

SECTION 01 02 00 - CONTRACT – LIST OF DRAWINGS

PART 1 - GENERAL

1.1 GENERAL CONDITIONS

- A. See Modified AIA Document A201.

1.2 SPECIFICATIONS

- A. Titles to Divisions and paragraphs in these specifications and in the notes on the drawings are introduced for convenience, and shall not be taken as an exact, correct or complete segregation of materials and labor.
- B. No responsibility is assumed by the Architect and Owner for omissions or duplications by the Contractor or his subcontractors due to real or alleged error in arrangement of matter in this specification or in notes on the drawings.
- C. Latest revisions of Federal, State and ASTM Specifications shall be used where only the specification number without date or revision number is given in specifications.
- D. The omissions from the plans and/or specification of express reference to any labor, equipment, system, assembly to make such system/assembly operational or materials reasonably to be inferred therefrom and necessary for the proper execution of the work shall not relieve the Contractor or Subcontractor from furnishing them of a kind in keeping with the general character of the work.

1.3 DRAWINGS

- A. List of Drawings:

GENERAL

G000	COVER
G001	ABBREVIATIONS & SYMBOLS
G002	UL RATED PENETRATIONS

CIVIL

C001	GENERAL NOTES AND LEGEND
C100	EXISTING CONDITIONS AND SITE PREP PLAN
C200	SITE PLAN
C300	UTILITY PLAN
C400	GRADING AND DRAINAGE PLAN
C500	SITE/CIVIL DETAILS
C501	RHODE ISLAND STANDARD DETAILS
C502	SITE/CIVIL DETAILS

LANDSCAPE

LA1.0	LANDSCAPE PLAN OVERVIEW
LA2.0	LANDSCAPE PLANTING PLAN
LA3.0	LANDSCAPE DETAILS

ARCHITECTURAL

A010	CODE REVIEW
A030	WALL CONSTRUCTION TYPES
A031	ROOF & FLOOR CONSTRUCTION TYPES
D100	DEMOLITION SITE PLANS
D101	DEMOLITION FLOOR PLANS
A100.1	OVERALL FIRST FLOOR PLAN
A100.2	OVERALL SECOND FLOOR PLAN
A101.1	PARTIAL FIRST FLOOR PLAN – A
A101.2	PARTIAL FIRST FLOOR PLAN – B
A101.3	PARTIAL FLOOR PLAN – CLERESTORIES
A102.1	PARTIAL SECOND FLOOR PLAN – A
A102.2	PARTIAL SECOND FLOOR PLAN – B
A103	OVERALL ROOF PLAN
A103.1	PARTIAL ROOF PLAN – A
A103.2	PARTIAL ROOF PLAN – B
A200	EXTERIOR ELEVATIONS
A300	ENLARGED PLANS
A301	ENLARGED PLANS
A400	BUILDING SECTIONS
A410	WALL SECTIONS
A411	WALL SECTIONS
A412	WALL SECTIONS
A500	EXTERIOR DOOR DETAILS
A501	EXTERIOR WINDOW DETAILS
A502	EXTERIOR DETAILS
A503	TYPICAL ROOF DETAILS
A600.1	OVERALL FIRST FLOOR REFLECTED CEILING PLAN
A600.2	OVERALL SECOND FLOOR REFLECTED CEILING PLAN
A601.1	PARTIAL FIRST FLOOR RCP – BASIS OF DESIGN a
A601.2	PARTIAL FIRST FLOOR RCP – ALTERNATE BID ITEM – A
A601.3	PARTIAL FIRST FLOOR RCP – ALTERNATE BID ITEM – B
A602.1	PARTIAL SECOND FLOOR RCP – A
A602.2	PARTIAL SECOND FLOOR RCP – B
A700	INTERIOR ELEVATIONS
A800	TYPICAL INTERIOR DETAILS
A801	TYPICAL WALL INTERSECTION & TERMINATION DETAILS
A802	ENLARGED PLAN DETAILS
A803	ENLARGED PLAN DETAILS
A810	INTERIOR CASEWORK DETAILS
A820	STAIR DETAILS
A900	FINISH SCHEDULE
A901	FINISH PLAN
A902	FURNITURE PLAN
A910	DOOR SCHEDULE
A911	GLAZING SCHEDULE
A920	DOOR DETAILS

STRUCTURAL

S001	GENERAL STRUCTURAL NOTES
S002	C & C TABLES AND SSI TABLES
S003	TYPICAL DETAILS
S004	TYPICAL DETAILS
S100.1	FOUNDATION PLAN
S100.2	FOUNDATION PLAN
S200.1	FIRST FLOOR FRAMING PLAN
S200.2	FIRST FLOOR FRAMING PLAN
S202.1	ROOF FRAMING PLAN
S202.2	ROOF FRAMING PLAN
S300	FOUNDATION DETAILS
S301	FOUNDATION DETAILS

PLUMBING

P000	PLUMBING: SYMBOLS AND ABBREVIATIONS
P101	PLUMBING: FIRST FLOOR PLAN DOMESTIC HOT & COLD WATER PIPING
P102	PLUMBING: SECOND FLOOR PLAN DOMESTIC HOT & COLD WATER PIPING
P201	PLUMBING: FIRST FLOOR PLAN SANITARY WASTE & VENT PIPING
P202	PLUMBING: SECOND FLOOR PLAN SANITARY WASTE & VENT PIPING
P203	PLUMBING: ROOF PLAN SANITARY WASTE & VENT PIPING
P301	PLUMBING: PARTIAL 1 ST FLOOR PLAN, TOILET RMS, AND MECHANICAL RM DOMESTIC H&CW
P302	PLUMBING: PARTIAL 1 ST FLOOR PLAN, TOILET RMS, AND MECHANICAL RM DOMESTIC H&CW
P303	PLUMBING: PARTIAL 1 ST FLOOR PLAN, KITCHEN & SCULLERY
P304	PLUMBING: PARTIAL 1 ST FLOOR PLAN, TRAINING BAY DOMESTIC H&CW
P305	PLUMBING: PARTIAL 1 ST FLOOR PLAN, TRAINING BAY SANITARY W&V
P306	PLUMBING: PARTIAL 2 ND FLOOR PLAN, TOILET ROOMS
P501	PLUMBING: TYPICAL DETAILS
P502	PLUMBING: TYPICAL DETAILS
P503	PLUMBING: FIRE SAFING DETAILS
P504	PLUMBING: FIRE SAFING DETAILS
P505	PLUMBING: FIRE SAFING DETAILS
P506	PLUMBING: FIRE SAFING DETAILS
P901	PLUMBING: EQUIPMENT SCHEDULES

FIRE PROTECTION

F000	FIRE PROTECTION: ABBREVIATIONS, SYMBOLS, & SCHEDULES
F101	FIRE PROTECTION: FIRST FLOOR PLAN
F102	FIRE PROTECTION: SECOND FLOOR PLAN
F201	FIRE PROTECTION: PARTIAL FIRST FLOOR PLAN
F202	FIRE PROTECTION: PARTIAL FIRST FLOOR PLAN
F203	FIRE PROTECTION: PARTIAL SECOND FLOOR PLAN
F204	FIRE PROTECTION: PARTIAL SECOND FLOOR PLAN
F500	FIRE PROTECTION: TYPICAL DETAILS
F501	FIRE PROTECTION: TYPICAL FIRE SAFING DETAILS

MECHANICAL

M000	MECHANICAL: SYMBOLS, LEGENDS & ABBREVIATIONS
M100	MECHANICAL: OVERALL FIRST FLOOR PLAN DUCTWORK
M101	MECHANICAL: OVERALL SECOND FLOOR PLAN DUCTWORK
M102	MECHANICAL: OVERALL ROOF PLAN
M103	MECHANICAL: SCHEDULES
M104	MECHANICAL: SCHEDULES
M105	MECHANICAL: SCHEDULES & DETAILS
M200	MECHANICAL: OVERALL FIRST FLOOR PLAN PIPING
M201	MECHANICAL: OVERALL SECOND FLOOR PLAN PIPING

ELECTRICAL

E001	SYMBOLS, ABBREVIATIONS AND NOTES
E100	FIRST FLOOR POWER PLAN
E101	SECOND FLOOR POWER PLAN
E102	FIRST FLOOR MECHANICAL EQUIPMENT POWER PLAN
E103	SECOND FLOOR MECHANICAL EQUIPMENT POWER PLAN
E104	ROOF POWER PLAN
E200	FIRST FLOOR LIGHTING PLAN
E201	SECOND FLOOR LIGHTING PLAN
E401	ONE-LINE POWER RISER DIAGRAM
E402	WIRING SCHEMATICS
E403	DETAILS
E501	SCHEDULES
E502	SCHEDULES
ES100	SITE POWER PLAN
ES200	SITE LIGHTING PLAN

FIRE ALARM

FA100	FIRST FLOOR FIRE ALARM AND MASS NOTIFICATION PLAN
FA101	SECOND FLOOR FIRE ALARM AND MASS NOTIFICATION PLAN

AUDIO / VISUAL

TA001	AUDIO/VISUAL LEGEND & ABBREVIATIONS
TA101.1	AUDIO/VISUAL PARTIAL FIRST FLOOR PLAN – A
TA102.1	AUDIO/VISUAL PARTIAL SECOND FLOOR PLAN – A
TA102.2	AUDIO/VISUAL PARTIAL SECOND FLOOR PLAN – B
TA300	AUDIO/VISUAL FLOW DIAGRAMS
TA400	AUDIO/VISUAL DETAILS

TELECOM

TT001	TELECOM LEGENDS & ABBREVIATIONS
TT101.1	TELECOM PARTIAL FIRST FLOOR PLAN – A
TT101.2	TELECOM PARTIAL FIRST FLOOR PLAN – B
TT102.1	TELECOM PARTIAL SECOND FLOOR PLAN – A
TT102.2	TELECOM PARTIAL SECOND FLOOR PLAN – B
TT103.1	TELECOM PARTIAL ROOF PLAN – A

TT200 TELECOM ENLARGED PLANS
TT300 TELECOM RISER DIAGRAMS
TT400 TELECOM DETAILS

SECURITY

TY001 SECURITY LEGEND & ABBREVIATIONS
TY101.1 SECURITY PARTIAL FIRST FLOOR PLAN – A
TY300 SECURITY RISER DIAGRAM
TY400 SECURITYDETAILS

VAULT

V001 SHEET INDEX
V101 VAULT & HEATED STORAGE IDS PLAN
V201 LIST OF EQUIPMENT
V202 LIST OF MATERIAL
V203 LIST OF MATERIAL (CONTINUED)
V301 SECURITY PANEL ENCLOSURE EQUIPMENT ARRANGEMENT
V302 VAULT (SECURE SIDE) EQUIPMENT ARRANGEMENT
V303 CONDUIT INSTALLATION FABRICATION & ASSEMBLY DETAILS
V304 PIR & SEISMIC DETECTORS EQUIPMENT ARRANGEMENT &
ELEVATION DETAILS
V305 VAULT DOOR BMS MOUNTING DETAILS
V306 HEATED STORAGE DOOR (SECURE SIDE) BMS MOUNTING DETAILS
V307 VAULT WIREWAY FABRICATION & ASSEMBLY DETAILS
V308 ANTENNA ENCLOSURE-SIREN & HEATED STORAGE PIR EQUIP.
ARRANGEMENT & ELEVATION
V309 VAULT DEVICE INFRASTRUCTURE ARRANGEMENT & ELEVATIONS
V310 HEATED STORAGE (UNSECURE SIDE) EQUIPMENT ARRANGEMENT &
ELEVATIONS
V311 HEATED STORAGE (SECURE SIDE) EQUIPMENT ARRANGEMENT &
ELEVATIONS
V312 VAULT NO.1 (SECURE SIDE) EQUIPMENT ARRANGEMENT &
ELEVATIONS
V313 VAULT NO.2 (SECURE SIDE) EQUIPMENT ARRANGEMENT &
ELEVATIONS

END OF SECTION 01 02 00

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Division 01 Section "Quality Requirements" for general testing and inspecting requirements.

1.3 DEFINITIONS

- A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes (when required), overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 Refer to specific scope of work as provided via procurement documents for specific unit pricing requirements.

END OF SECTION 01 22 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURESPART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 2. Divisions 02 through 33 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A and/or facsimile of form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific

- features and requirements indicated. Indicate deviations, if any, from the Work specified.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Generally not allowed unless otherwise indicated.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed and/or the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURESPART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Division 01 Section "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
 - 2. Divisions 02 through 33 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
 - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
 - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A and/or facsimile of form provided in Project Manual.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific

- features and requirements indicated. Indicate deviations, if any, from the Work specified.
- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
 - e. Samples, where applicable or requested.
 - f. Certificates and qualification data, where applicable or requested.
 - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
 - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
 - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Substitution request is fully documented and properly submitted.
 - c. Requested substitution will not adversely affect Contractor's construction schedule.
 - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - e. Requested substitution is compatible with other portions of the Work.
 - f. Requested substitution has been coordinated with other portions of the Work.
 - g. Requested substitution provides specified warranty.
 - h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Generally not allowed unless otherwise indicated.
- C. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed and/or the Notice of Award. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Substitution request is fully documented and properly submitted.
 - e. Requested substitution will not adversely affect Contractor's construction schedule.
 - f. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - g. Requested substitution is compatible with other portions of the Work.
 - h. Requested substitution has been coordinated with other portions of the Work.
 - i. Requested substitution provides specified warranty.
 - j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 33 00 - SUBMITTAL PROCEDURESPART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Division 01 Section "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Division 01 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
 - 3. Division 01 Section "Closeout Procedures" for submitting warranties.
 - 4. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 5. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 6. Division 02 through 49 Sections for specific requirements for submittals in those Sections.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

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

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will **not** be provided by Architect for Contractor's use in preparing submittals.
1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings[**and Project record drawings**].
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD 2023
 - c. Contractor shall execute a data licensing agreement in the form of [AIA Document C106, Digital Data Licensing Agreement].
 - d. The following digital data files will be furnished for each appropriate discipline:
 - 1) Floor plans.
 - 2) Reflected ceiling plans.
 - 3) Elevations.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. 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.

- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on **[Architect's]** receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
 1. Initial Review: Allow **[15]** 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.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow **[15]** days for review of each resubmittal.
 4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow **[21]** days for initial review of each submittal.
 - a. <Insert list of Specification Sections requiring sequential review>.
 5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow **[15]** days for review of each submittal. Submittal will be returned to **[Architect]** before being returned to Contractor.

- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 - a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
 4. Transmittal Form for Electronic Submittals: Use **[electronic form]** acceptable to Owner, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Transmittal number[, numbered consecutively].
 - q. Submittal and transmittal distribution record.

- r. Other necessary identification.
- s. Remarks.
- 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
 - e. <Insert required information>.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.
- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- H. 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.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Post electronic submittals as PDF electronic files directly to **[Architect's FTP site]** specifically established for Project.
 - a. Architect, will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Submit electronic submittals via email as PDF electronic files.
 - a. Architect, return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 3. Certificates and Certifications Submittals: Provide a 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.
 - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.

- b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
 6. Submit Product Data in the following format:
 - a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data[, **unless submittal based on Architect's digital data drawing files is otherwise permitted**].
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least **[8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm)]** .
 3. Submit Shop Drawings in the following format:
 - a. PDF electronic file.
 4. BIM File Incorporation: **[Develop and incorporate]** Shop Drawing files into Building Information Model established for Project.
 - a. Prepare Shop Drawings in the following format: [Same digital data software program, version, and operating system as the original Drawings] [**<Insert software name and version>**].
 - b. Refer to Division 01 Section "Project Management and Coordination" for requirements for coordination drawings.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. 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.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit **[one]** full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit **[three]** <Insert number> sets of Samples. Architect[and Construction Manager] will retain **[two]** <Insert number> Sample sets; remainder will be returned.[Mark up and retain one returned Sample set as a project record sample.]
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least **[three]** sets of paired units that show approximate limits of variations.
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.
 5. Submit product schedule in the following format:
 - a. PDF electronic file.

- F. Application for Payment and Schedule of Values: Comply with requirements specified in Division 01 Section "Payment Procedures."
- G. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Division 01 Section "Quality Requirements."
- H. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Division 01 Section "Closeout Procedures."
- I. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- J. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- K. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- L. Installer Certificates: Submit 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.
- M. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- N. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- O. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- P. Material Test Reports: Submit 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.
- Q. Product Test Reports: Submit written reports indicating that 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.
- R. Research Reports: Submit 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.

- S. Preconstruction Test Reports: Submit 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.
- T. Compatibility Test Reports: Submit 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.
- U. Field Test Reports: Submit written reports 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.
- V. Design Data: Prepare and submit 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.

2.2 DELEGATED-DESIGN SERVICES

- 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 Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit [**digitally signed PDF electronic file**] [**and** paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
- C. BIM File Incorporation: [**Incorporate**] delegated-design drawing and data files into Building Information Model established for Project.
 - 1. Prepare delegated-design drawings in the following format: [Same digital data software program, version, and operating system as the original Drawings] .

PART 3 - EXECUTION

3.1 ARCHITECT'S[AND CONSTRUCTION MANAGER'S] ACTION

- A. Action Submittals: Architect review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate [**action, as follows:**]
 - 1. <Insert description of each action indicated on Architect's (and Construction Manager's) stamp>.

- B. 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.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01 33 00

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority and/or Construction Manager, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Requirements:
 - 1. Division 01 Section "Allowances" for testing and inspecting allowances.
 - 2. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect and/or or Construction Manager.
- C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
- D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 CONFLICTING REQUIREMENTS

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

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
 2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.
- D. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
 1. Specification Section number and title.
 2. Entity responsible for performing tests and inspections.
 3. Description of test and inspection.
 4. Identification of applicable standards.
 5. Identification of test and inspection methods.
 6. Number of tests and inspections required.
 7. Time schedule or time span for tests and inspections.
 8. Requirements for obtaining samples.
 9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
 1. Project quality-control manager may also serve as Project superintendent for small or limited projects.
 2. Project quality control manager shall not have other project responsibilities for large and/or complex projects.

- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
 - 1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
 - 2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
 - 3. Owner-performed tests and inspections indicated in the Contract Documents, including tests and inspections indicated to be performed by the Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of technical 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.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect and Commissioning Authority, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.

3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.

- G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 ACCEPTABLE TESTING AGENCIES

- A. Firms acceptable to perform designated tests and inspections are:
1. SW Cole, 227 Wampanoag Trail, Riverside, RI 02915
 2. Briggs Engineering & Testing, 100 Weymouth Street, Rockland, MA 02370
 3. Theilsh Engineering, 195 Frances Ave, Cranston, RI 02910
 4. Other firms as approved by architect

3.2 TEST AND INSPECTION LOG

- A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
 2. Description of the Work tested or inspected.
 3. Date test or inspection results were transmitted to Architect.
 4. Identification of testing agency or special inspector conducting test or inspection.

- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's, Commissioning Authority's, and Construction Manager's reference during normal working hours.

3.3 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

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

1.3 INDUSTRY STANDARDS

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

REFERENCES

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

AA	Aluminum Association (The) www.aluminum.org	(703) 358-2960
AABC	Associated Air Balance Council www.aabchq.com	(202) 737-0202
AAMA	www.aamanet.org	
AASHTO	American Association of State Highway and Transportation Officials	(202) 624-5800
AATCC	American Association of Textile Chemists and Colorists www.aatcc.org	(919) 549-8141
ABAA	Air Barrier Association of America www.airbarrier.org	(866) 956-5888
ABMA	www.abma-dc.org	
ACI	American Concrete Institute	(248) 848-3700
ACPA	American Concrete Pipe Association www.concrete-pipe.org	(972) 506-7216
AEIC	Association of Edison Illuminating Companies, Inc. (The) www.aeic.org	(205) 257-2530
AF&PA	www.afandpa.org	(202) 463-2700
AGA	American Gas Association	(202) 824-7000

AHAM	Association of Home Appliance Manufacturers www.aham.org	(202) 872-5955
AHRI	Air-Conditioning, Heating, and Refrigeration Institute, The www.ahrinet.org	(703) 524-8800
AI	www.asphaltinstitute.org	
AIA	American Institute of Architects (The)	(800) 242-3837
AISC	American Institute of Steel Construction www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	American Iron and Steel Institute www.steel.org	(202) 452-7100
AITC	www.aitc-glulam.org	
ALSC	American Lumber Standard Committee, Incorporated	(301) 972-1700
AMCA	Air Movement and Control Association International, Inc. www.amca.org	(847) 394-0150
ANSI	American National Standards Institute www.ansi.org	(202) 293-8020
AOSA	www.aosaseed.com	
APA	APA - The Engineered Wood Association	(253) 565-6600
APA	Architectural Precast Association www.archprecast.org	(239) 454-6989
API	American Petroleum Institute www.api.org	(202) 682-8000
ARI	www.ari.org	
ARMA	Asphalt Roofing Manufacturers Association	(202) 207-0917
ASCE	American Society of Civil Engineers www.asce.org	(800) 548-2723 (703) 295-6300
ASCE/SEI	American Society of Civil Engineers/Structural Engineering Institute (See ASCE)	

REFERENCES

ASHRAE	www.ashrae.org	(404) 636-8400
ASME	ASME International www.asme.org	(800) 843-2763
ASSE	American Society of Sanitary Engineering	(440) 835-3040
ASTM	ASTM International (American Society for Testing and Materials International)	(610) 832-9500
ATIS	Alliance for Telecommunications Industry Solutions www.atis.org	(202) 628-6380
AWCMA	American Window Covering Manufacturers Association (Now WCMA)	
AWCI	www.awci.org	
AWI	Architectural Woodwork Institute	(571) 323-3636
AWPA	American Wood Protection Association (Formerly: American Wood Preservers' Association)	(205) 733-4077
AWS	American Welding Society www.aws.org	(800) 443-9353 (305) 443-9353
AWWA	American Water Works Association www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	www.buildershardware.com	
BIA	Brick Industry Association (The)	(703) 620-0010
BICSI	BICSI, Inc. www.bicsi.org	(800) 242-7405 (813) 979-1991
BIFMA	BIFMA International (Business and Institutional Furniture Manufacturer's Association International) www.bifma.com	(616) 285-3963
BISSC	Baking Industry Sanitation Standards Committee www.bissc.org	(866) 342-4772
CCC	www.carpetcushion.org	

CDA	Copper Development Association	(800) 232-3282
CEA	Canadian Electricity Association www.canelect.ca	(613) 230-9263
CEA	Consumer Electronics Association www.ce.org	(866) 858-1555 (703) 907-7600
CFFA	www.chemicalfabricsandfilm.com	
CGA	Compressed Gas Association	(703) 788-2700
CIMA	Cellulose Insulation Manufacturers Association www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	Ceilings & Interior Systems Construction Association www.cisca.org	(630) 584-1919
CISPI	www.cispi.org	
CLFMI	Chain Link Fence Manufacturers Institute	(301) 596-2583
CPA	Composite Panel Association www.pbmdf.com	(703) 724-1128
CRI	Carpet and Rug Institute (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRRC	www.coolroofs.org	(510) 485-7175
CRSI	Concrete Reinforcing Steel Institute	(847) 517-1200
CRRC	Cool Roof Rating Council www.coolroofs.org	(866) 465-2523 (510) 485-7175
CSA	Canadian Standards Association www.csa.ca	(800) 463-6727 (416) 747-4000
CSA	(Formerly: IAS - International Approval Services) www.csa-international.org	(416) 747-4000
CSI	www.csinet.org	(703) 684-0300
CSSB	Cedar Shake & Shingle Bureau	(604) 820-7700
CTI	Cooling Technology Institute	(281) 583-4087

REFERENCES

	(Formerly: Cooling Tower Institute)	
DHI	Door and Hardware Institute www.dhi.org	(703) 222-2010
ECA	Electrical Components Association www.ec-central.org	(703)907-8024
EIA	www.eia.org	
EIMA	EIFS Industry Members Association	(800) 294-3462
EJCDC	Engineers Joint Contract Documents Committee http://content.asce.org/ejcdc/	(703) 295-6000
EJMA	Expansion Joint Manufacturers Association, Inc. www.ejma.org	(914) 332-0040
ESD	(Electrostatic Discharge Association) www.esda.org	
ETL SEMCO	(Formerly: ITS - Intertek Testing Service NA) www.intertek-etlsemko.com	
FIBA	(The International Basketball Federation) www.fiba.com	
FIVB	(The International Volleyball Federation) www.fivb.ch	
FM Approvals	www.fmglobal.com	
FM Global	FM Global www.fmglobal.com	(401) 275-3000
FRSA	Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.	(407) 671-3772
FSA	Fluid Sealing Association www.fluidsealing.com	(610) 971-4850
FSC	Forest Stewardship Council www.fsc.org	49 228 367 66 0
GA	www.gypsum.org	(301) 277-8686

REFERENCES

GANA	Glass Association of North America	(785) 271-0208
GRI	(Part of GSI)	
GS	www.greenseal.org	
GSI	Geosynthetic Institute	(610) 522-8440
HI	Hydronics Institute www.gamanet.org	(908) 464-8200
HI/GAMA	Hydronics Institute/Gas Appliance Manufacturers Association Division of Air-Conditioning, Heating, and Refrigeration Institute (AHRI) www.ahrinet.org	(908) 464-8200
HMMA	Hollow Metal Manufacturers Association (Part of NAAMM)	
HPVA	www.hpva.org	
HPW	H. P. White Laboratory, Inc.	(410) 838-6550
IAPSC	International Association of Professional Security Consultants www.iapsc.org	(515) 282-8192
ICBO	International Conference of Building Officials www.iccsafe.org	(888) 422-7233
ICEA	www.icea.net	
ICRI	International Concrete Repair Institute, Inc.	(847) 827-0830
ICPA	International Cast Polymer Association www.icpa-hq.org	(703) 525-0320
IEC	International Electrotechnical Commission www.iec.ch	41 22 919 02 11
IEEE	www.ieee.org	
IES	Illuminating Engineering Society of North America	(703) 525-0320
IEST	Institute of Environmental Sciences and Technology www.iest.org	(847) 255-1561

REFERENCES

IGMA	Insulating Glass Manufacturers Alliance www.igmaonline.org	(613) 233-1510
ILI	www.iliai.com	
ISA	Instrumentation, Systems, and Automation Society, The	(919) 549-8411
ISO	International Organization for Standardization www.iso.ch	41 22 749 01 11
ISSFA	International Solid Surface Fabricators Association www.issfa.net	(877) 464-7732 (801) 341-7360
ITS	(Now ETL SEMCO)	
ITU	International Telecommunication Union	41 22 730 51 11
KCMA	Kitchen Cabinet Manufacturers Association www.kcma.org	(703) 264-1690
LGSEA	Light Gauge Steel Engineers Association www.arcat.com	(202) 263-4488
LMA	(Now part of CPA)	
LPI	Lightning Protection Institute	(800) 488-6864
MBMA	Metal Building Manufacturers Association www.mbma.com	(216) 241-7333
MCA	Metal Construction Association www.metalconstruction.org	(847) 375-4718
MFMA	www.maplefloor.org	
MFMA	Metal Framing Manufacturers Association, Inc.	(312) 644-6610
MH	Material Handling (Now MHIA)	
MHIA	Material Handling Industry of America www.mhia.org	(800) 345-1815 (704) 676-1190
MIA	www.marble-institute.com	
MPI	Master Painters Institute	(888) 674-8937

