, Free-standing
DISHWASHER	GE	GDF510PGRBB	Black		Yes	24" Built-in
MICROWAVE/ HOOD	GE	JVM6175DKBB	Black			Over-the-range, 1.7 cu. ft.
WASHER/DRYER	GE		White			Stacked

TYPE A UNIT

APPLIANCE	MFR	MODEL #	FINISH	ADA COMPLIANT	ENERGY STAR RATED	SIZE/TYPE
REFRIGERATOR/ FREEZER	GE	GTE18GTNRBB	Black		Yes	Top freezer, 17.5 cu. ft., No icemaker kit
RANGE	GE	JBS460DMBB	Black	Yes		5.0 cu. ft., Electric, Free-standing, front controls
DISHWASHER	GE	GDT225SGLBB	Black	Yes	Yes	24" Built-in
COUNTRTOP MICROWAVE	GE	PES7227DLBB	Black	Yes		Countertop model, 2.2 cu. ft.
RANGE HOOD	Broan	40000 series	Black		Yes	30" Under-cabinet, ducted
WASHER	GE	GFW430SSMWW	White			With pedestal
DRYER	GE	GFD45ESSMWW	White			With pedestal

- ADA-COMPLIANT CONTROLS REQUIRED FOR TYPE A UNITS
- ADA-COMPLIANT WHEN INSTALLED WITH CONTROLS <48" MAX HEIGHT AND PROPER PARALLEL-APPROACH CLEARANCES

2.02 ACCESSORIES

- 3 ft. pigtail cord and plug for ranges, dishwashers and food waste disposals.
- Anti-tip brackets for all free-standing ranges.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install all items in accordance with manufacturer's instructions.
- B. Provide all required accessories and fasteners to ensure a complete functioning installation.

END OF SECTION

SECTION 12 21 13

HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Provide and install materials, and all related accessories required for complete blind installation on all windows indicated on drawings to receive blinds.

1.02 WORK SPECIFIED IN OTHER SECTIONS

- A. Wood Blocking: Section 06 10 50

1.03 SUBMITTALS

- A. Submit manufacturer's product data and full range of color samples.

1.04 QUALITY ASSURANCE

- A. Safety Certification: WCMA A100.1 - Safety of Window Covering Products; Window Covering Manufacturers Association. (ANSI/WCMA A100.1-2018)

1.05 EXTRA MATERIAL

- A. Provide (3) full-size units for each blind type, size and color installed.

PART 2 PRODUCTS

2.01 MINI BLINDS

A. Materials

1. Extruded PVC 2" wide with faux wood coating.
 - a. Provide slat-to-slat seal coverage with closure with no visible route holes when closed.
2. Provide engineered bottom rail with cordless push up system.
3. Matching headrail.

B. Basis of Design: NORMAN Faux Wood Blinds

1. Other Manufacturers.: Products manufactured by BALI, SPRINGS WINDOW FASHIONS, KIRSCH or HUNTER DOUGLAS, INC. are acceptable upon Architects review and acceptance.

- C. Lift Cord: Cordless.
- D. Control Wand: Extruded solid plastic; hexagonal shape.
 - 1. Non-removable type.
 - 2. Length of window opening height less 3 inches.
 - 3. Color: clear.
- E. Provide hold-down clips for blinds installed on half and full-lite doors

PART 3 EXECUTION

3.01 INSTALLATION

- A. Field measure each window for correct dimensions.
- B. Blinds to be installed between window jambs, set ½" off face of window frame.
- C. Provide a single blind for each window unit. For double and triple windows, provide multiple blinds on a single head rail.
- D. Following installation, shorten lift cord to proper length
- E. Replace any bent or damaged slats or other defective items prior to installation.
- F. Install level and of proper length and width to fit all windows designated to be treated.
- G. Adjust for smooth operation.

END OF SECTION

SECTION 12 32 00

MANUFACTURED WOOD CASEWORK

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide base and wall cabinets as indicated.

1.02 RELATED SECTIONS

- A. Countertops: Section 06 40 00.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's/fabricator's data and installation instructions for each type of casework unit.
- B. Samples: Submit samples of specified finishes.
- C. Shop Drawings
 1. Submit shop drawings for casework showing plans, elevations, ends and cross sections.
 2. Show details and location of anchorages and fitting to floors, walls and base.
 3. Include layout of units with relation to surrounding walls, doors, windows and other building components.

1.04 QUALITY ASSURANCE

- A. Fabricator qualifications: A firm specializing in the fabrication of millwork with a satisfactory record of performance on projects of comparable size and quality. Fabricator shall be acceptable to the Architect.
- B. Installation: Performed only by experienced skilled finish carpenters.
- C. Quality Grade: Materials and fabrication shall be "custom grade" in accordance with "Quality Standard Illustrated," of the AWI conforming to the following sections:
 1. Section 200: Plywood and particleboard.
 2. Section 400: Casework.

1.04 REFERENCE

- A. All manufactured factory-finished cabinets shall comply with ANSI/KCMA A161.1. All cabinets must bear the identification of the cabinet manufacturer. All cabinets to be NKCA certified and labeled, with labels in place at time of installation and inspection.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect casework during delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver casework until concrete, masonry and other similar wet work has been completed and is thoroughly dry, outside door openings are permanently watertight, exterior windows are glazed and, in case of temperature dropping below 60 degrees F., until temporary heating and ventilating systems are in operation.
- C. Store casework in dry, well-ventilated spaces with constant minimum temperature of 60 degrees F., and maximum relative humidity of 55%.

1.06 PROJECT CONDITIONS

- A. Provide and maintain a constant temperature and humidity before, during and after installation as required to maintain optimum moisture content of installed materials.
- B. Obtain measurements and verify dimensions and details before proceeding with finish carpentry.

PART 2 PRODUCTS

2.01 CABINETS

- A. Manufacturer
 - 1. Basis of Design: Drawings and specifications are based on SMART CABINETRY Ultimate Series.
 - 1. Style: Squire Maple Doors – Shaker Style with Veneer Flat Panel and Square Edge Profile. Standard Overlay.
 - 2. Other manufacturers are acceptable for review after compliance with the project Substitution requirements. In addition, submittals requesting substitutions must also include a physical sample of similar casework types and material.
- B. Provide complete factory assembled and finished components.
 - 1. Provide wall and base cabinets with standard accessories.
 - 2. Provide matching filler panels and end panels where indicated or required.

- B. General: All composite wood products will be compliant with California 93120.
- C. Materials
 - 1. Wall and base cabinets shall be of same construction; outside appearance must be the same; construction type must have face frames.
 - 2. Provide solid lumber and exterior grade plywood with veneer core for all cabinets.
 - 3. All parts touching floor to be pressure treated solid lumber.
 - 4. Provide all fillers, moldings and trims required to assure a neat, accurate job fit.
- D. Components and Fabrication
 - 1. Face Frames: 3/4" thick kiln dried solid hardwood; stiles and rails to be 1-1/2" wide; mullions to be 3" wide.
 - 2. Wall and Base Sides: 1/2" Nominal plywood with light maple laminate interior and designated laminated exterior.
 - 3. Backs: 1/2" plywood with light maple laminate.
 - 4. Wall Tops and Bottoms: 1/2" Nominal plywood with light maple laminate, hot melt glued into dados on all four sides.
 - 5. Shelves: 3/4" Nominal - Edgebanded
 - 6. Doors and Drawer Fronts: Style as selected by Architect; 3/4" thick, solid hardwood.
 - 7. Base Bottoms: 1/2" plywood with light maple laminate interiors. Bottoms are hot melt glued into dados on all four sides.
 - 8. Drawers: 5/8" Solid Dovetail Drawers with four sided construction and captive 1/4" Nominal matching plywood bottom.
 - 9. Hardware
 - a. Drawer Slides: 75 pound capacity, epoxy coated metal side rails.
 - b. Hinges: 6-way adjustable hinges, heavy duty, self closing, and concealed within the cabinet door and frame
 - 10. Construction Rails I-Beam 1/2" Nominal plywood. Rails to be hot melt glued into face frame, sides, and cabinet back.
- E. Adhesive: Low-VOC, FS MMM-A-125C, Type II, water- and mold-resistant; complying with required VOC regulations.
 - 1. VOC Content: The volatile organic compound (VOC) content of adhesives shall not exceed the limits defined in Rule #1168 "Adhesive and Sealant Applications" of the South Coast Air Quality Management District (SCAQMD), of the State of California.
- F. Finish
 - 1. Factory finish consisting of stain, sealer and top coats, lightly sanded between applications. Provide sealer and top coats oven dried.
 - 2. Cabinet Colors: As selected by Architect from manufacturer's standard colors.

PART 3 EXECUTION

3.01 INSTALLATION

A. General

1. Install plumb, level, true and straight with no distortions so that doors and drawers will fit openings properly and be accurately aligned.
2. Shim as required using concealed shims.
3. Where casework abuts other finished work, scribe and apply filler strips for accurate fit with concealed fasteners.
4. Where possible, assemble units into one integral unit with joints flush, tight and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16".
5. Anchor cabinet units securely in place with concealed (when doors and drawers are closed) fasteners, anchored into structural support members of wall construction. Comply with manufacturer's instructions and recommendations for support of unit.
6. Adjust casework and hardware so that doors and drawers are centered in openings and operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

B. Base Cabinets

1. Fasten each individual cabinet to floor at toe space, with fasteners spaced at 24" on center.
2. Bolt continuous cabinets together.
3. Secure individual cabinets with not less than 2 fasteners into floor, where they do not adjoin other cabinets.