REFERENCES

MSS	Manufacturers Standardization Society of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	National Association of Architectural Metal Manufacturers www.naamm.org	(630) 942-6591
NACE	(National Association of Corrosion Engineers International) www.nace.org	(281) 228-6200
NADCA	www.nadca.com	
NAGWS	National Association for Girls and Women in Sport	(800) 213-7193, ext. 453
NAIMA	North American Insulation Manufacturers Association www.naima.org	(703) 684-0084
NBGQA	National Building Granite Quarries Association, Inc. www.nbgqa.com	(800) 557-2848
NCAA	www.ncaa.org	
NCMA	National Concrete Masonry Association	(703) 713-1900
NCTA	National Cable & Telecommunications Association www.ncta.com	(202) 222-2300
NEBB	National Environmental Balancing Bureau www.nebb.org	(301) 977-3698
NECA	www.necanet.org	
NeLMA	Northeastern Lumber Manufacturers' Association	(207) 829-6901
NEMA	National Electrical Manufacturers Association www.nema.org	(703) 841-3200
NETA	InterNational Electrical Testing Association www.netaworld.org	(888) 300-6382 (269) 488-6382
NFHS	www.nfhs.org	
NFPA	NFPA www.nfpa.org	(800) 344-3555

REFERENCES

NFRC	National Fenestration Rating Council	(301) 589-1776
NGA	National Glass Association www.glass.org	(866) 342-5642 (703) 442-4890
NHLA	National Hardwood Lumber Association www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	www.nlga.org	
NOFMA	NOFMA: The Wood Flooring Manufacturers Association www.nofma.org	(901) 526-5016
NOMMA	National Ornamental & Miscellaneous Metals Association	(888) 516-8585
NRCA	National Roofing Contractors Association www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	National Ready Mixed Concrete Association www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	(National Sanitation Foundation International) www.nsf.org	(734) 769-8010
NSSGA	www.nssga.org	(703) 525-8788
NTMA	National Terrazzo & Mosaic Association, Inc. (The)	(800) 323-9736
NWFA	National Wood Flooring Association www.nwfa.org	(800) 422-4556 (636) 519-9663
PCI	Precast/Prestressed Concrete Institute www.pci.org	(312) 786-0300
PDI	www.pdionline.org	(978) 557-0720
PGI	PVC Geomembrane Institute	(217) 333-3929
PTI	Post-Tensioning Institute www.post-tensioning.org	(248) 848-3180
RCSC	Research Council on Structural Connections www.boltcouncil.org	
RFCI	www.rfci.com	(706) 882-3833

REFERENCES

RIS	Redwood Inspection Service	
SAE	SAE International www.sae.org	(877) 606-7323 (724) 776-4841
SCAQMD	South Coast Air Quality Management District www.aqmd.com	(909) 396-2000
SCTE	www.scte.org	(610) 363-6888
SDI	Steel Deck Institute	(847) 458-4647
SDI	Steel Door Institute www.steeldoor.org	(440) 899-0010
SEFA	Scientific Equipment and Furniture Association www.sefalabs.com	(877) 294-5424 (516) 294-5424
SEI/ASCE	(See ASCE)	
SIA	Security Industry Association	(866) 817-8888
SJI	Steel Joist Institute www.steeljoist.org	(843) 626-1995
SMA	Screen Manufacturers Association www.smacentral.org	(561) 533-0991
SMACNA	National Association www.smacna.org	
SMPTE	www.smpte.org	
SPFA	Spray Polyurethane Foam Alliance www.sprayfoam.org	(800) 523-6154
SPIB	Southern Pine Inspection Bureau (The)	(850) 434-2611
SPRI	Single Ply Roofing Industry www.spri.org	(781) 647-7026
SSINA	Specialty Steel Industry of North America www.ssina.com	(800) 982-0355 (202) 342-8630
SSPC	www.sspc.org	(412) 281-2331

REFERENCES

STI	Steel Tank Institute	(847) 438-8265
SWI	Steel Window Institute www.steelwindows.com	(216) 241-7333
SWPA	Submersible Wastewater Pump Association www.swpa.org	(847) 681-1868
TCA	www.tilt-up.org	
TCNA	Tile Council of North America, Inc.	(864) 646-8453
TEMA	Tubular Exchanger Manufacturers Association www.tema.org	(914) 332-0040
TIA/EIA	Telecommunications Industry Association/Electronic Industries Alliance www.tiaonline.org	(703) 907-7700
TMS	www.masonrysociety.org	
TPI	Truss Plate Institute, Inc.	(703) 683-1010
TPI	Turfgrass Producers International www.turfgrassod.org	(800) 405-8873 (847) 649-5555
TRI	Tile Roofing Institute www.tilerroofing.org	(312) 670-4177
UL	www.ul.com	(847) 272-8800
UNI	Uni-Bell PVC Pipe Association	(972) 243-3902
USAV	USA Volleyball www.usavolleyball.org	(888) 786-5539 (719) 228-6800
USGBC	U.S. Green Building Council www.usgbc.org	(800) 795-1747
USITT	www.usitt.org	(315) 463-6463
WASTEC	Waste Equipment Technology Association	(800) 424-2869
WCLIB	West Coast Lumber Inspection Bureau www.wclib.org	(800) 283-1486 (503) 639-0651
WCMA	Window Covering Manufacturers Association	(212) 297-2122

REFERENCES

	www.wcmanet.org	
WDMA	(Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(312) 321-6802
WI	www.wicnet.org	
WMMPA	Wood Moulding & Millwork Producers Association	(800) 550-7889
WSRCA	Western States Roofing Contractors Association www.wsrca.com	(800) 725-0333 (650) 570-5441
WWPA	Western Wood Products Association www.wwpa.org	(503) 224-3930

- C. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

DIN	www.din.de	
IAPMO	International Association of Plumbing and Mechanical Officials	(909) 472-4100
ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543

- D. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

COE	Army Corps of Engineers www.usace.army.mil	
CPSC	Consumer Product Safety Commission www.cpsc.gov	(800) 638-2772 (301) 504-7923
DOC	Department of Commerce www.commerce.gov	(202) 482-2000
DOD	Department of Defense http://dodssp.daps.dla.mil	(215) 697-6257
DOE	Department of Energy www.energy.gov	(202) 586-9220

REFERENCES

EPA	Environmental Protection Agency	(202) 272-0167
FAA	Federal Aviation Administration www.faa.gov	(866) 835-5322
FCC	Federal Communications Commission www.fcc.gov	(888) 225-5322
FDA	www.fda.gov	
GSA	General Services Administration	(800) 488-3111
HUD	Department of Housing and Urban Development www.hud.gov	(202) 708-1112
LBL	Lawrence Berkeley National Laboratory www.lbl.gov	(510) 486-4000
NCHRP	(See TRB)	
NIST	National Institute of Standards and Technology	(301) 975-6478
OSHA	Occupational Safety & Health Administration www.osha.gov	(800) 321-6742 (202) 693-1999
PBS	Public Buildings Service (See GSA)	
PHS	http://www.hhs.gov/ophs/	
RUS	Rural Utilities Service	(202) 720-9540
SD	State Department www.state.gov	(202) 647-4000
TRB	Transportation Research Board http://gulliver.trb.org	(202) 334-2934
USDA	www.usda.gov	
USP	U.S. Pharmacopeia	(800) 227-8772
USPS	Postal Service www.usps.com	(202) 268-2000

REFERENCES

- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ADAAG	Americans with Disabilities Act (ADA) Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities Available from U.S. Access Board www.access-board.gov	(202) 272-0080
CFR	Code of Federal Regulations Available from Government Printing Office www.gpoaccess.gov/cfr/index.html	(866) 512-1800 (202) 512-1800
DOD	Department of Defense Military Specifications and Standards Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	(215) 697-2664
DSCC	Defense Supply Center Columbus (See FS)	
FED-STD	Federal Standard (See FS)	
FS	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil/ www.dsp.dla.mil Available from General Services Administration	(202) 619-8925
	Available from National Institute of Building Sciences www.wbdg.org/ccb	(202) 289-7800
FTMS	Federal Test Method Standard (See FS)	
MIL		
MIL-STD	(See MILSPEC)	
MILSPEC	Available from Department of Defense Single Stock Point http://dodssp.daps.dla.mil	
UFAS	Available from Access Board www.access-board.gov	(202) 272-0080

- F. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following

REFERENCES

list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

CBHF	www.dca.ca.gov/bhfti	(916) 574-2041
CCR	California Code of Regulations	(916) 323-6815
CDHS	California Department of Health Services www.dhcs.ca.gov	(916) 445-4171
CDPH	California Department of Public Health, Indoor Air Quality Section www.cal-iaq.org	
CPUC	www.cpuc.ca.gov	
TFS	Texas Forest Service http://txforestservation.tamu.edu	
UFC# ##	Blast protection standards	

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 01 60 00 - PRODUCT REQUIREMENTSPART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
1. Division 01 Section "Substitution Procedures" for requests for substitutions.
 2. Division 01 Section "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.

2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Division 01 Section "Submittal Procedures."
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Division 01 Section "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

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

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft 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.
- C. Storage:
 1. Store products to allow for inspection and measurement of quantity or counting of units.
 2. Store materials in a manner that will not endanger Project structure.
 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 6. Protect stored products from damage and liquids from freezing.
 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. **Manufacturer's Warranty:** Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. **Special Warranties:** Prepare a written document that contains appropriate terms and identification, ready for execution.
1. **Manufacturer's Standard Form:** Modified to include Project-specific information and properly executed.
 2. **Specified Form:** When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. **Submittal Time:** Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. **General Product Requirements:** Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. **Standard Products:** If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. **Or Equal:** For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. **Product Selection Procedures:**
1. **Product:** Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. **Manufacturer/Source:** 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.
 3. **Products:**

- a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
4. Manufacturers:
- a. Restricted List: 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 may be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: 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.

2.2 COMPARABLE PRODUCTS

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

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of the Work.

- B. Related Requirements:

1. Division 01 Section "Summary" for limits on use of Project site.
2. Division 01 Section "Submittal Procedures" for submitting surveys.
3. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
4. Division 02 Section "Selective Structure Demolition" for demolition and removal of selected portions of the building.
5. Division 07 Section "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For **[land surveyor]** **[professional engineer]**.

- B. Certificates: Submit certificate signed by **[land surveyor]** **[professional engineer]** certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least **[10]** **<Insert number>** days prior to the time cutting and patching will be performed. Include the following information:
 - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 - 4. Dates: Indicate when cutting and patching will be performed.
 - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- E. Certified Surveys: Submit **two** copies signed by **[land surveyor]** **[professional engineer]**.
- F. Final Property Survey: Submit **10** copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. **[Operational elements include the following:]**
 - a. Primary operational systems and equipment.
 - b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.

- g. Communication systems.
 - h. Fire-detection and -alarm systems.
 - i. Conveying systems.
 - j. Electrical wiring systems.
 - k. Operating systems of special construction.
 - l. <Insert operating system>.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. [**Other construction elements include but are not limited to the following:**]
- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Sprayed fire-resistive material.
 - e. Equipment supports.
 - f. Piping, ductwork, vessels, and equipment.
 - g. Noise- and vibration-control elements and systems.
 - h. <Insert miscellaneous element>.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with requirements in Division 01 sustainable design requirements Section.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
- 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to [**local utility**] [**Owner**] that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 4. Maintain minimum headroom clearance of [96 inches (2440 mm)] <Insert dimension> in occupied spaces and [90 inches (2300 mm)] <Insert dimension> in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

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

3.4 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
- C. Temporary Support: Provide temporary support of work to be cut.
- D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Division 01 Section "Summary."
- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to **[minimize] [prevent]** interruption to occupied areas.
- G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. **[Concrete] [and] [Masonry]**: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.5 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.6 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.

2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
 4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in **[Division 01] [Division 01 Section "Construction Waste Management and Disposal."]**
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.7 STARTING AND ADJUSTING
- A. Coordinate startup and adjusting of equipment and operating components with requirements in Division 01 Section "General Commissioning Requirements."
 - B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.8 PROTECTION OF INSTALLED CONSTRUCTION

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

END OF SECTION 017300

SECTION 01 74 20 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSALPART 1 - GENERAL1.1 RELATED DOCUMENTS

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

1.2 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.
- B. Related Requirements:
1. Division 02 Section "Selective Structure Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements
 2. Division 04 Section "Unit Masonry" for disposal requirements for masonry waste.

1.3 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.

1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of **[50] [75] <Insert number>** percent by weight of total non-hazardous 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[.], **including the following:**

1. Demolition Waste (which may include the following when within the project scope):

- a. Asphalt paving.
- b. Concrete.
- c. Concrete reinforcing steel.
- d. Brick.
- e. Concrete masonry units.
- f. Wood studs.
- g. Wood joists.
- h. Plywood and oriented strand board.
- i. Wood paneling.
- j. Wood trim.
- k. Structural and miscellaneous steel.
- l. Rough hardware.
- m. Roofing.
- n. Insulation.
- o. Doors and frames.
- p. Door hardware.
- q. Windows.
- r. Glazing.
- s. Metal studs.
- t. Gypsum board.
- u. Acoustical tile and panels.
- v. Carpet.
- w. Carpet pad.
- x. Demountable partitions.
- y. Equipment.
- z. Cabinets.
- aa. Plumbing fixtures.
- bb. Piping.
- cc. Supports and hangers.
- dd. Valves.
- ee. Sprinklers.
- ff. Mechanical equipment.
- gg. Refrigerants.
- hh. Electrical conduit.
- ii. Copper wiring.
- jj. Lighting fixtures.
- kk. Lamps.
- ll. Ballasts.
- mm. Electrical devices.
- nn. Switchgear and panelboards.
- oo. Transformers.
- pp. <Insert materials required>.

2. Construction Waste (which may include the following when within the project scope):

- a. Masonry and CMU.
- b. Lumber.
- c. Wood sheet materials.
- d. Wood trim.
- e. Metals.
- f. Roofing.
- g. Insulation.
- h. Carpet and pad.
- i. Gypsum board.

- j. Piping.
- k. Electrical conduit.
- l. Packaging: Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 30 days of date established for the Notice to Proceed.

1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:
 - 1. Material category.
 - 2. Generation point of waste.
 - 3. Total quantity of waste in **tons (tonnes)**.
 - 4. Quantity of waste salvaged, both estimated and actual in **tons (tonnes)**.
 - 5. Quantity of waste recycled, both estimated and actual in **tons (tonnes)**.
 - 6. Total quantity of waste recovered (salvaged plus recycled) in **tons (tonnes)**.
 - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. 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.
- F. 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.
- G. Qualification Data: For waste management coordinator and refrigerant recovery technician.

- H. 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.

1.7 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.
 - 1. .

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 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 on-site 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.

3.2 RECYCLING DEMOLITION AND CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Receivers and Processors: Use only available recycling receivers and processors licensed to do business in the local area.
- C. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
- D. 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.
- E. 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 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 from Owner's property and transport to recycling receiver or processor.

3.3 RECYCLING DEMOLITION WASTE

- A. Concrete: Remove reinforcement and other metals from concrete and sort with other metals.
 - 1. Pulverize concrete to maximum 1-1/2-inch (38-mm) size.
 - 2. Crush concrete and screen to comply with requirements in Division 31 Section "Earth Moving" for use as satisfactory soil for fill or subbase.
- B. Masonry: Remove metal reinforcement, anchors, and ties from masonry and sort with other metals.
 - 1. Pulverize masonry to maximum 1-inch (25-mm) size.
 - a. Crush masonry and screen to comply with requirements in Division 31 Section "Earth Moving" for use as general fill or satisfactory soil for fill or subbase.
 - b. Crush masonry and screen to comply with requirements in Division 32 Section "Plants" for use as mineral mulch.
 - 2. Clean and stack undamaged, whole masonry units on wood pallets.
- C. Wood Materials: Sort and stack members according to size, type, and length. Separate lumber, engineered wood products, panel products, and treated wood materials.

- D. 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.
- E. Asphalt Shingle Roofing: Separate organic and glass-fiber asphalt shingles and felts. Remove and dispose of nails, staples, and accessories.
- F. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location. Remove edge trim and sort with other metals. Remove and dispose of fasteners.
- G. Acoustical Ceiling Panels and Tile: Stack large clean pieces on wood pallets and store in a dry location.
- H. Metal Suspension System: Separate metal members including trim, and other metals from acoustical panels and tile and sort with other metals.
- I. Carpet and Pad: Roll large pieces tightly after removing debris, trash, adhesive, and tack strips.
 - 1. Store clean, dry carpet and pad in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- J. Carpet Tile: Remove debris, trash, and adhesive.
 - 1. Stack tile on pallet and store clean, dry carpet in a closed container or trailer provided by Carpet Reclamation Agency or carpet recycler.
- K. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves, sprinklers, and other components by type and size.
- L. Conduit: Reduce conduit to straight lengths and store by type and size.

3.4 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. 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.
- C. 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.
 - a. Comply with requirements in Division 32 Section "Plants." for use of clean ground gypsum board as inorganic soil amendment.

3.5 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged, recycled, 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. Burning: Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
- D. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.
- E. Disposal: Remove waste materials from Owner's property and legally dispose of them.

3.6 ATTACHMENTS

- A. Form CWM-1 for construction waste identification.
- B. Form CWM-2 for demolition waste identification.
- C. Form CWM-3 for construction waste reduction work plan.
- D. Form CWM-4 for demolition waste reduction work plan.
- E. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.
- F. Form CWM-6 cost/revenue analysis of demolition waste reduction work plan.
- G. Form CWM-7 for construction waste
- H. Form CWM-8 for demolition waste.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Repair of the Work.
- B. Related Requirements:
 - 1. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 2. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 3. Divisions 02 through 10 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 ACTION SUBMITTALS

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

1.4 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

1.6 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Divisions 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect and/or Construction Manager. Label with manufacturer's name and model number where applicable.
 - a. Schedule of Predictive and Preventative Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.
 5. Submit test/adjust/balance records.
 6. Submit sustainable design submittals required in Division 01 sustainable design requirements Section and in individual Division 02 through 33 Sections.
 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
 6. Advise Owner of changeover in heat and other utilities.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements, including touchup painting.
 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

11. Provide the Contractor's comprehensive list of incomplete work items prior to requesting the Architect to perform any inspection for determination of Substantial Completion.
 - a) Note that if no reasonable list of incomplete work items remaining is provided by the Contractor that will be considered an admission by the Contractor that the Contractor has not ready for a Substantial Inspection determination by the Architect. As such, no inspection will occur by the Architect.
 - b) The Contractor is thus responsible for any failure to meet the Contractor's commitments of construction schedule to the Owner.

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

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

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect and/or Construction Manager.
 - d. Name of Contractor.
 - e. Page number.
4. Submit list of incomplete items in the following format:
 - a. PDF electronic file. Architect, through Construction Manager, will return annotated file.

1.9 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - j. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - k. Leave Project broom clean.
- C. Pest Control: Comply with pest control requirements in Division 01 Section "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls." Division 01 Section "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 77 00

SECTION 01 78 20 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

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

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
 2. One paper copy for Owner. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect may return copy with comments.
1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Name and contact information for Commissioning Authority.
 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required on USB thumb drive.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear

plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

- a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
 3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
 4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
 5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
 1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
 1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.
 6. Normal shutdown instructions.
 7. Seasonal and weekend operating instructions.
 8. Required sequences for electric or electronic systems.
 9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

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

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
- B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
- G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 78 20

SECTION 017830 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Division 01 Section "Execution" for final property survey.
 - 2. Division 01 Section "Closeout Procedures" for general closeout procedures.
 - 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 4. Divisions 02 through 10 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit PDF electronic files of scanned record prints.
 - 2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned record prints and one set(s) of prints.
 - 2) Print each drawing, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
 - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 - 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 - 5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 2. Format: Annotated PDF electronic file.
 3. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 4. Refer instances of uncertainty to Architect for resolution.
 5. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Division 01 Section "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect.
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders and record Drawings where applicable.

- B. Format: Submit record Specifications as annotated PDF electronic file.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

- B. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

- B. Format: Submit miscellaneous record submittals as PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean,

dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 30

SECTION 02 41 20 - SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

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

B. Related Requirements:

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

1.3 DEFINITIONS

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

1.4 MATERIALS OWNERSHIP

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

1.5 PREINSTALLATION MEETINGS

- A. Pre-demolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.
 - 6. <Insert agenda items>.

1.6 INFORMATIONAL SUBMITTALS

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

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

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

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove the following items:
 - a. Furniture and equipment
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- F. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.
- G. Storage or sale of removed items or materials on-site is not permitted.
- H. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
 - 1. Single Ply Membrane Roofing.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Perform and/or engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
 - 2. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs, preconstruction videotapes and/or templates as indicated. If not indicated, provide preconstruction photographs for record.
1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

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

3.3 PREPARATION

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

3.4 SELECTIVE DEMOLITION, GENERAL

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

7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 9. Dispose of demolished items and materials promptly. Comply with requirements in Division 01 Section "Construction Waste Management and Disposal" when provided.
- B. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area as indicated on Drawings.
 5. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw; and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Division 01 Section "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials and dispose of at designated spoil areas on Owner's property.
- D. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

3.8 SELECTIVE DEMOLITION SCHEDULE

- A. Existing **Items** and/or **Construction** to Be Removed: as indicated on drawings
- B. Existing Items to Be Removed and Salvaged: as indicated on drawings
- C. Existing Items to Be Removed and Reinstalled: as indicated on drawings "Existing Items to Remain" Paragraph below may be used to inform Contractor of items that are to remain, such as those that occur in, or are adjacent to, construction being demolished, but are not being removed and reinstalled. Retain paragraph if required.

Existing Items to Remain: as indicated on drawings and/or noted herein:

END OF SECTION 02 41 20

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.0 RELATED DOCUMENTS

- A. The Contractor, Subcontractors, and/or suppliers providing goods and services referenced in or related to this Section shall also be bound by the Related Documents identified in Division 01 Section "Summary."
- B. General Notes, Sections, Plans, Typical Details, and other notes indicated on the structural drawings. In cases of conflict, information indicated on the structural drawings shall govern.

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
- B. Related Sections include the following:
 - 1. Division 31 Section "Earthwork" for fill under slabs-on-grade.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Qualification Data: For Installer, manufacturers, and testing agency.

- E. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- F. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Form materials and form-release agents.
 - 4. Steel reinforcement and accessories.
 - 5. Waterstops.
 - 6. Curing compounds.
 - 7. Floor and slab treatments.
 - 8. Bonding agents.
 - 9. Adhesives.
 - 10. Vapor retarders.
 - 11. Semirigid joint filler.
 - 12. Repair materials.
- G. Floor surface flatness and levelness measurements to determine compliance with specified tolerances.
- H. Field quality-control test and inspection reports.
- I. Minutes of preinstallation conference.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- C. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
 - F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.
- 1.5 DELIVERY, STORAGE, AND HANDLING
- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.0 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other approved panel materials.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- C. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- D. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

- E. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- A. Weldable reinforcing bars: A706/A706M-05a Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type I/II, gray.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
 - 2. Maximum Coarse-Aggregate Size: 1-1/2 inch nominal in fiber-reinforced slabs. ¾ inch nominal in steel-reinforced slabs.
- B. Water: ASTM C 94/C 94M and potable.

2.4 SYNTHETIC FIBER REINFORCEMENT

- A. Synthetic fiber reinforcement shall conform to the requirements of ASTM C 1116. Synthetic fiber reinforcement shall be made of polypropylene multifilament fibers.

2.5 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

Products:

1. Burke by Edoco; Titan Hard.
2. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
3. Curecrete Distribution Inc.; Ashford Formula.
4. Dayton Superior Corporation; Day-Chem Sure Hard.
5. Euclid Chemical Company; Euco Diamond Hard.
6. Kaufman Products, Inc.; SureHard.
7. L&M Construction Chemicals, Inc.; Seal Hard.
8. Meadows, W.R., Inc.; Liqui-Hard.
9. Symons Corporation, a Dayton Superior Company; Buff Hard.

2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2.7 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- A. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

2.8 CURING MATERIALS

- A. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.9 RELATED MATERIALS

- A. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 per ASTM D 2240.
- A. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- C. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, Foundation Walls, Slabs-on-Grade exposed to freeze-thaw: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 3000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Slump Limit: 4 inches, plus or minus 1 inch.
 - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 3/4-inch nominal maximum aggregate size (applies to footings and foundation walls, and all other concrete exposed to freeze/thaw action).
- B. Slabs on Grade: Proportion normal-weight concrete mixture as follows:
 - 1. Minimum Compressive Strength: 4000 psi at 28 days.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 - 3. Maximum aggregate size: 3/4 inch
 - 4. Slump Limit: 4 inches, plus or minus 1 inch.
 - 5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.

2.12 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.0 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- A. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- B. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- C. Construct forms tight enough to prevent loss of concrete mortar.
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- E. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- F. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- G. Chamfer exterior corners and edges of permanently exposed concrete.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.1 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 anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."

3.2 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.3 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- B. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- C. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and

other locations, as indicated.

1. Terminate full-width joint filler strips not less than ½-inch or more than 1-inch below finished concrete surface where joint sealants are indicated.
2. Install joint filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

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

3.6 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

- A. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

- B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

- C. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

- D. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

E. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. 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.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view,.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

A. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces indicated by architect.

B. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated by architect.

2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
- C. Broom Finish: Apply a broom finish to exterior platforms, steps, and ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with the Architect before application.

3.9 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment to concrete floors exposed to view according to manufacturer's written instructions.
 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 2. Comply with Manufacturer's written instructions for application.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- A. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- A. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- B. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

- C. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- A. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- B. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- E. Repair materials and installation not specified above may be used, subject to Architect's approval.
- 3.14 FIELD QUALITY CONTROL
- A. Testing and Inspecting: Contractor to coordinate, owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- A. Inspections:
1. Steel reinforcement placement.
 2. Headed bolts and studs.
 3. Verification of use of required design mixture.
 4. Concrete placement, including conveying and depositing.
 5. Curing procedures and maintenance of curing temperature.
- B. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 100 cu yd. or fraction thereof of each concrete mixture placed each day.

- a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
12. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

END OF SECTION 03 30 00

SECTION 04 05 10 – MORTAR RESTORATION

PART 1 - GENERAL

1.1 SUMMARY OF WORK

- A. For repairing precast concrete and structural concrete, as indicated.

1.2 SUBMITTAL

- A. Submit the following items in time to prevent delay of the work and to allow adequate time for review and resubmittals, if needed; do not order materials or start work before receiving the written approval:
 - 1. Certificates should be submitted stating that all Installers of the repair mortar have successfully completed the training workshop for installation of the mortar.
- B. Samples of all specified materials and Material Safety Data Sheets (MSDS) as appropriate.
- C. Install mortar samples on masonry, preferably on the building. Do not make samples in cups or apply to plywood or other non-masonry surfaces.
- D. Written verification from the Contractor that all specified items will be used. Provide purchase orders, shipping tickets, receipts, etc. to prove that the specified materials were ordered and received.