C. Wall Cabinets

1. Verify that wood blocking has been installed at required locations.
2. Bolt continuous cabinets together.
3. Secure individual cabinets with not less than 2 fasteners into wall (wood blocking), where they do not adjoin other cabinets.

3.02 CLEANING AND PROTECTION

A. Repair or remove and replace defective work as directed upon completion of installation.

1. Patch surfaces damaged by installation to prior condition as approved or replace damaged units as directed.

B. Clean shop-finished surfaces, touch-up as required, and remove or refinish damaged or soiled areas, as acceptable to Architect.

1. Dust cabinet interiors. Clean exterior surfaces to original condition.

END OF SECTION

SECTION 12 36 40
STONE COUNTERTOPS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Work includes granite countertops as indicated on the drawings.

1.02 RELATED SECTIONS

- A. Sealants: Section 07 92 00.

1.03 SUBMITTALS

- A. Submit shop drawings for countertops.
 - 1. Provide large scale details.
 - 2. Indicate methods of fabrication, edging, location and construction of joints.
- B. Submit samples of each type of stone.

1.04 QUALITY ASSURANCE

- A. Fabricator qualifications: A firm specializing in the fabrication of stone countertops with a minimum of 5 years experience and a satisfactory record of performance on projects of comparable size and quality. Fabricator shall be acceptable to the Architect.
- B. Installation: Performed only by skilled finish carpenters with a minimum of 3 years experience in installing stone countertops to that required for this project.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Protect materials and items during delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Do not deliver materials and items until concrete, masonry, painting, grinding and other similar wet work has been completed and is thoroughly dry.
- C. Store materials in dry, well-ventilated spaces with constant minimum temperature of 60° F., and maximum relative humidity of 55%.

1.06 PROJECT CONDITIONS

- A. Provide and maintain a constant temperature and humidity before, during and after installation as required to maintain optimum moisture content of installed materials.
- B. Obtain measurements and verify dimensions and details before proceeding with fabrication.

PART 2 PRODUCTS

2.01 BASIC MATERIALS AND FABRICATION METHODS

- A. Stone Types and Colors: As indicated on the drawings.
- B. Fabrication
 - 1. Fabricate to dimensions, profiles and details indicated with openings and mortises precut, where possible to receive fixtures, accessories and other similar items of work.
 - 2. Ease edges as indicated on the drawings. Fabricate edges as detailed.
 - 3. Complete fabrication and other work before shipment to site to the greatest extent practicable. Dissamble components where necessary for fitting at site. Provide ample allowance for scribing, trimming and fitting.
- C. Measurements: Prior to fabrication of items required to be fitted to other construction, obtain field measurements and verify dimensions and Shop Drawing details as required for accurate fit.

2.02 MISCELLANEOUS MATERIALS

- A. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous, nonporous joints, with chemical bond.

PART 3 EXECUTION

3.01 PREPARATION

- A. Condition materials, items and products to average prevailing humidity conditions in installation areas before installing.
- B. Install blocking and anchoring devices built into substrates for anchorage of countertops.

3.02 INSTALLATION

- A. General
 - 1. Install items plumb, level, true and straight with no distortion.
 - 2. Shim as required using concealed shims.

3. Install to a tolerance of 1/8" in 8'-0" for plumb and level, with no offset in flushness of adjoining surfaces.
- B. Scribe and cut work to fit adjoining work and refinish cut surfaces or repair damaged finish at cuts.
- C. Install countertops level, true to alignment, accurately fit to wall conditions and securely fastened to base units and other support systems as indicated.

3.03 CLEANING AND PROTECTION

- A. Repair damaged and defective items to eliminate functional and visual defects. Where not possible to repair properly, replace items as directed by the Architect.
- B. Protect installed work during remaining construction operations.

END OF SECTION

SECTION 12 56 51

FURNITURE, FURNISHINGS AND ACCESSORIES

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials and transportation necessary for the complete installation of all furniture, furnishings and accessories indicated on the drawings or specified herein or both.

1.02 SUBMITTALS

- A. Shop Drawings: For each item, submit manufacturer's product data in accordance with the General Conditions.
- B. Samples: Submit color chips and fabric samples for Architect's color verification or selection.
- C. Maintenance Instructions: Submit three copies of manufacturer's recommended maintenance instructions, including information needed for removal of common stains.

1.03 DELIVERY AND INSTALLATION

- A. Protect furniture and accessories during delivery, storage and handling to prevent damage, soiling and deterioration.
- B. Shipment of furniture and accessory items may be made directly to building site in cases where prior approval of Architect has been obtained and the building is ready for furniture installation. Furniture Contractor is responsible for knowing when his merchandise is to arrive and must have available all labor and equipment for unloading and handling.
- C. Delivery must be in accordance with the Progress Schedule developed by this Contractor in cooperation with the other Contractors and Owner as provided for under Article 4 of the General Conditions.
- D. Contractor is responsible for temporary storage of all furniture and accessory items until time for delivery and installation.
- E. Particular care must be taken by furniture Contractor when handling equipment and furniture during installation so as not to damage existing building, carpet and shelving.

1.04 DAMAGED ITEMS

- A. Furniture Contractor is responsible for all damage to items provided under this contract up to the time of acceptance by the Owner, whether this damage results during shipment from manufacturer, delivery to site, placement, or through carelessness or malicious mischief or whatever reason, and final payment will be made only for undamaged items. Contractor shall replace all damaged items or parts of assembled or manufactured items as soon as discovered.
- B. Nominal touch-up or repair of painted finishes will be permitted if done in accordance with the manufacturer's recommended procedures for such repair and the end results, in the opinion of the Architect, appears as good as new. Repairs must return item to original appearance and function.

PART 2 PRODUCTS

2.01 FURNITURE, FURNISHINGS AND ACCESSORIES

- A. See following documents.

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. Placement shall be made in accordance with the locations indicated on the drawings. When conditions require adjustment of placement, the Architect will determine or approve alternate placement.
- B. Placement and installations shall be performed by mechanics skilled in the requirements of that type of work.
- C. Upon completion of the work, all furniture and accessories shall be fully assembled with moveable parts operating properly.
- D. Installation shall be in accordance with the requirements, standards and procedures of the product manufacturer.

END OF SECTION



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

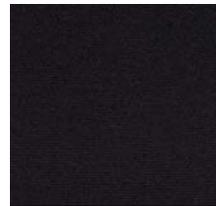
May 8, 2023

Plan Tag: **C1**
 Item Name: Task Chair
 Style/Series: Focus 2.0
 Product #: 1123 BK2 Y/e3 AR6 FG4 CS6 CH1
 MB BT1 BC1 MC1 FC1 YCC01 LA1 KD
 Dimensions: 27.5" W x 26" D x 39" H (adj.)
 Finishes: Black Mesh, Black Frame

Manufacturer: SitOnIt Seating
 Rep: BLG / Lauren Carbaugh
 Tel: 614.787.5795
 E: Lauren@blgreps.com

Upholstery Mfg.: Maharam (Graded-in)
 Pattern: Messenger 26-0070014-0109
 Color: 029 Onyx
 COM Yardage/Sq. Ft.:

Description: Focus 2.0 Task Chair
 Mesh Highback, Multi-Adjustable Arms,
 Enhanced Syncro with Seat Depth Adjustment,
 5-Star Nylon Base, Standard Cylinder,
 Hard Floor and Carpet Casters



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: ADMIN. A-100 (2)
 MAINT. A-102 (1)
 MGR. A-103 (1)

Total Quantity: **4**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **C2**
 Item Name: Side Chair
 Style/Series: Focus
 Product #: 564 1 A130 FG4 C12 B1 MC1 AC
 Dimensions: 24.5" W x 26" D x 34" H
 Finishes: Black Mesh, Black Frame

Manufacturer: SitOnIt Seating
 Rep: BLG / Lauren Carbaugh
 Tel: 614.787.5795
 E: Lauren@blgreps.com

Upholstery Mfg.: Maharam (Graded-in)
 Pattern: Messenger 26-0070014-0109
 Color: 029 Onyx
 COM Yardage/Sq. Ft.:

Description: Focus Side Chair with Casters
 Mesh Back, Four Legs with Casters
 Fixed Loop Arms
 Hard Floor and Carpet Casters
 300 lb Weight Capacity
 Stacks 4 High



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: CONF. A-101 (6)
 MGR. A-103 (1)
 COMP. CO-100 (4)

Total Quantity: **11**



PRODUCT SPECIFICATION

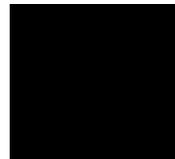
Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag:	C3	Manufacturer:	JSI
Item Name:	Dining Chair / Armless	Rep:	BLG / Lauren Carbaugh
Style/Series:	Americana	Tel:	614.787.5795
Product #:	313C M w/ Uph. Seat	E:	Lauren@blgreps.com
Dimensions:	22" D x 18-1/2" W x 35-1/4" H SH 18-3/4"		
Finishes:	Raven Coordinate on Maple (M)		