1.3 QUALITY ASSURANCE/TEST REQUIREMENTS

- A. Mortar Samples: Prepare a sample of each type of repair listed below, using masonry removed from the building where designated by the Owner. Prepare, install, and finish each sample repair according to the specifications. All samples must be applied to masonry. Prepare samples in an area where they will be exposed to the same conditions as will be present on the building during curing. Allow samples to cure at least three days (or longer, if possible) before obtaining Owner's approval for color match. Mortar colors will continue to lighten as they cure and are exposed to the weather, so samples should be installed as far in advance as possible. A slightly darker color will give better long term results. Samples should be viewed from a minimum distance of 12 feet.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Materials are to be delivered, stored, and handled to protect them from damage, extreme temperature, and moisture in accordance with Manufacturer's written instructions.
- B. Deliver and store material in Manufacturer's original, unopened containers with the production date shown on the container or packaging.
- C. Comply with the Manufacturer's written specifications and recommendations for mixing, application, and curing of mortars.

1.5 PROTECTION/SITE CONDITIONS

- A. Cold Weather Requirements: Do not work in temperatures below 40° F, when the substrate is colder than 40° F, or when the temperature is expected to fall below 40° F for 48 hours after installation of repair mortars. Building an enclosure and heating areas to maintain this temperature may only be done with the written approval of the Architect.
- B. Hot Weather Requirements: Protect repair mortar from direct sunlight and wind. Do not use or prepare mortar when ambient air temperature is above 90° F.

PART 2 - PRODUCTS

2.1 MASONRY REPAIR MATERIALS

- A. Manufacturer Basis of Design: Jahn Restoration Mortars, premixed cementitious repair materials formulated to match the color and texture of the existing masonry, not containing any acrylic, latex, or other synthetic polymer additives..
- B. Substitutions: If proposed equal is submitted, lab test to establish equivalent performance levels. Use an independent testing laboratory, as determined by the Architect, and paid for by the submitting party.
- C. Repair Mortars: Jahn M90, "HG" for horizontal repair and "VG" for vertical repair.
 - 1. Single-component, cementitious, mineral based repair mortars designed for the restoration of concrete. Provide material with two separate formulations - for horizontal and vertical applications.
- D. Anchor Setting Mortar: Jahn Anchor Setting Mortar (M80).
 - 1. For setting anchors in existing masonry, provide single-component, cementitious, non-shrinking mortar is designed for securing anchors, tie rods and bolts in new or existing masonry structures. Provide material, Jahn M80, mineral based and maintains a high pH, protecting anchors from rust. Cured material shall achieve approximately 6,500 psi in 24 hours and up to 10,000 psi in 72 hours.
- E. Mechanical anchors and dowels: Stainless steel threaded rod (ASTM F593) with diameters as indicated on Contract Drawings, bent and cut to lengths required to achieve embedments shown on the Contract Drawings..
- F. Water: clean and potable.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. Do not use any additives, such as bonding agents, accelerators, or retardants in the mortar.

3.2 PREPARATION FOR REPAIRS

- A. Remove all loose mortar and masonry prior to installation of the repair mortar. "Sound" masonry with a hammer to verify its integrity. If necessary, cut away an additional 1/2" of the substrate to ensure the surface to be repaired is solid and stable. Remove any sealant residue.
- B. Where cramp anchors, threaded rod anchors, or dowels have been cut and pieces remain embedded in the substrate: Anchors that are free of rust, solidly embedded, and do not project beyond the surface of the masonry unit may remain.
- C. Cut the edges of the repair area to provide a minimum depth of 1/4". The edges of the repair should be square cut. Do not allow any feathered edges in the repair area.
- D. Install mechanical anchors in all repair areas if specified on the Contract Drawing or as otherwise directed by the Architect.
- E. Install anchors as follows:
 - 1. Drill holes to diameter specified on Contract Drawing.
 - 2. Clean holes using compressed, oil-free air, and bristle brushes, until no dust cloud is produced when a brush, inserted the full depth of the hole, is pulled out of the hole.
- F. Embed anchors in back-up using Jahn M80, mixed according to Manufacturer's instructions.
- G. Cover anchors with a minimum of 3/4" repair material.
- H. Clean all dust from surface and pores of the substrate, using clean water and a scrub brush.
- I. For very dry or porous surfaces, pre-wet the substrate ahead of time to prevent the substrate from drawing moisture out of the repair too quickly. Re-wet the surface immediately before applying the repair material.

3.3 MIXING MORTAR FOR REPAIR

- A. It is recommended that a dust mask be worn during mixing. Do not mix more material than can be used within 30 minutes. Discard any mixed material that has been unused for 30 minutes or more.
- B. Mixing ratios for limestone, sandstone, granite, marble, brick, terra cotta, precast concrete, and structural concrete are as follows:
 - 1. Approximately 5 1/2 parts dry material to 1 part water:
 - a. M90 - Structural Concrete
- C. Add water to dry ingredients and mix well. Adjust amount of water according to the weather and the porosity of the substrate.

3.4 APPLICATION OF REPAIR MATERIAL

- A. Apply the mortar mix using a trowel in a series lifts with no waiting period or scratch coat necessary between layers, up to a total maximum thickness of 3". For repairs thicker than 3",

apply mortar in two layers, allowing the first layer to cure for a while before applying the second layer. If applied in layers, scrape off any cement skin that has formed and continue application. Dampen the surface before applying the next layer. Work mortar firmly into the surface of the masonry, including the corners, and under and around all mechanical anchors.

- B. Build up repair material so that it is slightly above the adjacent masonry surface. Allow mortar 15 to 30 minutes to set slightly (wait time will vary with temperature and humidity—longer in cool weather), then scrape off excess material using a straight edge. Do not press down or “float” the repair. Where repairs occur at panel edges or corners, form mortar to match the profile of the surrounding masonry. In all cases, finish repair so that it is as indistinguishable as possible from the adjacent masonry.

3.5 FINISHING TECHNIQUES

- A. Clean any mortar residue from area surround the repair by sponging as many times as necessary with clean water. This should be done before repair material sets.
- B. After the repair has been cured and allowed to dry for at least one week, if the appearance of a repair does not meet the specifications of the job, the surface color of the repair may be enhanced by applying a vapor permeable, mineral based pigmented stain. (CSP Stain, a mineral based pigmented stain is available from Cathedral Stone® Products, Inc., 7266 Park Circle Drive, Hanover, MD 27016; tel. (410) 782-9150; fax. (410) 782-9155.)

3.6 CURING PROCEDURE

- A. Lightly mist the repair with water to wet the entire surface of the finished repair approximately 30 minutes to 1 hour after completion on hot sunny days, and approximately 2 hours or longer, on cool or cloudy days. Time will vary with temperature and humidity. Mist several times a day on the three days following the repair installation. Should access to the repairs be impossible for a period of time, plastic may be used to cover them temporarily. The application of plastic, however, does not remove the need for normal curing techniques. Do not cover repairs with plastic immediately after finishing, water in the repair will be trapped on the surface, causing it to lighten.

3.7 CLEAN UP

- A. Remove uncured mortar from the perimeter of the repair before it dries using clean water and a rubber sponge. Repeat several times with clean water to prevent a halo effect (staining of adjacent masonry). Cured mortar may only be removed chemically or mechanically.
- B. Remove uncured mortar from tools and equipment with water as soon as possible. Cured material may only be removed chemically or mechanically.

END OF SECTION 04 05 10

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior non-load-bearing wall framing.
- B. Related Sections include the following:
 - 1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
 - 2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated. If not indicated, as required by the State Building Code.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height, unless indicated otherwise.
 - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 3/4 inch.
 - b. Roof structural framing upward and downward movement of 1 1/2" minimum at 30 foot span or additional deflection at large span conditions.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
 - 1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
 - 2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
 - 3. Roof Trusses: Design according to AISI's "Standard for Cold-Formed Steel Framing - Truss Design."

1.4 DELEGATED ENGINEERING REQUIREMENTS

- A. Contract Documents: Concept of work specified by this Section is expressed on the Drawings and in Specifications, however, they may not indicate or specify the full extent of the work that may be required.
- B. Delegated Engineering Responsibility: Required fabricator/manufacturer to employ a delegated structural engineer, licensed to practice structural engineering in the jurisdiction where the project will be erected, to provide engineering design for work of this Section to comply with the concept expressed in the Contract Documents and State Building Codes.
- C. Prepare engineering calculations, shop drawings and other submittals and affix professional seal according to the respective jurisdictional licensing regulations.
- D. Prepare Program of Special Inspection requirements for the required special inspections under the State Building Code requirements. Submit the document to the Coordinator of the Program for Special Inspection prior to commencement of construction work under this Section. Owner will arrange for the Special Inspections that are required by the delegated structural engineer.
- E. Changes to the Building Structural Frame: If required by the delegated engineering, submit request for changes to the building structural frame to the Architect. Construction costs associated with change, shall be at no additional cost to the Owner. This includes bracing any structural steel design by the building structural frame design engineer when wall kickers induce rotation into structural members.
- F. Building Structural Frame Movement Design Criteria: Obtain necessary project data from the Structural Engineer of Record for the building frame and make such provision in the work as may be necessary. Identify movement compliance on Shop Drawings.
- G. Exterior Architectural Finish Cladding or Veneer Deflection Criteria:
 - 1. Wind Resistance Criteria: Withstand load effect of 150 percent of inward positive and outward negative design wind loading design pressures acting inward and outward normal to plane of wall according to ASTM E330.
 - a. Masonry Veneer: maximum deflection due to negative or positive wind load pressures $l/600$ of assembly clear span or $1/16$ inch whichever is smaller.
 - b. Exterior Manufactured Stone Cladding: maximum deflection due to negative or positive wind load pressures $l/360$ of assembly clear span or $1/16$ inch whichever is smaller.
 - c. Exterior Adhered Stone Masonry Veneer Cladding: maximum deflection due to negative or positive wind load pressures $l/360$ of assembly clear span or $1/16$ inch whichever is smaller.
 - d. Exterior Insulation Finish System: maximum deflection due to negative or positive wind load pressures $l/360$ of assembly clear span or $1/16$ inch whichever is smaller.
 - e. Other Cladding: maximum deflection due to negative or positive wind load pressures as required or recommended by the cladding manufacturer, but not less than $l/240$ of assembly clear span or $1/16$ inch whichever is smaller.
- H. Interior Wall Framing Deflection Criteria:
 - 1. Withstand applied dead and live load total combined effect not to exceed a bucking/deflection of $l/360$ unless a more stringent requirement by the wall finish manufacturer is required, recommended and/or as indicated in the Construction Documents.

1.5 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.
- D. Qualification Data: For professional engineer and testing agency.
- E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- F. Research/Evaluation Reports: For cold-formed metal framing.

1.6 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications [Delegated Engineering Design]: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- D. Product Tests: Mill certificates or data from a qualified independent testing agency[, or in-house testing with calibrated test equipment] indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.
- E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
 - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."

- H. Comply with AISI's "Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings."
- I. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Allied Studco.
 - 2. AllSteel Products, Inc.
 - 3. California Expanded Metal Products Company.
 - 4. Clark Steel Framing.
 - 5. Consolidated Fabricators Corp.; Building Products Division.
 - 6. Craco Metals Manufacturing, LLC.
 - 7. Custom Stud, Inc.
 - 8. Dale/Incor.
 - 9. Design Shapes in Steel.
 - 10. Dietrich Metal Framing; a Worthington Industries Company.
 - 11. Formetal Co. Inc. (The).
 - 12. Innovative Steel Systems.
 - 13. MarinoWare; a division of Ware Industries.
 - 14. Quail Run Building Materials, Inc.
 - 15. SCAFCO Corporation.
 - 16. Southeastern Stud & Components, Inc.
 - 17. Steel Construction Systems.
 - 18. Steeler, Inc.
 - 19. Super Stud Building Products, Inc.
 - 20. United Metal Products, Inc.

2.2 MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G60, A60, AZ50, or GF30.
- C. Steel Sheet for Vertical Deflection and Drift Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G90.

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: As indicated on Drawings. If not indicated, not less than 18 gauge.
 2. Flange Width: 2" inches.
 3. Section Properties: As required to meet performance requirements for imposed loadings.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 1. Minimum Base-Metal Thickness: Minimum of One gauge heavier than wall stud gauge.
 2. Flange Width: 1-1/4 inches (32 mm) minimum.
- C. Vertical Deflection Clips: Manufacturer's standard bypass or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Dietrich Metal Framing; a Worthington Industries Company.
 - b. MarinoWare, a division of Ware Industries.
 - c. SCAFCO Corporation
 - d. The Steel Network, Inc.
- D. Single Deflection Track [Interior Walls to Roof and/or Floor]: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure.
 1. Minimum Base-Metal Thickness: Minimum of One stud gauge heavier than wall stud gauge.
 2. Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.
- E. Double Deflection Tracks [Interior Walls to Roof and/or Floor]: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
 - a. Minimum Base-Metal Thickness: Minimum of One stud gauge heavier than wall stud gauge.
 - b. Flange Width: 1 inch plus the design gap for 1-story structures and 1 inch plus twice the design gap for other applications.
 2. Inner Track: Of web depth indicated, and as follows:
 - a. Minimum Base-Metal Thickness: 0.0428 inch minimum.

b. Flange Width: Equal to sum of outer deflection track flange width plus 1 inch.

- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure.

2.4 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Anchor clips.
 5. End clips.
 6. Foundation clips.
 7. Gusset plates.
 8. Stud kickers, knee braces, and girts.
 9. Joist hangers and end closures.
 10. Hole reinforcing plates.
 11. Backer plates.

2.5 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Anchor Bolts: ASTM F 1554, Grade 55, threaded carbon-steel hex-headed bolts or headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- F. Welding Electrodes: Comply with AWS standards.

2.6 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- B. Cement Grout: Portland cement, ASTM C 150, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and

water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

- D. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
 - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive

materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

- C. Install load bearing shims or grout between the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated.
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to [bypassing] [infill] studs and anchor to building structure.
 - 4. Connect drift clips to cold formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of width and thickness indicated and stud or stud-track solid blocking of width and thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - a. Install solid blocking at centers indicated.
 - 2. Bridging: Cold-rolled steel channel welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 4. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

3.5 FIELD QUALITY CONTROL

- A. Testing: Owner may engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work where test results indicate that it does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.

- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

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.
- B. DESCRIPTION OF THE WORK:
 - 1. The extent of metal fabrication work is shown and includes items fabricated from iron and steel shapes, plates, bars, strips, tubes, pipes and castings which are not part of structural steel or other metal systems in other sections of these specifications. Such work includes but is not limited to:
 - 2. Section Includes:
 - a. Miscellaneous steel framing and supports.
 - b. Miscellaneous steel trim.
 - c. Downspout guards.
 - f. Bolts, anchors, nuts, washers, fastening devices, etc.
 - g. Pipe sleeves not specified in other sections.
 - h. Miscellaneous structural steel, metals and supports, including shelf angles, loose bearing plates, lintels, steel trim, framing and supports.
- C. Products furnished, but not installed, under this Section:
 - 1. Loose steel lintels.
 - 2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
 - 3. Steel weld plates and angles for casting into concrete.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design ladders, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance of Aluminum Ladders: Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. 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 (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.3 RELATED WORK UNDER OTHER SECTIONS;

- A. Division 09 Section "Painting"

1.4 QUALITY ASSURANCE;

- A. Code and Standards:

1. AISC “Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings”, including “Commentary of the AISC Specifications”.
 2. AISC “Specification for the Design of Cold-Formed Steel Structural Members”.
 3. AWS “Structural Welding Code”.
- B. Qualification for Welding Work: Qualify welding processes and welding operators in accordance with AWS “Standard Qualification Procedure”. Welding operators shall be qualified in accordance with Section 05 of AWS D1.1 Qualification records shall be maintained at the site for review by the Inspection Agency representative and the Architect, when requested.
- C. 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 wherever taking field measurements before fabrication might delay work.
- 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. See concrete and masonry sections of these specifications for installation inserts and anchorage devices.
- E. Shop Assembly: Pre-assemble 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.

1.5 SUBMITTALS

- A. Product Data: For the following:
1. Paint products.
 2. Grout.
- B. Manufacturer’s Data: For information only, submit copies of manufacturer’s specifications, anchor details and installation instructions for products to be used in the fabrication of miscellaneous metal work, including paint products. Transmit copy of instructions to Installer.
- C. Shop Drawings: Submit shop drawings for fabrication and erection of miscellaneous metal assemblies. Include plans and elevations at not less than 1” to 1’-0” scale, and include details of sections and connections at not less than 3” to 1’-0” scale. Show anchorage and accessory items. Provide templates for anchor and bolt installation by others.
- D. Samples: For each type and finish of extruded nosing and tread.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces without blemishes.

2.2 FERROUS METALS

- A. Metal Surfaces, General: For fabrication of miscellaneous metal work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trades names and roughness.
- B. Recycled Content of Steel Products: Provide products with average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 25 percent
- C. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- D. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- G. Abrasive-Surface Floor Plate: Steel plate with abrasive material metallurgically bonded to steel.
- H. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- I. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- J. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches and/or as indicated.
 - 2. Material: Galvanized steel, ASTM A 653/A 653M, commercial steel, Type B, with G90 coating; 0.108-inch nominal thickness.
 - 3. Material: Cold-rolled steel, ASTM A 1008/A 1008M, commercial steel, Type B; 0.0966-inch minimum thickness; coated with rust-inhibitive, baked-on, acrylic enamel or hot-dip galvanized after fabrication for exterior applications.
- K. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M.

2.3 NONFERROUS METALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- B. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- C. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- D. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
- E. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).
- F. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze)

2.4 ANCHORS:

- A. Threaded-Type Concrete Inserts: Galvanized ferrous castings, internally threaded to receive 3/4" diameter machine bolts; either malleable iron complying with ASTM A 47 or cast steel complying with ASTM A 27; hot dipped galvanized.
- B. Wedge-Type Concrete Inserts: Galvanized box-type ferrous castings, designed to accept 3/4" diameter bolts having special wedge-shaped heads; either malleable iron complying with ASTM A 47 or cast steel complying with ASTM A 27; hot dipped galvanized.
 - 1. Provide carbon steel bolts having special wedge-shaped heads, nuts, washers and shims; all galvanized in compliance with ASTM A 153.

- C. Slotted-Type Concrete Inserts: Galvanized 1/8" thick pressed steel plate complying with ASTM A 283; box-type welded construction with slot designed to receive 3/4" diameter square head bolt and with knockout cover; hot dipped galvanized.

2.5 FASTENERS

- A. General: Provide zinc-coated fasteners, with galvanizing complying with ASTM A 153, for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required for the installation of miscellaneous metal items.
1. Standard Bolts and Nuts: ASTM A 307, Grade A, regular hexagon head.
 2. Lag Bolts: FS FF-B-561, square head type.
 3. Machine Screws: FS FF-S-92, cadmium plated steel.
 4. Wood Screws: FS FF-S-111, flat head, carbon steel.
 5. Plain Washers: FS FF-W-92, round general assembly, grade carbon steel.
 6. Lock Washers: FS FF-W-84, helical spring type, carbon steel.
 7. Masonry Anchorage Devices: Expansion shields, FS FF-S-325.
 8. Toggle Bolts: Tumble-wing type; FS FF-B-588, type, class and style as required.
- B. General: 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 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls.
1. Provide stainless-steel fasteners for fastening aluminum.
 2. Provide stainless-steel fasteners for fastening stainless steel.
 3. Provide stainless-steel fasteners for fastening nickel silver.
 4. Provide bronze fasteners for fastening bronze.
- C. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
- E. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.6 PAINT:

- A. Metal primer Paint: Primer selected must be compatible with finish coats of paint. Coordinate selection of metal primer with finish paint requirements specified in Division 09.
- B. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in galvanized steel, complying with Military Specification MIL-P-21035 (Ships).
1. Product conforming to above specification: ZRC cold galvanizing compound.
- C. Where galvanizing prior to completing fabrication cannot be avoided, joints shall be welded after fabrication, ground smooth and finished with four (4) full coats of California Products Corp. WW Totrust, Sealube ZRC, ZIRP by Duncan Galvanizing or approved equal.

2.7 FABRICATION, GENERAL

- A. Workmanship: Use materials of size and thickness shown or, if not shown, of required size and thickness to produce strength and durability in finished product. Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.
- B. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- C. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32" unless otherwise shown. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Weld corners and seams continuously, complying with AWS recommendations. Grind exposed welds smooth and flush, to match and blend adjoining surfaces.
- E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head (countersunk) screws or bolts.
- F. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices as shown and as required to provide adequate support for intended use.
- G. Cut, reinforce, drill and tap miscellaneous metal work as required to receive finish hardware and similar items.
- H. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.
- I. Galvanizing: provide a hot-dip zinc coating, with the addition of 0.05 – 0.09% Nickel to the zinc bath, for those items supporting or built-into exterior masonry or concrete, steel items exposed to the weather, and other items shown or specified to be galvanized, as follow:
 - 1. ASTM A 153 for galvanizing iron and steel hardware.
 - 2. ASTM A 123 for galvanizing rolled, pressed and forged steel shapes, plate, bars and strip 1/8" thick and heavier.
 - 3. After pickling and prior to galvanizing, the steel shall be immersed in a bath of zinc ammonium chloride. The dry kettle process shall be used to eliminate any flux inclusions on the surface of the galvanized material.
- J. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- K. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors as indicated. If not indicated, at not more than 24 inches o.c. maximum spacing.
- L. Shop Painting:
 - 1. Shop paint miscellaneous metal work, except members or portions of members to be embedded in concrete or masonry, surfaces and edges to be field welded, and galvanized surfaces, unless otherwise specified.
 - 2. Remove scale, rust and other deleterious materials before applying shop coat. Clean off heavy rust and loose mill scale in accordance with SSPC SP-2 "Hand Tool Cleaning", or SSPC SP-3 "Power Tool Cleaning", or SSPC SP-7 "Brush-off Blast Cleaning".
 - 3. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".

4. Apply one shop coat of metal primer paint to fabricated metal items, except apply two coats of paint to surfaces inaccessible after assembly or erection. Change color of second coat to distinguish it from the first.
5. Immediately after surface preparation, brush or spray on metal primer paint, applied in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 1.5 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.
6. Where painting of galvanized steel is indicated, provide factory-applied polyamide epoxy primer, 2.0 milsDFT, minimum, in preparation for field applied topcoat. Apply primer within twelve hours after galvanizing at the galvanizer's plant in a controlled environment meeting applicable environmental regulations, and as recommended by the coating manufacturer.
 - a. Provide Duncan PrimerGalv for all galvanized surfaces indicated to be field painted.
7. Shop Marking: When shop markings are utilized on metal items for the convenience of the fabricator, or installer, use marking devices which are compatible to the subsequent paint coatings; otherwise remove markings upon installation and prepare surfaces for their finish coatings.

2.8 MISCELLANEOUS METAL FABRICATIONS:

A. Rough Hardware:

1. Furnish bent or other custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel and iron shapes as required for framing and supporting woodwork and for anchoring or securing woodwork to concrete or other structures. Straight bolts and other stock rough hardware are specified in Division 06.
2. Manufacture or fabricated items of sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

B. Loose Bearing Plates:

1. Provide for steel items bearing on masonry or concrete construction, made flat, free from warps or twists, and of required thickness and bearing area, as indicated. Drill plates to receive anchor bolts and for grouting as required. Galvanize after fabrication.

C. Loose Steel Lintels:

1. Provide loose structural steel shape lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together to form a single unit. Provide not less than 6" bearing at each side of openings, unless otherwise shown.
 - a. Galvanize loose steel lintels to be installed at exterior walls.

D. Miscellaneous Framing and Supports:

1. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.
2. Reinforce openings through steel deck, greater than 12" x 12" (144 sq. in.), with angle framing as detailed, and indicated on the Structural Drawings.
3. Fabricate miscellaneous units to sizes, shapes and profiles shown or, if not shown, of required dimensions to receive adjacent other work to be retained by framing. Except as otherwise shown, fabricate from structural steel shapes and plates and steel bars, of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and similar items.
4. Equip units with integrally welded anchor straps for casting into poured concrete or building into masonry wherever required. Furnish inserts if units must be installed after

concrete is placed. Except as otherwise shown, space anchors 24" o.c. and provide minimum anchor units of 1-1/4" x 1/4" x 8" steel straps.

a. Galvanize exterior miscellaneous frames and supports.

5. Miscellaneous Steel trim:

a. Galvanize exterior miscellaneous steel trim.

2.9 MISCELLANEOUS MATERIALS

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Shop Primers: Provide primers that comply with Division 09 painting Sections.
- C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
- D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- E. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- F. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- G. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Concrete: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3,000 psi (20 MPa) minimum.
- I. At protection bollards provide 1/8" nominal wall thickness polyethylene thermoplastic (HDPE) covers where indicated

2.10 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19 mm) bolts, spaced not more than 6-inches (150 mm) from ends and 24-inches (600 mm) o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.11 FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.

1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches (600 mm) o.c.

- D. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

2.12 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
- C. Galvanize exterior miscellaneous steel trim.

2.13 PIPE DOWNSPOUT GUARDS

- A. Fabricate pipe downspout guards from 3/8-inch- thick by 12-inch- wide steel plate, bent to fit flat against the wall or column at both ends and to fit around pipe with 2-inch (50-mm) clearance between pipe and pipe guard. Drill each end for two 3/4-inch (19-mm) anchor bolts.
- B. Galvanize pipe downspout guards.

2.14 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

2.15 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Galvanize loose steel lintels located in exterior walls.

2.16 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.17 STAINLESS STEEL SHEET

- A. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316, stretcher-leveled standard of flatness.
 1. Stainless-Steel Sheet: 0.050 inch, minimum thickness recommended to comply with performance requirements for applications indicated.
 - a. Finish: No. 4, unless otherwise selected.

2.18 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.19 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with universal shop primer or primers specified in Division 09 painting Sections unless zinc-rich primer is indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Division 09 Section "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine the areas and conditions under which miscellaneous metal items are to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, such as concrete inserts, 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.

3.3 INSTALLATION:

- A. Setting Loose Bearing Plates:
 - 1. Clean concrete and masonry bearing surfaces of any bond-reducing materials, and roughen to improve bond to surfaces. Clean the bottom surface of bearing plates.
 - 2. Set loose bearing plates on wedges, or other adjustable devices. After the joints have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut-off flush with the edge of the bearing plate before packing with mortar.
 - 3. Pack bedding mortar solidly between bearing surfaces and plates to ensure that no voids remain.