Upholstery Mfg.: Graded-in Price Group A
 Pattern: TBD - Vinyl
 Color: TBD
 COM Yardage/Sq. Ft.:

Description: JSI Americana Series Armless Dining Chair
 w/ Upholstered Seat (Vinyl)
 Raven Coordinate Finish on Maple
 22" D x 18-1/2" W x 35-1/4" H SH 18-3/4"



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COMMUNITY ROOM CR-100 (40)

Total Quantity: **40**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	C4	Manufacturer:	Pottery Barn
Item Name:	Stool	Rep:	
		Tel:	1.888.779.5176
Style/Series:	Benchwright Counter Stool		
Product #:			
Dimensions:	17" W x 20.5" D x 39.5" H 24" SH		
Finishes:	Blackened Oak		

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Pottery Barn Benchwright Counter Stool
 Wood Plank Seat
 Expertly crafted with of kiln-dried solid rubberwood
 Kiln-dried wood helps prevent warping, splitting,
 and developing mildew
 Finished by hand
 Contract Grade



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COMMUNITY ROOM CR-100 (6)

Total Quantity: **6**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag:	C5	Manufacturer:	West Elm
Item Name:	Club Chair	Rep:	
		Tel:	1.888.922.4119
Style/Series:	Heather Taylor Home		
Product #:	Sophie Chair		
Dimensions:	29" W x 34" D x 30.25" H		

Finishes:

Upholstery Mfg.: As Shown / Midnight Simple Plaid
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: West Elm Heather Taylor Home Sophie Chair
 Contract Grade
 Solid oak and engineered wood frame
 Solid oak legs
 All wood is kiln-dried for added durability
 Simple plaid upholstery - 53% cotton,
 47" polyester
 High-gauge sinuous springs
 Seat cushion is foam and fiber filled
 Back cushion is fiber filler
 Loose reversible cushions
 29" W x 34" D x 30.25" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COMMUNITY ROOM CR-100 (2)
 LOBBY L-100 (4)

Total Quantity: **6**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **C6**
 Item Name: Rattan Accent Chair
 Style/Series: Rattan Accent Chair
 Product #: SKU: 8726175
 Dimensions: 30" W x 28" D x 35" H
 Finishes: Black

Manufacturer: Pottery Barn
 Rep:
 Tel: 1.888.779.5176

Upholstery Mfg.: As Shown
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Pottery Barn Rattan Accent Chair
 Woven from rattan
 Kiln-dried wood helps prevent warping, splitting,
 cracking and developing mildew
 Loose seat cushion is made of a cotton/polyester
 fabric and has a zipper closure
 30" W x 28" D x 35" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COMMUNITY ROOM CR-100 (2)

Total Quantity: **2**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag:	C7	Manufacturer:	Pottery Barn
Item Name:	Dining Chair	Rep:	
		Tel:	1.888.779.5176
Style/Series:	Palmetto Stacking Dining Chair		
Product #:	5544551		
Dimensions:	26" W x 23.5" D x 34.5" H		
Finishes:	As Shown		

Upholstery Mfg.: As Shown
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Pottery Barn Palmetto Stacking Dining Chair
 Frame is crafted of rustproof welded aluminum
 and wrapped in all-weather wicker
 Includes quick-drying and water-repellent cushions
 with polyester canvas slipcovers in natural
 26" W x 23.5" D x 34.5" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COVERED PORCH (6)

Total Quantity: **6**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	C8	Manufacturer:	Frontgate
Item Name:	Dining Chair	Rep:	
		Tel:	888.263.9850
Style/Series:	Café Curved Back Stacking Chairs		
Product #:	43579 (sold in sets of 4)		
Dimensions:	24-3/4" W x 24" D x 34" H		
Finishes:	Golden Bronze		

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Frontgate Café Curved Back Stacking Chair, Set of 4
 Full-scale, lightweight
 Advanced weather-defying fiber is double woven over powdercoated aluminum frames
 Premium wicker construction resists mold, mildew, fading and splintering
 Frame is backed with 10-year structural warranty
 24-3/4" W x 24" D x 34" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COVERED PORCH (8)

Total Quantity: **8 (2 sets of 4)**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag:	C9	Manufacturer:	Frontgate
Item Name:	Lounge Chair	Rep:	
		Tel:	888.263.9850
Style/Series:	Carlisle (set of 2)		
Product #:	61492		
Dimensions:	27" W x 29-1/2" D x 43" H		
Finishes:	Onyx Finish w/ Chestnut Wicker		

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Frontgate Carlisle Woven-enhanced Swivel Rocker Lounge Chair with Aluminum Frame.
 Woven mahogany all-weather resin wicker seat
 Relaxing high back
 100% ingot aluminum
 UV protected top coat
 Smooth 360 degree swivel and rocking mechanism
 Onyx Finish w/ Chestnut Wicker
 27" W x 29-1/2" D x 43" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COVERED PORCH (2)

Total Quantity: **2 (1 set)**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **D1**
 Item Name: Desk - Double Pedestal

Manufacturer: Global Furniture Group
 Rep: Gina Frazier
 Tel: 614.325.5888
 E: gfrazier@globalfurniture.com

Style/Series: Genoa
 Product #: G3072D4 w/ AG2

Dimensions: 72" W x 30" D x 29" H

Finishes: Black BLK 1
 Plastic Laminate: TBD

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Global Genoa Series Laminate Desk
 Double Pedestal - FF Left and BBF Right
 Full Modesty to Floor
 Grommet Center Rear
 Pencil tray included
 72" W x 30" D x 29" H
 PLam TBD



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: MGR. A-103 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **D2**
 Item Name: Desk - Single Pedestal
 Style/Series: Genoa
 Product #: G3060SPL w/ AG2

Manufacturer: Global Furniture Group
 Rep: Gina Frazier
 Tel: 614.325.5888
 E: gfrazier@globalfurniture.com

Dimensions: 30" D x 60" W x 29" H

Finishes:
 Plastic Laminate: TBD

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Global Genoa Series Laminate Desk
 with Single Box File Pedestal (Left)
 3/4 Modesty
 Grommet Center Rear
 60" W x 30" D x 29" H
 PLam TBD



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: MAINT. A-102 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **F1**
 Item Name: Lateral File - Four Drawer
 Style/Series: 1900 Plus Series
 Product #: 1936P-4F12,W401,~STD,~GLO,BLK,~STD
 Dimensions: 36" W x 19.25" D x 51.89" H

Manufacturer: Global Furniture Group
 Rep: Gina Frazier
 Tel: 614.325.5888
 E: gfrazier@globalfurniture.com

Finishes: Black BLK 1
 Frame:
 Plastic Laminate:

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Global 1900 Plus Series
 4-Drawer Lateral File
 36" W x 19.25" D x 51.89" H
 Standard Paint - BLK 1 - Black
 12.25" H Drawers
 Counterweight Balance - Standard



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: MGR. A-103 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

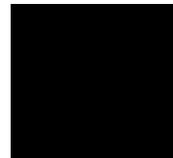
Plan Tag: **F2**
 Item Name: Lateral File - Two Drawer
 Style/Series: 1900 Plus Series
 Product #: 1936P-2F12,W401,~STD,~GLO,BLK,~STD
 Dimensions: 36" W x 19.25" D x 27.89" H

Manufacturer: Global Furniture Group
 Rep: Gina Frazier
 Tel: 614.325.5888
 E: gfrazier@globalfurniture.com

Finishes: Black BLK 1
 Frame:
 Plastic Laminate:

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Global 1900 Plus Series
 2-Drawer Lateral File
 36" W x 19.25" D x 27.89" H
 Standard Paint - BLK 1 - Black
 12.25" H Drawers
 Counterweight Balance - Standard



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: ADMIN. A-100 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag:	MB1	Manufacturer:	ULINE
Item Name:	Marker Board	Rep:	
		Tel:	262.612.4200
Style/Series:	Glass Dry Erase Board		
Product #:	H-7180		
Dimensions:	4' W x 3' H		

Finishes: Magnetic White
 Frame: Frameless
 Plastic Laminate:

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Uline Glass Dry Erase Board
 4' W x 3' H
 Tempered glass, magnetic
 Includes 4 markers, tray and mounting hardware
 Includes 4 rare earth magnets



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: ADMIN. A-100 (1)
 CONF. A-101 (1)
 MAINT. A-102 (1)
 MGR. A-103 (1)

Total Quantity: **4**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **S1**
 Item Name: **Sofa**

Manufacturer: **West Elm**
 Rep:
 Tel: **1.888.922.4119**

Style/Series: **Heather Taylor Home**
 Product #: **Sophie Sofa**
 Dimensions: **82" W x 36" D x 30.25" H**

Finishes:
 Frame:
 Plastic Laminate:

Upholstery Mfg.: **As Shown / Midnight Simple Plaid**
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: **West Elm Heather Taylor Home Sophie Sofa**
Contract Grade
Solid oak and engineered wood frame
Solid oak legs
All wood is kiln-dried for added durability
Simple plaid upholstery - 53% cotton,
47" polyester
High-gauge sinuous springs
Seat cushion is foam and fiber filled,
Back cushion are fiber filler
Loose reversible cushions
82" W x 36' D x 30.25" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: **LIBRARY CR-101 (2)**