3.4 GALVANIZING:

- A. Completely clean interior as well as exterior surfaces and coat with zinc. Provide vent holes for air and frothy fluxes to be allowed to flow upward and completely out; cleaning solutions and molten zinc must be allowed to flow in and completely wet surfaces.
- B. Locate vent holes at the highest point and drainage holes at the lowest point each member.
- C. Interconnect all sections of fabricated pipework with full open tee or with miter joints. Each enclosed section must be provided with a vent hole at each end.
- D. Base plates and end plates must be designed to facilitate venting and draining. Fully cutting the plate provides minimum obstruction to a full, free flow into and out of the pipe. Since this is not always possible, the use of vent holes in the plate often provides a solution.
- E. Close vent holes with drive caps or plugs installed after galvanizing, hammer in and file off flush with surrounding surfaces.
- F. Completely submerge tubular structures in one dip in the galvanizing kettle.
- G. Provide vent and drainage holes in internal gusset plates and end flanges. In circular hollow shapes these should be located diametrically opposite to each other at opposite ends of the member.
- H. In rectangular hollow shapes, the four corners of the internal gusset plates should be cropped. Internal gusset plates in all large hollow sections should be provided with an additional opening at the center.

3.5 FASTENING TO IN-PLACE CONSTRUCTION:

- A. Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items, including ladder, cages, alternating tread ladders, etc. to in-place construction; using threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, wood screws and other connectors as required.

3.6 CUTTING, FITTING AND PLACEMENT:

- A. Perform cutting, drilling and fitting required for installation of miscellaneous metal items. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Provide temporary bracing or anchors in formwork for items which are to be built into concrete, masonry, or similar construction.
- B. 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 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.

3.7 FIELD WELDING:

- A. 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.

3.8 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.

- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.9 TOUCH-UP PAINTING:

- A. Cleaning and touch-up painting of field welds, bolted connections and abraded areas of the shop paint on miscellaneous metal is specified in Division 09.

3.10 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
- C. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.11 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.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 50 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Materials and installation requirements for other work, commonly assigned to carpentry trade, are specified in other sections of these specifications.
- B. The types of carpentry work specified in this section include (but are not necessarily limited to) the following:
 - 1. Wood furring.
 - 2. Wood grounds, nailers, blocking.
 - 3. Miscellaneous wood framing.
 - 4. Plywood backing panels.
- C. Fire-retardant treated plywood and lumber.

1.3 RELATED WORK UNDER OTHER SECTIONS

- 1. Division 09 Section "Gypsum Board".
- 2. Division 26, Electrical, mounted equipment.

1.4 SUBMITTALS

- A. Wood Treatment Data: For information only, submit chemical treatment manufacturer's instructions for proper use of each type of treated material.
 - 1. Certificate: Pressure Treatment, for each type specified, include certification by treating plant stating chemicals and process used, net amount of salts retained and conformance with applicable standards.
 - 2. For water-borne preservatives, include statement that moisture content of treated materials was reduced to a maximum of 15% prior to shipment to project site.
- B. Certificates: Fire-Retardant Treatment, certification by testing plant that treatment material complies with this specification and with all governing regulations, and treatment will not bleed through finished surfaces.
- C. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preserved-treated wood.
 - 2. Fire-retardant-treated wood.
 - 3. Engineered wood and LVL products.

4. Power-driven fasteners.
5. Powder-actuated fasteners.
6. Expansion anchors.
7. Metal framing anchors.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground.
 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

2.3 FIRE-RETARDANT TREATED WOOD:

- A. Fire-Retardant Treatment: AWPA C20 for lumber and AWPA C27 for plywood; noncorrosive type. Provide at building interior where required by code.
- B. Where lumber or plywood is indicated to be fire-retardant treated, provide Dricon Fire-Retardant Treatment Chemicals (NO SUBSTITUTION), to achieve a flame spread rating of not more than 25 when tested in accordance with UL Test 723 or ASTM E 84.
 1. Where transparent or paint finish is shown or scheduled for “FR-T” wood, use a fire-retardant treatment which will not bleed through or adversely affect bond of finish.
- C. Complete fabrication prior to treatment, wherever possible, to minimize cutting and jointing after treatment.
- D. Coat surfaces cut after treatment with a heavy brush coat of the same fire-retardant chemical.
- E. Kiln-dry lumber to a maximum moisture content of 19% and plywood to a minimum moisture content of 15%, after treatment.
- F. Inspect each piece of lumber and plywood after drying; do not use warped, twisted, bowed or otherwise damaged or defective pieces.
 1. Provide UL label on each piece of fire-retardant treated lumber and plywood.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 1. Provide wood for support or attachment of other work such as cant strips, bucks, nailers, blocking, furring, grounds, stripping and similar members. Provide lumber of sizes shown or specified, worked to shapes shown, and as follows:
 - a. Moisture Content: 15% maximum for lumber items not specified to receive wood preservative treatment.
 2. Grade: Construction Grade light framing size lumber of any species, or board size lumber, as required. Provide Construction Grade boards (RIS or WCLIB) or No. 2 boards (SPIB or WWPA).
- B. For items of dimension lumber size, provide Construction, or No. 2 grade lumber and any of the following species with moisture content not exceeding 15%:
 1. Hem-fir (north); NLGA.
 2. Mixed southern pine; SPIB.
 3. Spruce-pine-fir; NLGA.
 4. Hem-fir; WCLIB or WWPA.
 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 6. Western woods; WCLIB or WWPA.

7. Northern species; NLGA.
 8. Eastern softwoods; NeLMA.
- C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine; No. 2 grade; SPIB.
 2. Hem-fir or hem-fir (north); Construction or No. 2 Common grade; NLGA, WCLIB, or WWP.
 3. Spruce-pine-fir (south) or spruce-pine-fir; Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWP.
 4. Eastern softwoods; No. 2 Common grade; NeLMA.
 5. Northern species; No. 2 Common grade; NLGA.
 6. Western woods; Construction or No. 2 Common grade; WCLIB or WWP.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.
- G. Plywood Exposed to Exterior:
1. Smooth Surface: A-C/EXT-APA with "A" face exposed or MDO/EXT-APA.
- H. Plywood Exposed on Interior:
1. Smooth Surface: A-D/INT-APA with "A" face exposed or MDO/EXT-APA.
- I. Concealed Plywood: Provide fire retardant treated plywood where required by building &/or fire codes for project construction type that require concealed wood to be fire retardant treated.
1. Exterior: C-D/INT-APA with exterior glue or C-C/EXT-APA.
 2. Interior: C-D Plugged/INT-APA.
- J. Electrical Panel Backboards: For backing panels of electrical and communication equipment, provide 3/4 inch (19 mm) C-D/INT-APA with exterior glue, fire-retardant treated. Paint plywood prior to installation of electrical and/or communication components. Color to be battleship gray.

2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: NES NER-272.

- C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- D. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry assemblies and equal to four times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).
- E. Wood Screws: ASME B18.6.1
- F. Screws for securing wood to metal stud framing: Self tapping: Teks #12 2-3/4 in. Phillips Flat-Head Self-Drilling Screws manufactured by ITW Buildex and Illinois Tool Works, Inc; Phillips II Plus Wood to Metal Screws manufactured by Phillips Fasteners, Fastenal or other similar products specifically recommended for use securing wood to metal stud framing.
- G. Screws specifically designed for securing through metal to wood blocking #10-24x 1-7/16 inch self-drilling flat head as manufactured by Fastenal; ITW Buildex and Illinois Tool Works; Phillips Fasteners, or other manufacturer providing products specifically designed for securing blocking when first drilling through metal to engage the wood blocking.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Install plywood backing panels on stud walls by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Install plywood backing panels on CMU and/or concrete walls by fastening to pressure treated 2x4 framing installed vertically on the CMU/concrete wall surface; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- F. Install sill sealer gasket to form continuous seal between sill plates and foundation walls.
- G. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- H. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches (2438 mm) o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches (2438 mm) o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal- (38-mm actual-) thickness.
 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. (9.3 sq. m) and to solidly fill space below partitions.
 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet (6 m) o.c.
- I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
1. Use inorganic boron for items that are continuously protected from liquid water.
 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 4. Wood Screws: ASME B18.6.1
- K. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Adhesives (for School projects) shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers." Revise first paragraph below to include other kinds of nails if required.
- L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.
- M. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

1. Comply with approved and/or indicated fastener patterns where applicable. Before fastening, mark fastener locations, using a template made of sheet metal, plastic, or cardboard.
2. Use finishing nails unless otherwise indicated. Countersink nail heads and fill holes with wood filler.
3. Use common nails unless otherwise indicated. Drive nails snug but do not countersink nail heads.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.
- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preserved-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.
- E. ROOF BLOCKING FASTENERS
 1. All blocking shall be fastened in compliance with the guidelines set-forth in the latest Factory Mutual publications.
 2. Fasteners for wood blocking shall be staggered and spaced twelve (12) inches on center. The staggered fastening pattern shall be increased within eight (8) feet from outside corners to six (6) inches on center. Smaller pieces of blocking, such as at penetrations, shall have a minimum of four fasteners per piece. A fastener shall be located no more than four inches from the end of each piece of blocking.
 3. Counter bore at all bolt heads, nuts, and washers as may be required to provide a flush surface for installation of new roofing materials.

3.3 WOOD FURRING INSTALLATION

- A. Install plumb and level with closure strips at edges and openings. Shim with wood as required.
 1. Firestop furred spaces on walls at each floor level, with wood blocking or incombustible materials, accurately fitted to close furred spaces. Comply with governing regulations.
- B. Furring to Receive Gypsum Drywall: Unless otherwise shown, provide 1" x 3" furring at 24" o/c. spacing, in the direction required for support of drywall; refer to Division 09.
- C. Suspended Furring: Provide size and spacing shown, including hangers and attachment devices.
- D. Tolerance: Shim and level wood furring to a tolerance of 1/8" in 10'-0", except 1/4" in 10'-0" at thick coat plaster work.

3.4 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet or sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- C. Where wood preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

END OF SECTION 06 10 00

SECTION 062010 - EXTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Exterior **wood medium-density overlay MDO cellular PVC and foam plastic** trim.

- B. Related Requirements:

- 1. Division 06 Section "Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.
 - 2. Division 06 Section "Exterior Rough Carpentry" for elevated decks including stairs and railings.

1.3 ACTION 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.

- 1. Include copies of warranties from chemical-treatment manufacturers for each type of treatment.

- B. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

- C. Samples for Verification:

- 1. For cellular PVC trim, with 1/2 of exposed surface finished; **32 sq. in.**

1.4 INFORMATIONAL SUBMITTALS

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

- 1. Cellular PVC trim.

- B. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

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

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack 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.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
1. For exterior ornamental wood columns, comply with manufacturer's written instructions and warranty requirements.
- B. 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.

1.8 WARRANTY

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

PART 2 - PRODUCTS

2.1 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than **1-1/2 inches (38 mm)** into wood substrate.
1. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
 2. For applications not otherwise indicated, provide **stainless-steel** fasteners.
- B. .

- C. Adhesive for Cellular PVC Trim: Product recommended by trim manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

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

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
 - 1. Scribe and cut exterior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
 - 2. Install to tolerance of **1/8 inch in 96 inches (3 mm in 2438 mm)** for level and plumb. Install adjoining exterior finish carpentry with **1/32-inch (0.8-mm)** maximum offset for flush installation and **1/16-inch (1.5-mm)** maximum offset for reveal installation.
 - 3. Coordinate exterior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install cellular PVC trim to comply with manufacturer's written instructions.
- B. Install trim with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than **24 inches (610 mm)** long except where necessary.
 - 1. Use scarf joints for end-to-end joints.
 - 2. Stagger end joints in adjacent and related members.

- C. Fit exterior joints to exclude water. Cope at returns and miter at corners to produce tight-fitting joints with full-surface contact throughout length of joint. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
- D. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.

3.5 ADJUSTING

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

3.6 CLEANING

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

3.7 PROTECTION

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

END OF SECTION 062010

SECTION 064020 - INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Interior frames and jambs.
2. Wood cabinets.
3. Plastic-laminate cabinets.
4. Wood countertops.
5. Plastic-laminate countertops.
6. Solid-surfacing-material countertops.
7. Laminated-plastic laboratory tops.
8. Closet and utility shelving.
9. Shop finishing of interior woodwork.

- B. Related Sections include the following:

1. Division 06 Section "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing woodwork and concealed within other construction before woodwork installation.
2. Division 06 Section "Finish Carpentry" for interior carpentry exposed to view that is not specified in this Section.

1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.
- B. Rough carriages for stairs are a part of interior architectural woodwork. Platform framing, headers, partition framing, and other rough framing associated with stairwork are specified in Division 06 Section "Rough Carpentry."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated[, **including**] [**cabinet hardware and accessories**] [**and**] [**finishing materials and processes**].

- B. Product Data: For [panel products] [high-pressure decorative laminate] [adhesive for bonding plastic laminate] [solid-surfacing material] [fire-retardant-treated materials] [cabinet hardware and accessories] [handrail brackets] [and] [finishing materials and processes].
1. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
1. Show details full size.
 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
 3. Show locations and sizes of cutouts and holes for [plumbing fixtures] [faucets] [soap dispensers] [and other items] installed in architectural woodwork.
 4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.
 5. Apply WI-certified compliance label to first page of Shop Drawings.
- D. Samples for Initial Selection:
1. Shop-applied transparent finishes.
 2. Shop-applied opaque finishes.
 3. Plastic laminates.
 4. PVC edge material.
 5. Thermoset decorative panels.
 6. Solid-surfacing materials.
- E. Samples for Verification:
1. Lumber with or for transparent finish, not less than [50 sq. in. (300 sq. cm)] [5 inches (125 mm) wide by 24 inches (600 mm) long], for each species and cut, finished on 1 side and 1 edge.
 2. Veneer leaves representative of and selected from flitches to be used for transparent-finished woodwork.
 3. Veneer-faced panel products with or for transparent finish, [8 by 10 inches (200 by 250 mm)] [12 by 24 inches (300 by 600 mm)], for each species and cut. Include at least one face-veneer seam and finish as specified.
 4. Lumber and panel products with shop-applied opaque finish, 50 sq. in. (300 sq. cm) for lumber and 8 by 10 inches (200 by 250 mm) for panels, for each finish system and color, with [1/2 of] exposed surface finished.
 5. Plastic laminates, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish[, with 1 sample applied to core material] [and specified edge material applied to 1 edge].
 6. Thermoset decorative-panels, 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish[, with edge banding on 1 edge].
 7. Solid-surfacing materials, 6 inches (150 mm) square.
 8. Corner pieces as follows:
 - a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches (450 mm) high by 18 inches (450 mm) wide by 6 inches (150 mm) deep.
 - b. Miter joints for standing trim.