Total Quantity: **2**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	S2	Manufacturer:	Frontgate
Item Name:	Sofa (outdoor)	Rep:	
		Tel:	888.263.9850
Style/Series:	Isola Aluminum Sofa		
Product #:	171183 BLW		
Dimensions:	84-1/2" W x 33" D x 30-3/4" H		

Finishes: Black Walnut
 Frame:
 Plastic Laminate:

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Frontgate Isola Aluminum Sofa
 Generously proportioned seating
 Powder coated aluminum frame
 3/4"-inch-wide bands of all-weather wicker
 Curved and rounded seats and backs
 10-year structural warranty on frame
 84-1/2" W x 33" D x 30-3/4" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COVERED PORCH (4)

Total Quantity: **4**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **SH1**
 Item Name: Open Shelf

Manufacturer: ULINE
 Rep:
 Tel: 262.612.4200

Style/Series: Type 304
 Product #: H5479

Dimensions: 36" W x 18" D x 72" H

Finishes: Stainless Steel

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Uline Type 304 Stainless Steel Wire Shelving
 4 adjustable shelves
 Shelves adjust in 1" increments



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: MAINT. A-102 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	ST1	Manufacturer:	Global Furniture Group
Item Name:	Closed Storage Cabinet	Rep:	Gina Frazier
		Tel:	614.325.5888
Style/Series:	9300 Series Storage Cabinet	E:	gfrazier@globalfurniture.com
Product #:	9336P-S72L,W401,CW365,~STD,~GLO,BLK,~STD		

Dimensions: 36" W x 18" D x 72" H

Finishes: Black BLK 1

Upholstery Mfg.:

Pattern:

Color:

COM Yardage/Sq. Ft.:

Description: Global 9300 Series Storage Cabinet
 Standard Paint Finish
 Include Counterweight
 Looped Full Pull
 One Fixed Shelf, Three Adjustable
 36" W x 18" D x 72" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: MAINT. A-102 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	ST2	Manufacturer:	ULINE
Item Name:	Flammable Storage Cabinet	Rep:	
		Tel:	262.612.4200
Style/Series:	Yellow Safety Cabinet / Standard		
Product #:	H-1564M		
Dimensions:	43" W x 18" D x 65" H		
Finishes:	Yellow		

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: ULINE Standard Flammable Storage Cabinet
 Double wall 18-gauge steel
 Sloped shelves safely direct spills away from containers
 Recessed paddle handle
 Continuous piano hinge
 Adjustable leveling feet
 Meets NFPA, IFC and OSHA Standards
 43" W x 18" D x 65" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: MAINT. A-102 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **T1**
 Item Name: Table
 Style/Series: Round Table Top w/ Tubular X-Base
 Product #: R60 XTBO-1616
 Dimensions: 60" Dia.

Manufacturer: Enwork
 Rep: BLG / Lauren Carbaugh
 Tel: 614.787.5795
 E: Lauren@blgreps.com

Finishes:
 Frame: Metal: R Black
 Plastic Laminate: TBD (Standard options)

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Enwork 60" dia. table with tubular base
 Standard laminate with 3mm edge
 **Custom tubular 4-post base for
 54-60" dia. top**
 48" sq. w/ levelers
 Black base, PLam TBD



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COMMUNITY ROOM CR-100 (5)

Total Quantity: **5**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	T2	Manufacturer:	Pottery Barn
Item Name:	Coffee Table	Rep:	
		Tel:	1.888.779.5176
Style/Series:	Rustic Farmhouse Rectangular Coffee Table		
Product #:	SKU: 3578241		
Dimensions:	54" W x 28" D x 18" H		
Finishes:	Vintage Pine Finish		

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Pottery Barn Rustic Farmhouse Rectangular Coffee Table
 Made of solid spruce wood with a smooth finish and straight grain
 Kiln-dried wood helps prevent warping, splitting, cracking and developing mildew
 Adjustable levelers
 Contract Grade



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COMMUNITY ROOM CR-100 (2)
 LOBBY L-100 (1)

Total Quantity: **3**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	T3	Manufacturer:	Enwork
Item Name:	Conference Table	Rep:	BLG / Lauren Carbaugh
		Tel:	614.787.5795
Style/Series:	Boatshape top with tubular base	E:	Lauren@blgreps.com
Product #:	BT 3672 A N N TBD w/ (2) LHBR		
Dimensions:	36" D (24" on ends) x 72" W x 29" H		
Finishes:	PLam: TBD Metal: R Black		

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Enwork Boat Shape Conference Table Top
 36" D (24" on ends) x 72" W x 29" H
 3mm Edge
 (2) LHBR Bases
 Black base, PLam TBD



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: CONF. A-101 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **T4**
 Item Name: Work Table
 Style/Series: Tubular
 Product #: CR 24 60 A N TBD w/
 LTS242R (Pkg. of 2)
 Dimensions: 24" D x 60" W x 29" H
 Finishes: PLam: TBD
 Metal: R Black

Manufacturer: Enwork
 Rep: BLG / Lauren Carbaugh
 Tel: 614.787.5795
 E: Lauren@blgreps.com

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Enwork Work Table Rectangle/Square Edge
 24" D x 60" W x 29" H
 LTS242R (Pkg. of 2)
 3mm Edge
 PLam: TBD
 Black base



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: ADMIN. A-100 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	T5	Manufacturer:	Enwork
Item Name:	Work Table	Rep:	BLG / Lauren Carbaugh
Style/Series:	Tubular	Tel:	614.787.5795
Product #:	CR 24 60 A N TBD w/ LTS242R (Pkg. of 2)	E:	Lauren@blgreps.com
Dimensions:	24" D x 72" W x 29" H		
Finishes:	PLam: TBD Metal: R Black		

Upholstery Mfg.:
Pattern:
Color:
COM Yardage/Sq. Ft.:

Description: Enwork Work Table Rectangle/Square Edge
24" D x 72" W x 29" H
LTS242R (Pkg. of 2)
3mm Edge
PLam: TBD
Black base



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: ADMIN. A-100 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	T6	Manufacturer:	Pottery Barn
Item Name:	Dining Table	Rep:	
		Tel:	888.779.5176
Style/Series:	Malibu		
Product #:	5091743		

Dimensions: 40" Dia. x 29" H

Finishes: Black Powder Coat

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Pottery Barn Malibu 40" Dia. Round Dining Table
 Crafted from Aluminum, Hand finished in Black
 Powder coat
 Adjustable levelers
 40" Dia. x 29" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COVERED PORCH (2)

Total Quantity: **2**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	T7	Manufacturer:	West Elm
Item Name:	Coffee Table	Rep:	
		Tel:	888.922.4119
Style/Series:	Portside		
Product #:	7358686		

Dimensions: 50.5" W x 25" D x 18" H

Finishes: Color: Driftwood

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: West Elm Portside Outdoor Rectangle Coffee Table
 Airy, rectangular legs
 Moisture-resistant solid mahogany and solid eucalyptus wood with wire-brushed surface
 Made with FSC-Certified wood
 Finish: Driftwood
 50.5" W x 25" D x 18" H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COVERED PORCH (2)

Total Quantity: **2**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	T8	Manufacturer:	Pottery Barn
Item Name:	Dining Table	Rep:	
		Tel:	1.888.779.5176
Style/Series:	Malibu		
Product #:	5931034		

Dimensions: 76" L x 36" D x 30" H
103" Overall with (2) 13.5" Butterfly Leaves

Finishes: Black Powder Coat

Upholstery Mfg.:
Pattern:
Color:
COM Yardage/Sq. Ft.:

Description: Pottery Barn Malibu 76" Metal Extending
Rectangular Dining Table
Aluminum with black powder coat finish
Butterfly leaves fold into the table for storage
76" L x 36" D x 30" H
103" Overall with (2) 13.5"
butterfly leaves
Seats 6 comfortably
10 extended



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: COVERED PORCH (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **TB1**
 Item Name: Tack Board

Manufacturer: ULINE
 Rep:
 Tel: 262.612.4200

Style/Series: Fabric Bulletin Board
 Product #: H-7809

Dimensions: 4' W x 3' H

Finishes: Aluminum frame
 Charcoal Fabric

Upholstery Mfg.:
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Uline Fabric Bulletin Board
 Push pin or magnet (not included)
 Long-lasting fabric hides pin holes
 Aluminum frame
 High-density fiberboard back
 4' W x 3' H



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: ADMIN A-100 (1)

Total Quantity: **1**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **EL1**
 Item Name: Elliptical
 Style/Series: CE800
 Product #:

Manufacturer: Spirit
 Rep: Bryan Knapp / G&G Fitness
 Tel: 614.557.7965
 E: bknapp@livefit.com

Dimensions: 78" L x 24.2" W x 70.1" H

Finishes: N/A

Upholstery Mfg.: N/A
 Pattern:
 Color:

COM Yardage/Sq. Ft.:

Description: Spirit CE800 Elliptical
 Generator drive system requires no external power source
 Contact and wireless heart rate monitoring
 30 lb. flywheel and 40 levels of resistance
 Narrow 3.8" pedal spacing with 2-degree inversion angle
 Adjustable cooling fan, USB charging port and reading rack
 Intuitive display
 Ergonomic pedals
 Optimal stride length - 20"
 Max user weight capacity - 450 lbs.



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: WELLNESS W-100 (2)

Total Quantity: **2**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172**

May 8, 2023

Plan Tag: **TR1**
 Item Name: **Readmill**
 Style/Series: **CT800**
 Product #:
 Dimensions: **85" L x 35.8" W x 60.6" H**
 Finishes: **N/A**

Manufacturer: **Spirit**
 Rep: **Bryan Knapp / G& G Fitness**
 Tel: **614.557.7965**
 E: bknapp@livefit.com

Upholstery Mfg.: **N/A**
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: **Spirit CT800 Treadmill**
 Easy-to-read bright white multi-window LED console
 Direct speed and incline buttons save time
 Contact and wireless heart rate options (chest strap sold separately)
 Maintenance-free deck system provides hassle-free use
 Spacious 22" x 60" multi-ply commercial belt
 4.0 HP DC motor with Grade H insulation
 12 mph top speed, 15 levels of incline
 Adjustable fan, cell phone ledge, small storage tray, tablet-friendly rack, bottle holders, USB chargin port
 Max user weight capacity - 450 lbs.



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: **WELLNESS W-100 (2)**

Total Quantity: **2**



PRODUCT SPECIFICATION

Project Name / Number: **Cobblestone Manor / 22172** May 8, 2023

Plan Tag:	AT1	Manufacturer:	Prism Fitness
Item Name:	Self-Guided Com. Package	Rep:	Bryan Knapp / G& G Fitness
		Tel:	614.557.7965
Style/Series:	Self-Guided Com. Package	E:	bknapp@livefit.com
Product #:	400-150-131		
Dimensions:	70" W x 30" D x 90" H		
Finishes:	N/A		

Upholstery Mfg.: N/A
 Pattern:
 Color:
 COM Yardage/Sq. Ft.:

Description: Prism Fitness Smart Deluxe Self-Guided Commercial Pkg.
 Tower for well-rounded functional training workout
 Includes:
 6 med balls
 3 stability balls
 2 recovery rollers
 2 mats
 5 cables w/ handles



PRODUCT IMAGE MAY NOT REFLECT EXACT SPECIFICATIONS

Room/Quantity: WELLNESS W-100 (1)

Total Quantity: **1**

SECTION 14 24 23

HYDRAULIC PASSENGER ELEVATOR – MACHINE ROOMLESS

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Provide all labor, materials, equipment and services necessary to install two machine roomless, holeless oil hydraulic passenger type elevator. Install elevator systems as described with all needed accessories as required to provide a complete installation.

1.02 RELATED SECTIONS

- A. Refer to other sections of these specifications for related work which is not of this section, including electrical service for elevator systems, hoistway, pit and machinery enclosure with access, lighting, ventilation and services.

1. Section 05 50 00 - Metal Fabrications; pit ladder, divider beams, lintels for door support.
2. Division 23 - Heating, Ventilating, and Air Conditioning; ventilation and temperature control.
3. Division 26 - Electrical; electrical service to main disconnect for elevator including electrical power for elevator installation and testing; electrical service for machine, machine closet and pit GFIC convenience outlets; non-GFIC outlet dedicated for sump pump, lighting in elevator pit; wiring for telephone service. If electrical requirements differ from those indicated on the Electrical Drawings, the Elevator Supplier must pay the Electrical Contractor for costs to accommodate this change. Power changes should be brought to the Architect's attention during bidding for inclusion in an Addendum.
4. Division 26 - Fire Alarm Systems; fire and smoke detectors and interconnecting devices; fire alarm signal lines to contacts in the machine room.
5. Division 26 - Telephone System wiring to machine room.
6. Division 28 – Access control provisions.

- B. Electrical Contractor: Provide the following:

1. A fused disconnect switch or circuit breaker per the National Electrical Code with feeder or branch wiring to controller. Size to suit elevator Contractor.
2. A 120 volt A.C., single phase power supply with fused SPST disconnect switch with feeder wiring to each controller for car lights.
3. Convenience outlet and light fixture in pit with switch located adjacent to the access door.

4. Heat or smoke or products of combustion sensing devices, located as indicated with wiring from the sensing devices to elevator controller.
5. Telephone system.

1.03 QUALITY ASSURANCE

A. Manufacturer

1. Regularly engaged in designing, engineering, manufacturing, installing and servicing elevators of the type and character specified.
2. Have a history, during the last ten (10) years, of not less than 50 successful installations and satisfied Owners where continuous maintenance service was performed. Such history to be fully documented, upon request, listing project name, date of installation, address, architect, owner, name and phone number of owner's facilities manager or maintenance superintendent.
3. Provide evidence that a service office with qualified service personnel is located within 50 miles of the installation and warehouse parts is maintained within 50 miles. Where service facilities are further than the specified distances, manufacturer to provide response time of not more than 1-1/2 hours to request of service.

B. Installer: Manufacturer or an authorized agent of the manufacturer with not less than 5 years of successful experience installing similar elevators.

C. Handicapped Provisions: Comply with National Elevator Industry Inc. (NEII) "Suggested Minimum Passenger Elevator Requirements for the Handicapped", and A.D.A. requirements, including clearances, handrails, locations for signal equipment and similar provisions.

D. Codes and Standards: Perform all work in accordance with the American National Standard Safety Code for Elevators, Dumbwaiters, Escalators and Moving Walks (ANSI A17.1), the National Electrical Code and the OBC.

E Regulatory Requirements

1. ASME A17.1 Safety Code for Elevators and Escalators, latest edition or as required by the local building code.
2. OBC.
3. NFPA 70 National Electrical Code.
4. NFPA 80 Fire Doors and Windows.
5. Americans with Disabilities Act - Accessibility Guidelines (ADAAG).

F. Fire-rated entrance assemblies: Opening protective assemblies including frames, hardware and operation shall comply with ASTM E152, UL 10B and NFPA Standard 80. Provide entrance assembly units bearing UL Class B labels.

G. Obtain and pay for all required permits, inspections and fees. Arrange for and make required inspections and tests. Obtain certificates and operating permits and

turn over to Owner upon acceptance of work.

1.04 SUBMITTALS

- A. Product Data: Submit manufacturer's product specifications and installation instructions for each principal component or product, and include certified test reports on required testing. List and describe features of the control system, performances and operating characteristics.
- B. Shop Drawings: Submit plans, elevations and details of car enclosures and hoistway entrances. Include:
 - 1. A comparison of maximum loads imposed on the building structures at points of support and all similar considerations of the elevator work.
- C. Maintenance Manuals: Submit bound maintenance manual for each elevator or type of elevator with operating and maintenance instructions, parts listing, recommended parts inventory listing, purchase source listing, emergency instructions and similar information.
- D. Samples: Submit samples of exposed finishes of car enclosures, hoistway entrances, and signal equipment; 8" squares of materials and 12" lengths of running materials.
- E. Inspection certificates and operating permits required by governing authorities to allow normal, unrestricted use of elevator.
- F. Deliver permit to operate elevator to Architect.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Do not deliver materials to the site until areas in which they are to be installed are ready to receive them in place for final installation.
- B. Wrap, carton and crate factory finished materials in a manner to protect finishes.
- C. Store, protect and handle materials in accordance with manufacturer's recommendations to prevent damage, soiling or deterioration.
- D. Fully protect movable and operating equipment from weather damage.

1.06 PROJECT CONDITIONS

- A. Painting
 - 1. Paint all equipment that is not factory finished.
 - 2. Provide all ferrous metals installed in the hoistway shop primed with a rust inhibitive primer.

B. Temporary Use

1. Provide all necessary protection to prevent damage to each elevator used for construction purposes before Substantial Completion.
2. Provide temporary enclosures, coverings, guards, barriers and other devices required to protect the elevator car enclosures, hoistway entrances, signal fixtures and related materials, components and finishes from damage. Protective materials, methods and procedures shall be approved by the elevator manufacturer and paid for by the user.
3. Maintenance during use, including cleaning, lubricating and adjusting equipment and components for proper elevator operation shall be performed only by the elevator manufacturer. Cost for maintenance shall be paid by the user.
4. Elevators shall be free of damage or deterioration at time of Substantial Completion. Cost to repair damaged materials and finishes and replace worn or defective components to restore elevators to their original condition shall be paid by the user.

1.07 MAINTENANCE

- A. Provide full preventative maintenance for a period of one year beginning on the date of final acceptance of work.
1. Frequency: Regular and systematic inspections not less than once every other week.
 2. Duration: One hour per visit.
 3. Personnel: Competent and trained employees of the elevator manufacturer.
 4. Maintenance: Includes necessary adjustments, greasing, oiling, cleaning, supplies and parts to keep equipment in proper operation, except such parts made necessary by misuse, accidents or negligence not caused by the manufacturer.
 5. Work Period: Perform all work during regular working hours of the manufacturer's maintenance personnel.
- B. Maintenance Service: To be performed solely by the successful elevator manufacturer and not assigned or transferred to any agent or subcontractor.
- C. Provide twenty-four hour emergency callback service as part of the maintenance service. If passenger entrapment is involved, a 45 minute response time is required on callbacks.
- D. Contractor to have a service office and full-time service personnel within a 50 mile radius of project site. Service office shall have been functioning with full-time personnel for a minimum period of 5 years before the bid date. Two competent, trained employees of the contractor must live within the 50 mile radius.

1.09 WARRANTY

- A. Provide special project guaranty, signed by the Contractor, Installer and Manufacturer, agreeing to replace/repair/restore defective materials and workmanship of the elevator work for a period of one year after date of completion.
- B. "Defective" is hereby defined to include, but not be limited to, operation or control system failures, performances below required minimums, excessive wear, unusual deterioration or aging of materials or finishes, unsafe conditions, the need for excessive maintenance, abnormal noise or vibration, and similar unusual, unexpected and unsatisfactory conditions.
- C. Repairs to be made at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 GENERAL DESCRIPTION

- A. Basis of Design: This specification is based on Hydrofit Elevator by OTIS
- B. Similar products/models by other manufacturers are acceptable providing they meet the requirements specified herein and include in their scope all changes to building physical dimensions or electric service beyond what is indicated on the drawings. THYSSEN/KRUPP or SCHINDLER may be bid provided they meet all detailed requirements of the following specification. Any deviation from these specifications shall be brought to the Architect's attention during bidding.
- C. Elevator 1: Description
 - 1. Type: Roomless Oil hydraulic cylinder type with holeless cylinder.
 - 2. Capacity: 3,500 lbs.
 - 3. Car Speed: 100 fpm.
 - 4. Operation: Simplex collective.
 - 5. Travel: As indicated.
 - 6. Stops: 3.
 - 7. Openings: 3 front.
 - 8. Opening Size: 3'-6" x 7'.
 - 9. Car - Clear Inside: 6' - 5•9/16" wide x 5' – 5•9/16" deep by 7'-9".
 - 10. Power Supply: 480 V, 3 phase 60 Hz.
 - 11. Priority Dispatching Floor: 1st floor.
- D. Elevator 2: Description
 - 1. Type: Roomless Oil hydraulic cylinder type with holeless cylinder.
 - 2. Capacity: 4,500 lbs.
 - 3. Car Speed: 100 fpm.
 - 4. Operation: Simplex collective.
 - 5. Travel: As indicated.
 - 6. Stops: 3.
 - 7. Openings: 3 front.
 - 8. Opening Size: 4'-0" x 7'.

9. Car - Clear Inside: 5' - 5•9/16" wide x 7' – 10•15/16" deep by 9'-9".
10. Power Supply: 480 V, 3 phase 60 Hz.
11. Priority Dispatching Floor: 1st floor.

2.02 MATERIALS, GENERAL

- A. Colors, patterns, and finishes: As selected by the Architect from manufacturer's full range of standard colors, patterns, and finishes.
- B. Steel
 1. Shapes and Bars: ASTM A 36.
 2. Sheet: ASTM A 366, cold-rolled steel sheet, commercial quality, Class 1, matte finish, stretcher leveled.
 3. Finish: Factory-applied baked enamel.
- C. Stainless Steel
 1. Shapes and Bars: ASTM A 276, Type 304 (18-8).
 2. Tubing: ASTM A 269, Type 304 (18-8).
 3. Finish: NAAMM No. 4 satin finish.
- D. Aluminum
 1. Sheet and Plate: ASTM B 209, alloy 6063-T52.
 2. Extrusions: ASTM B 221, alloy 6063-T52.
 3. Finish: NAAMM, clear anodized AA M10C22A31.
- E. Nickel Silver: ASTM B 151 extrusions, alloy UNS No. C74500, polished finish.
- F. Plastic Laminate: Decorative high-pressure type, complying with NEMA LD3, Type GP-50 General Purpose Grade, nominal 0.050" thickness.
 1. Color/Pattern: As selected by Architect from plastic laminate manufacturer's complete line.

2.03 HOISTWAY EQUIPMENT

- A. Platform: Fabricated frame of formed or structural steel shapes, gusseted and rigidly welded with a wood subfloor. Underside of the platform shall be fireproofed.
- B. Sling: Steel stiles affixed to a steel crosshead and bolstered with bracing members to remove strain from the car enclosure.
- C. Guide Rails: Steel; fastened to the building with steel brackets.
- D. Guide Shoes: Mounted on top and bottom of the car and be held in contact with the guide rail by adjustable devices.

- E. Buffers: Provide substantial buffers in the elevator pit. Mount buffers on continuous channels fastened to the elevator guide rail or securely anchored to the pit floor. Provide extensions if required by project conditions.
- F. Twin Telescoping Jacks: Units of sufficient size to lift the gross load to the height specified. Factory test jack to insure adequate strength and freedom from leakage. Brittle material, such as gray cast iron, is prohibited in the jack construction. Jack unit shall consist of the following components:
 - 1. Two heavy seamless steel tubing plungers accurately turned and polished.
 - 2. Stop ring shall be electrically welded to the plunger to positively prevent plunger leaving the cylinder.
 - 3. Packing or seal of suitable design and quality.
 - 4. Drip ring around cylinder top.
 - 5. Cylinder made of steel pipe and provided with a pipe connection and air bleeder.
 - 6. Jack synchronization: The two plungers shall resynchronize periodically by microprocessor based controls to ensure smooth, accurate performance.
- G. Automatic Terminal Limits: Place electric limit switches in the hoistway near the terminal landings. Limit switches shall be designed to cut off the electric current and stop the car if it runs beyond either terminal landing.
- H. Leveling Device: Provide elevator with an automatic leveling device which will bring the car to a stop within 1/4" of landing level regardless of load or direction of travel. Landing level will be maintained within the leveling zone irrespective of the hoistway doors being opened or closed.
- I. Failure Protection: Design electrical control circuit so if a malfunction occurs, due to motor starter failure, oil becoming low in the system, or the car failing to reach a landing in the up direction within a pre-determined time, the elevator car will automatically descend to the lowest terminal landing. If power operated doors are used, the doors will automatically open when the car reaches that landing to allow passengers to depart. The doors will then automatically close and all control buttons, except the "door open" button in the car station, shall be made inoperative.
- J. Wiring, Piping, and Oil: Provide all necessary hoistway wiring in accordance with the National Electrical Code. All necessary pipe and fittings shall connect the power unit to the jack unit. Provide proper grade oil.

2.04 POWER UNIT

- A. Power Unit (Oil Pumping and Control Mechanism): A self-contained unit consisting of the following items:
 - 1. Oil reservoir with tank cover and controller compartment with cover.
 - 2. An oil hydraulic pump.

3. An electric motor.
 4. Oil control unit with the following components built into single housing; high pressure relief valve, check valve, automatic unloading up start valve, lowering and leveling valve, and magnetic controller.
- B. Pump: Positive displacement screw type to give smooth operation, especially designed and manufactured for elevator service.
- C. Drive: Drive shall be by direct coupling with the pump and motor submerged in the oil reservoir or by multiple V-belts and sheaves of number and size to insure maximum factor of safety. Drive type shall be determined based primarily on the load on the car, travel, and speed.
- D. Motor: Standard manufacture motor specifically designed for oil-hydraulic elevator service. Duty rating shall comply with specified speeds and loads.
- E. Oil Control Unit: The following components shall be built into a single housing. Welded manifolds with separate valves to accomplish each function are not acceptable. Adjustments shall be accessible and be made without removing the assembly from the oil line.
1. Relief valve shall be externally adjustable and be capable of bypassing the total oil flow without increasing back pressure more than 10 percent above that required to barely open the valve.
 2. Up start and stop valve shall be externally adjustable and designed to bypass oil flow during start and stop of motor pump assembly. Valve shall close slowly, gradually diverting oil to or from the jack unit, ensuring smooth up starts and up stops.
 3. Check valve shall be designed to close quietly without permitting any perceptible reverse flow.
 4. Lowering valve and leveling valve shall be externally adjustable for drop-away speed, lowering speed, leveling speed and stopping speed to ensure smooth "down" starts and stops. The leveling valve shall be designed to level the car to the floor in the direction the car is traveling when slowdown is initiated.
- F. Power controller shall contain electrical contactors, electro-mechanical switches and thermal overload relays. Mount components in a NEMA 1 enclosure. Logic control system shall be microprocessor based and protected from environmental extremes and excessive vibrations.
- G. Reduced Voltage Starting: Provide a solid state starter to limit current inrush during starting and to provide gradual acceleration of the motor. Motor starting shall not be initiated by mechanical contacts. Starter shall include a current limit adjustment range of 200 percent to 450 percent of the overload adjustment range. Provide an integral fault detection and diagnostic system.

2.05 HOISTWAY ENTRANCES

- A. Doors and Frames: Provide complete hollow metal type hoistway entrances at each hoistway opening.
 - 1. Manufacturer's standard entrance design, bearing Underwriters' Laboratories "B" labels, and consisting of 14 gauge frames with 2 inch profile, 16 gauge doors, hangers, hanger supports, hanger covers, fascia plates, sight guards, and necessary hardware.
 - 2. Elevator wall interface with hoistway entrance assembly shall comply with elevator manufacturer's requirements.
 - 3. Doors: Flush construction.
 - a. Stainless steel: ASTM A 167, Type 304 stainless steel panels, No. 4 satin finish.
 - 4. Frames: Formed construction.
 - a. Stainless steel: ASTM A 167, Type 304 formed stainless steel sheet, No. 4 satin finish.
 - b. Provide oversized frame throat where required from interior to exterior face of shaft wall.

- B. Interlocks: Equip each hoistway entrance with an Underwriters' Laboratories "B" label approved type interlock tested as required by code. Design interlock to prevent operation of the car away from the landing until the doors are locked in the closed position as defined by code and prevent opening the doors at any landing from the corridor side unless the car is at rest at that landing or is in the leveling zone and stopping at that landing.

- C. Door Hanger and Tracks: Provide sheave type two point suspension hangers and tracks for each hoistway sliding door.
 - 1. Sheaves: Polyurethane tires with ball bearings properly sealed to retain grease.
 - 2. Hangers: Provide an adjustable slide to accommodate the up-thrust of the doors.
 - 3. Tracks: Drawn steel shapes, smooth surface and shaped to conform to the hanger sheaves.

- D. Hoistway Sills: Extruded, with grooved surface, 1/4 inch thickness.
 - 1. Nickel-silver: ASTM B 151 nickel silver, alloy UNS C74500, polished finish.

2.06 CAR ENCLOSURE

- A. Car Enclosure
 - 1. Walls: Reinforced 16 gauge cold-rolled steel with two coats factory applied baked enamel finish, with applied wood core panels covered on both sides with high pressure plastic laminate. Provide manufacturers premium selections.
 - 2. Canopy: Reinforced 14 gauge cold-rolled steel with hinged exit. Finish:

- Two coats factory applied reflective baked enamel.
3. Ceiling: Downlight type, 16 gauge metal pans with LED downlights suspended and dimmer switch 7'-4" above the finished floor. Number of downlights shall be dependent on platform size with a minimum of six.
 - a. Metal pans: Stainless steel, No. 4 satin finish.
 4. Cab Columns, Front, and Transom: Stainless steel, No.4 satin finish.
 5. Doors: Horizontal sliding car doors reinforced with steel for panel rigidity. Hang doors on sheave type hangers with polyurethane tires that roll on a polished steel track and are guided at the bottom by non-metallic shoes sliding in a smooth threshold groove.
 - a. Door Finish: Stainless steel, No.4 satin finish.
 6. Handrail: Continuous flat bar handrail with ends curved to the wall, stainless steel satin finish, lacquered. Provide at rear/side walls only.
 7. Ventilation: Two speed exhaust fan mounted on the car top.
 8. Pad Buttons: Provide pad buttons on cab front(s) and walls.
 - a. Provide one set of vinyl protection pads for the project.
 9. Base: Stainless steel satin finish.
 10. Finished Floor: TBD. Provide subfloor for future finished floor.
- B. Car Top Inspection: Provide a car top inspection station with an "emergency stop" switch and constant pressure "up-down" direction buttons to make the normal operating devices inoperative and give the inspector complete control of the elevator. Mount the car top inspection station in the door operator assembly.

2.07 DOOR OPERATION

- A. Door Operation: Provide a direct current motor driven heavy duty operator designed to operate the car and hoistway doors simultaneously. Door movements shall be electrically cushioned at both limits of travel and the door operating mechanism shall be arranged for manual operation in event of power failure.

Doors shall automatically open when the car arrives at the landing and automatically close after an adjustable time interval or when the car is dispatched to another landing. Direct drive geared operators, AC controlled units with oil checks, or other deviations are not acceptable.

1. No Un-Necessary Door Operation: Car door shall open only if the car is stopping for a car or hall call, answering a car or hall call at the present position or selected as the next car up.
2. Door Open Time Saver: If a car is stopping in response to a car call assignment only (no coincident hall call), the current door hold open time is changed to a shorter field programmable time when the electronic door protection device is activated.

3. Double Door Operation: When a car stops at a landing with concurrent up and down hall calls, no car calls, and no other hall call assignments, the car door opens to answer the hall call in the direction of the car's current travel. If an onward car call is not registered before the door closes to within 6 inches of fully closed, the travel will reverse and the door will reopen to answer the other call.
- B. Electronic Passenger Sensing Device with Nudging: Provide at each entrance a solid state electronic detector and an electro-mechanical reversal edge as follows:
1. After a stop is made, doors shall remain open for an adjustable time interval. Closing may be initiated instantaneously by registration of a car call, operation of load weighing device or signal from the service demand integrator.
 2. Doors will remain open as long as the electronic detector senses the presence of a passenger or object in the door opening. If door movement is obstructed for a predetermined time, a buzzer will sound and doors will close at a reduced speed. If the reversal edge contacts a person or object while closing, doors will immediately stop and resume closing after the obstruction has been removed.
 3. Electronic Passenger Sensing Device (Light Ray Device)
 - a. Provide infra-red light ray device in elevator car entrance. Provide complete, operational system.
 - 1) Light Curtain: Minimum 40 beam, evenly spaced from floor to 6'-0" above floor.
 - 2) Control Module: Top of car mounting.
 - 3) Transmitter: Mounted in housing on left or right door jamb.
 - 4) Receiver: Mounted in housing on door jamb opposite transmitter.
 - 5) Housing: Gage as recommended by manufacturer.
 - 6) Electrical: 110 VAC 6VA.

2.08 CAR OPERATING STATION

- A. Car Operating Panel: Flush mounted stainless steel panels, containing call button for each landing served, and containing other buttons, switches and controls required for specified car operation and control.
1. Access Control: Coordinate and integrate reader operation system with Division 28.
 2. Include, but not limited to, emergency lighting and alarm bell, key operated stop switch, key operated lights and key operated single-speed fan switch, key operated car top inspection switch, key operated independent service key switch, and all necessary safety functions and firefighter service and code required functions.
 3. All key switches are to bekeyed in accordance with Owner's finish hardware master keying system. See Section 08 71 10
 4. Stainless Steel Panel Finish: #4 satin.
 5. Provide operating device symbols as required by code. Mark other buttons

and switches with manufacturer's standard identification, including Braille next to buttons, for required use or function.

6. Mount controls at height complying with ANSI A117.1 requirements for handicapped.
 7. Provide illuminated buttons, which light up when activated and remain illuminated until call or other function has been fulfilled. Provide non-illuminated buttons with brushed stainless steel finish.
- B. "Hands Free Communication": Push button activated, vandal resistant in a speaker/microphone enclosure complying to A.D.A. requirements.
- C. In-Car Travel Direction Lanterns: Mounted in car entrance jamb visible from corridor. Illuminates to indicate direction of car travel. Provide with chime which sounds once for "UP" direction and twice for "DOWN" direction as doors are opening.
- D. Position Indicator: An electronic dot matrix position indicator mounted in a module matching the control panel. As the car travels, its position in the hoistway shall be indicated by the illumination of the alpha/numeric character corresponding to the landing which the elevator is stopped or passing.
- E. Emergency Light: An emergency light and capacity plate shall be integrated into a module. Emergency light shall illuminate automatically upon loss of the building's normal power supply.

2.09 CAR OPERATION SYSTEM

- A. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
- B. Emergency Power: In the event of a normal power supply failure, the elevator system shall be arranged to lower from an emergency power supply. The emergency power supply shall consist of a battery furnished by the elevator contractor. The elevator contractor shall provide circuitry so after normal power failure and establishment of emergency power, each elevator shall lower to a field adjustable return landing and park with the doors closed. If the designated return landing is above the current position, the elevator shall run down to the next lower landing and park with the doors closed.

2.10 HALL STATIONS

- A. Hall Stations, General: Illuminated buttons indicating a call has been registered at that floor for the indicated direction. Faceplates shall be No. 4 satin finish stainless steel. Provide one set of risers.
1. Each terminal station shall contain one illuminating pushbutton.
 2. Phase 1 firefighters service keyswitch, with instructions, shall be incorporated into the hall station at the designated level.

- B. Floor Identification Pads: Provide door jamb pads at each floor. Jamb pads shall comply with Americans with Disabilities Act (ADA) requirements.

2.11 MISCELLANEOUS ELEVATOR COMPONENTS

- A. Oil Hydraulic Silencer: Install an oil hydraulic silencer (muffler device) at the power unit location. Silencer shall contain pulsation absorbing material inserted in a blowout proof housing arranged for inspecting interior parts without removing unit from oil line. Rubber hose without blowout proof features will not be acceptable.
- B. Vibration Pads: Mount vibration pads under the power unit assembly to isolate the unit from the building structure.
- C. Sound Insulating Panels: When pump and motor are not submerged, provide panels manufactured of reinforced 14 gauge steel with 1 inch thick 1-1/2 pound fiberglass core attached to interior and mounted on all four open sides of the power unit frame.
- D. Sound Isolating Couplings: When pump and motor are not submerged, install a minimum of two couplings in the oil line in the machine room between pump and jack.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install elevators as specified in accordance with all governing codes, manufacturer's written direction and ANSI A17.1.
- B. Lubricate all equipment in accordance with manufacturer's written instructions.

3.02 CLEAN-UP

- A. Remove all unused materials and leave cab and all related areas clean.

3.03 DEMONSTRATION

- A. Instruct Owner's personnel in proper use, operations, and daily maintenance of elevators. Review emergency provisions, including emergency access and procedures to be followed at time of failure in operation and other building emergencies. Train Owner's personnel in normal procedures to be followed in checking for sources of operational failures or malfunctions.
- B. Make a final check of each elevator operation, with Owner's personnel present, immediately before date of substantial completion. Determine that control systems and operating devices are functioning properly.

END OF SECTION

SECTION 14 91 82

TRASH CHUTES

PART 1 GENERAL

1.01 DESCRIPTION

- A. This section specifies gravity trash chutes complete and ready for operation.

1.02 RELATED SECTIONS

- A. Firestopping: Section 07 84 00.
- B. Plumbing: Division 22

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, Shop Drawings, Product Data, and Samples.
- B. Complete layout drawings of system, including detail drawings of load stations, roof vent, discharge openings, riser anchoring and electrical riser.
- C. Shop Drawings of Fabricated Equipment and Manufacturer's Literature and Data:
Submit as one package:
 - 1. Gravity Chute
 - 2. Roof Vents
 - 3. Flushing Head/Ring
 - 4. Gravity Chute Loading Stations
 - 5. Discharge Openings with Automatic Fire Damper
 - 6. Door Locks
- D. Manufacturer's certificate stating that the loading and discharge doors and frames meet the requirements of Underwriter's Laboratory, Inc. for the fire rating specified.

1.04 QUALITY ASSURANCE

- A. Criteria
 - 1. Manufacturer regularly and presently manufactures the item submitted as one of their principal products.
 - 2. There is a permanent service organization maintained or trained by the manufacturer which will render satisfactory service to this installation within eight (8) hours of receipt of notification that service is requested.

3. Installer, or supplier of a service, has technical qualifications, experience, and trained personnel and facilities to perform the specified work. A minimum of three (3) years of experience in the installation of gravity chutes.
4. Manufacturer's system has been in satisfactory operation on two (2) installations similar to this system for at least two (2) years. Provide names of these facilities and contact information.

B. Product Criteria

1. Multiple Units: When two (2) or more units of the same type or class of materials or equipment are required, these units are products of one manufacturer.
2. Assembled Units: Manufacturers of equipment assemblies, which use components made by others, assume complete responsibility for the final assembled product.
 - a. All components of an assembled unit need not be products of the same manufacturer, but component parts which are alike are the products of a single manufacturer.
 - b. Components are compatible with each other and with the total assembly for the intended service.
3. Nameplates: Nameplate bearing manufacturer's name or identifiable trademark securely affixed in a conspicuous place on equipment or name or trademark cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.

C. Design Criteria

1. The information shown on the contract drawings is intended to establish basic requirements of the system. Within these limitations, the Contractor is responsible for the final design of the gravity chute and to make whatever modifications of, and additions to the drawings, as may be required to fulfill the performance requirements.
2. Contractor is responsible for coordination of chute drawings and installation with all other building systems.

D. Transport trash in plastic bags.

E. Employee Instructions: Provide a qualified representative possessing complete knowledge of system and equipment to train employees in operation and maintenance of system. Training period shall be as follows:

1. Four (4) hours instructing maintenance personnel on the operation and maintenance of system.
2. In addition to verbal instruction, furnish written instructions in triplicate relative to care, adjustment, and operating of all parts of equipment in independently bound folders. Written instructions shall include complete, correct, and legible wiring diagrams, complete and comprehensive sequence of operations, complete parts lists with descriptive literature and identifications, diagrammatic cuts of equipment and parts.

1.05 MAINTENANCE SERVICE

- A. Furnish inspection and maintenance service on all chute equipment for a period of one (1) year after Substantial Completion. This service shall consist of examination by competent trained and qualified mechanic; cleaning, oiling, greasing, adjustments and replacement of any parts required to place equipment in proper working order, (except for parts requiring replacement due to improper use, accidents or operator negligence). Maintenance is to be preformed monthly.

1.06 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. National Fire Protection Association (NFPA):
 - 1. 80-2010: Fire Doors and Fire Windows
 - 2. 82-2009: Incinerators, Waste and Linen Handling Systems and Equipment
 - 3. 90A-2012: Installation of Air-Conditioning and Ventilating Systems
- C. American Society for Testing and Materials (ASTM):
 - 1. A176: Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
 - 2. A463: Steel Sheet, Cold-Rolled, Aluminum-Coated, Type 1 and Type 2
 - 3. A653: Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip process, Commercial Quality
- D. Underwriter's Laboratories (UL):
 - 1. 555-2006: Safety Fire Dampers

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Subject to requirements with the specified requirements, provide chutes systems manufactured by AMERICAN CHUTE SYSTEM, WILKINSON-HI-RISE or MIDLAND CHUTES.

2.02 GRAVITY CHUTE

- A. Risers
 - 1. 24 inch diameter tubes, constructed of (16 gauge) aluminized steel conforming to ASTM A463.
 - 2. Chute parts extending above-roof shall conform to ASTM A176, Type 430 stainless steel.

3. Provide slip type expansion joints in chute risers between floors, upper section telescoping into section below.
 4. Support chutes by frames and fasteners at each floor to prevent sound transmission to the floor slab as recommended by manufacturer. Weld and dress smooth connection joints between vertical shafts and horizontal intakes with no projections that may catch or tear the trash bags.
 5. Provide factory applied sound insulation with sprayed on sound deadening material.
 6. Gravity chute shall meet the NFPA 82 requirements.
 7. Vent: Extend full chute diameter a minimum of four feet above roof level. Cap roof vent to prevent rain from entering chute and allow for the circulation of air within the chute riser.
 8. Equipment Access: Fabricate chutes with access for maintaining equipment located with the chute, such as flushing and sanitizing units, fire sprinklers and plumbing and electrical connections.
- B. Provide Chute Fire Damper at Discharge Opening as indicated on drawings.
1. The base of the gravity chute shall terminate with a discharge opening with a fire damper that carries the UL (1-1/2 hour 250 degrees F) "B" label, covering size, design and construction of gate, frame and closing mechanism. Dampers shall conform to UL 555
- C. Provide Gravity Chute water, disinfecting and sanitizing device as indicated on drawings:
1. Equip chute at with flushing spray heads designed to wash the inside of chute. Equip chutes with one-inch inside pipe size chrome plated brass flushing spray head, at four feet above the highest intake door, and with a 1/2 inch inside pipe size, chrome plate brass sprinkler head located at discharge door at every second intake door.
 2. Contractor shall provide all necessary fittings to water supply piping to connect the disinfecting and sanitizing device to the plumbing system.
 3. Sanitizing Unit: Disinfecting and sanitizing spray head unit located in chute above highest intake door, including 1-gal. tank and adjustable proportioning valve with bypass for manual control of sanitizing and flush operation, ready for hot-water piping connection, and with access for head and piping maintenance.

2.03 GRAVITY CHUTE LOADING STATIONS

- A. Fabricate loading station of 16 gauge stainless steel. Station shall consist of the intake door mounted in a single face plate. The intake door shall have pivot type hinges ADA compliant, self latching lever, and be located as indicated on drawings.
- B. Intake doors shall carry the UL (1-1/2 hour 250 degrees F) "B" label, covering size, design and construction of the door, frame, latching, and closing mechanism.

Fabricate door of stainless steel and provide self-closing and self-latching devices. Door size shall be a minimum of 15-inch wide by 18-inch high, bottom hinged with cylinder lock. Install door frame flush with finished wall.

1. Each intake door shall have an indicator showing when the door is locked.
 2. Clearly letter on the intake door in letters approximately one-inch high, the word "TRASH". Raise or incise letters in door face in permanent manner. Raised lettering shall be metal or plastic with metal attachment.
 3. Provide cylinder locks, keyed the same, for all load stations. Furnish 15 keys for each chute. Stamp the letters "TRASH CHUTE KEY" on each key tag to identify location of use.
- C. Provide intake and shroud doors with electric interlocking mechanism to permit only one door in a riser to be opened at a time.
- D. The shroud shall be no less than 45⁰ angle, but shall be 60⁰ when possible.
- E. Access Door to be 15 inches by 15 inches, with an UL (1-1/2 hour 250 degree F) "B" label, located where indicated on drawings.
1. Provide hand-operated latch release device.
 2. Provide anchors for door frame of type to suit material of wall in which they are installed.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Gravity Chute Loading Stations:
1. Set station flush with adjacent surface.
 2. Attach face plate to supports with stainless steel screws.
- B. Hangers: Provide supports at each floor line and at the roof line.
- C. Automatic Fire Dampers: Shall conform to UL 555 and NFPA 82.
- D. Protection: Protect all finish parts of equipment, such as shafts and bearing where accessible, from rust prior to operation by means of protective grease coating and wrapping. Close pipe openings with caps or plugs during installation. Cover and protect equipment against dirt, water, and chemical or mechanical injury. Clean all exposed surfaces and components at completion of all work.

3.02 TESTS

- A. Demonstrate entire system will with fully loaded waste bags and that it operates as specified. Demonstrate operation of fire damper at discharge opening.
- B. Architect and Owner's Representative shall witness the system testing and final inspection.

END OF SECTION