9. Exposed cabinet hardware and accessories, one unit for each type[**and finish**].

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For [**Installer**] and or [**fabricator**].
- B. Product Certificates: For each type of product, signed by product manufacturer.
- C. Woodwork Quality Standard Compliance Certificates: [**AWI Quality Certification Program certificates**] [**WI-certified compliance certificates**].

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.[**Shop is a certified participant in AWI's Quality Certification Program.**]
- B. Installer Qualifications: [**Fabricator of products**] [**Certified participant in AWI's Quality Certification Program**]
- C. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.
- D. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 1. Provide AWI Quality Certification Program [**labels**] [**and**] [**certificates**] indicating that woodwork[, **including installation,**] complies with requirements of grades specified.
- E. Quality Standard: Unless otherwise indicated, comply with WI's "Manual of Millwork" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 1. Provide WI-certified compliance [**labels**] [**and**] [**certificates**] indicating that woodwork[, **including installation,**] complies with requirements of grades specified.
 2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with such selections and requirements in addition to the quality standard.
- F. Fire-Test-Response Characteristics: Where fire-retardant materials or products are indicated, provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.
- G. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.7 DELIVERY, STORAGE, AND HANDLING

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

1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between **60 and 90 deg F (16 and 32 deg C)** and relative humidity between **[25 and 55] <Insert humidity range>** percent during the remainder of the construction period.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

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

PART 2 - PRODUCTS

2.1 WOODWORK FABRICATORS

- A. Available Fabricators: Subject to compliance with requirements, fabricators offering interior architectural woodwork that may be incorporated into the Work include, but are not limited to, the following:
- B. Fabricators: Subject to compliance with requirements, provide interior architectural woodwork by one of the following:

2.2 MATERIALS

- A. General: Provide materials that comply with requirements of **[AWI's]** **[WI's]** quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Certified Wood: Interior architectural woodwork shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- C. Wood Species for Opaque Finish: **[Any closed-grain hardwood]** **[Eastern white pine, sugar pine, or western white pine]**.
- D. Wood Products: Comply with the following:
 - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content .
Low-Emitting Materials: Composite wood products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 - 2. Hardboard: AHA A135.4.
 - 3. Medium-Density Fiberboard: ANSI A208.2, Grade MD[, **made with binder containing no urea formaldehyde**].
 - 4. Particleboard: ANSI A208.1, Grade M-2[, **made with binder containing no urea formaldehyde**].
 - 5. Particleboard: Straw-based particleboard complying with requirements in ANSI A208.1, Grade M-2, except for density.
 - 6. Softwood Plywood: DOC PS 1[, **Medium Density Overlay**].
 - 7. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1[, **made with adhesive containing no urea formaldehyde**].
- E. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
 - 1. Provide PVC or polyester edge banding complying with LMA EDG-1 on components with exposed or semiexposed edges.
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering high-pressure decorative laminates that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
 - a. Abet Laminati, Inc.
 - b. Arborite; Division of ITW Canada, Inc.
 - c. Formica Corporation.
 - d. Lamin-Art, Inc.
 - e. Nevamar Company, LLC; Decorative Products Div.
 - f. Panolam Industries International Incorporated.
 - g. Westinghouse Electric Corp.; Specialty Products Div.
 - h. Wilsonart International; Div. of Premark International, Inc.
- G. Chemical-Resistant, High-Pressure Decorative Laminate: NEMA LD 3, Grade HGP, and as follows:
1. Laminate has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.9.5:
 - a. Nitric Acid (30 Percent): Moderate effect.
 - b. Sulfuric Acid (77 Percent): Moderate effect.
 - c. Hydrochloric Acid (37 Percent): Moderate effect.
 - d. Phosphoric Acid (75 Percent): No effect.
 - e. Acetic Acid (98 Percent): No effect.
 - f. Formaldehyde: No effect.
 - g. Ethyl Acetate: No effect.
 - h. Ethyl Ether: No effect.
 - i. Phenol (85 Percent): Moderate effect.
 - j. Benzene: No effect.
 - k. Xylene: No effect.
 - l. Butyl Alcohol: No effect.
 - m. Furfural: No effect.
 - n. Methyl Ethyl Ketone: No effect.
 - o. Sodium Hydroxide (25 Percent): No effect.
 - p. Sodium Sulfide (15 Percent): No effect.
 - q. Ammonium Hydroxide (28 Percent): No effect.
 - r. Zinc Chloride: No effect.
 - s. Gentian Violet: No effect.
 - t. Methyl Red: No effect.
 2. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Formica Corporation; Lab Grade 840 Black.
 - b. Panolam Industries International Incorporated; Pionite Chemguard.
 - c. Wilsonart International, Div. of Premark International, Inc.; Chemsurf.
 - d. **<Insert manufacturer's name; product name or designation.>**
- H. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. ABA Industries.
 - b. Avonite, Inc.
 - c. E. I. du Pont de Nemours and Company.
 - d. Formica Corporation.
 - e. LG Chemical, Ltd.
 - f. Meganite Inc.; a division of the Pyrochem Group.
 - g. Nevamar Company, LLC; Decorative Products Div.
 - h. Samsung; Cheil Industries Inc.
 - i. Swan Corporation (The).
 - j. Transolid, Inc.
 - k. Wilsonart International; Div. of Premark International, Inc.
 - l. <Insert manufacturer's name.>
 3. Type: Standard type[or **Veneer type made from material complying with requirements for Standard type, as indicated**], unless Special Purpose type is indicated.
 4. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**].
- I. Tempered Float Glass for Cabinet Doors: ASTM C 1048, Kind FT, Condition A, Type I, Class **[1 (clear)] [2 or 3 (tinted)]**, Quality-Q3[, **with exposed edges seamed before tempering**], 6 mm thick, unless otherwise indicated.
1. Tint Color: As selected from manufacturer available tint colors.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this Article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified.
1. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective.
 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
 3. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Comply with performance requirements of AWPA C20 (lumber) and AWPA C27 (plywood). Use the following treatment type:
1. Exterior Type: Organic-resin-based formulation thermally set in wood by kiln drying.
 2. Interior Type A: Low-hygroscopic formulation.

3. Mill lumber after treatment within limits set for wood removal that do not affect listed fire-test-response characteristics, using a woodworking plant certified by testing and inspecting agency.
 4. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
 5. Kiln-dry materials before and after treatment to levels required for untreated materials.
- C. Fire-Retardant Particleboard: Panels complying with the following requirements, made from softwood particles and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 25 or less per ASTM E 84.
1. For panels **3/4 inch (19 mm)** thick and less, comply with ANSI A208.1 for Grade M-2 except for the following minimum properties: modulus of rupture, **1600 psi (11 MPa)**; modulus of elasticity, **300,000 psi (2070 MPa)**; internal bond, **80 psi (550 kPa)**; and screw-holding capacity on face and edge, **250 and 225 lbf (1100 and 1000 N)**, respectively.
 2. For panels **13/16 to 1-1/4 inches (20 to 32 mm)** thick, comply with ANSI A208.1 for Grade M-1 except for the following minimum properties: modulus of rupture, **1300 psi (9 MPa)**; modulus of elasticity, **250,000 psi (1720 MPa)**; linear expansion, 0.50 percent; and screw-holding capacity on face and edge, **250 and 175 lbf (1100 and 780 N)**, respectively.
 3. Product: Subject to compliance with requirements, provide "Duraflake FR" by Weyerhaeuser.
- D. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.
1. Product: Subject to compliance with requirements, provide "Meditate FR" by SierraPine Ltd.; Meditate Div.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware (Scheduled by Describing Products)."
- B. Butt Hinges: **2-3/4-inch (70-mm)**, 5-knuckle steel hinges made from **0.095-inch- (2.4-mm-)** thick metal, and as follows:
1. Semiconcealed Hinges for Flush Doors: BHMA A156.9, B01361.
 2. Semiconcealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, **[100] [135] [170]** degrees of opening[, **self-closing**].
- D. Back-Mounted Pulls: BHMA A156.9, B02011.

- E. Wire Pulls: Back mounted, solid [metal] [5 inches (127 mm) long, 2-1/2 inches (63.5 mm) deep, and 5/16 inch (8 mm) in diameter].
- F. Catches: [Magnetic catches, BHMA A156.9, B03141]
- H. Adjustable Shelf Standards and Supports: [BHMA A156.9, B04102; with shelf brackets, B04112].
- I. Shelf Rests: BHMA A156.9, B04013; [metal, two-pin type with shelf hold-down clip].
- J. Drawer Slides: BHMA A156.9, B05091.
 - 1. Standard Duty (Grade 1, Grade 2, and Grade 3): Side mounted[and extending under bottom edge of drawer]; [full-extension] [partial-extension] type; [zinc-plated steel] [epoxy-coated steel] with polymer rollers.
 - 2. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; [full-extension] type; zinc-plated steel ball-bearing slides.
 - 3. Box Drawer Slides: [Grade 1HD-100]; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.
 - 4. File Drawer Slides: [Grade 1HD-200]; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.
 - 5. Pencil Drawer Slides: [Grade 2] ; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.
 - 6. Keyboard Slides: [Grade 1HD-100]; for computer keyboard shelves.
- K. [Aluminum] Slides for Sliding Glass Doors: BHMA A156.9, B07063.
- L. Door Locks: BHMA A156.11, E07121.
- M. Drawer Locks: BHMA A156.11, E07041.
- N. Grommets for Cable Passage through Countertops: [2-inch (51-mm)] OD, [black] , molded-plastic grommets and matching plastic caps with slot for wire passage.
 - 1. Product: Subject to compliance with requirements, provide "[OG] [SG] series" by Doug Mockett & Company, Inc.

2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.
- C. Rough Carriages for Stairs: [Select Structural] grade and[any of] the following species, kiln dried to 15 percent maximum moisture content:
 - 1. Douglas fir-larch.
 - 2. Douglas fir-south.
 - 3. Douglas fir-larch (north).
 - 4. Hem-fir.

5. Hem-fir (north).
 6. Southern pine.
 7. Spruce-pine-fir (south).
 8. Spruce-pine-fir.
- D. Rough Carriages for Stairs: Laminated veneer lumber, made with an exterior-type adhesive complying with ASTM D 2559, and with the following allowable design values as determined according to ASTM D 5456:
1. Extreme Fiber Stress in Bending, Edgewise: **[2600 psi (17.9 MPa)]** for **12-inch nominal-** (286-mm actual-) depth members.
 2. Modulus of Elasticity, Edgewise: [**1,800,000 psi (12 400 MPa)** <Insert value>.
- E. 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.
- F. Adhesives, General: Adhesives shall not contain urea formaldehyde.
- G. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- H. VOC Limits for Installation Adhesives: Installation adhesives shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
1. Wood Glues: 30 g/L.
 2. Multipurpose Construction Adhesives: 70 g/L.
 3. Contact Adhesive: 250 g/L.
- I. Adhesive for Bonding Plastic Laminate: **[PVA] [Urea formaldehyde] [Resorcino]**.
1. Adhesive for Bonding Edges: Hot-melt adhesive[**or adhesive specified above for faces**].
- 2.6 FABRICATION, GENERAL
- A. Interior Woodwork Grade: Unless otherwise indicated, provide **[Premium]** grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members **3/4 Inch (19 mm)** Thick or Less: **1/16 inch (1.5 mm)**.
 2. Edges of Rails and Similar Members More Than **3/4 Inch (19 mm)** Thick: **1/8 inch (3 mm)**.
 3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: **1/16 inch (1.5 mm)**.
- E. Complete fabrication, including assembly[, **finishing,**] and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- F. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
1. Seal edges of openings in countertops with a coat of varnish.
- G. Install glass to comply with applicable requirements in Division 08 Section "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.
- 2.7 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH
- A. Grade: [**Premium**] [**Custom**] [**Economy**].
 - B. Wood Species: [**Any closed-grain hardwood**] [**Eastern white pine, sugar pine, or western white pine**] <Insert species>.
 - C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
 - D. Assemble casings in plant except where limitations of access to place of installation require field assembly.
 - E. Assemble moldings in plant to maximum extent possible. Miter corners in plant and prepare for field assembly with bolted fittings designed to pull connections together.
- 2.8 PLASTIC-LAMINATE CABINETS
- A. Grade: [**Premium**].
 - B. AWI Type of Cabinet Construction: [**Flush overlay**].

- C. WI Construction Style: Style [**A, Frameless**].
- D. WI Construction Type: Type [**I, multiple self-supporting units rigidly joined together**]
- E. WI Door and Drawer Front Style: [**Flush overlay**]
- G. Reveal Dimension: [**1/2 inch (13 mm)**]
- H. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
 - 1. Horizontal Surfaces Other Than Tops: Grade [**HGS**].
 - 2. Postformed Surfaces: Grade [**HGP**].
 - 3. Vertical Surfaces: Grade [**HGS**].
 - 4. Edges: [**Grade HGS**].
- I. Materials for Semiexposed Surfaces:
 - 1. Surfaces Other Than Drawer Bodies: [**High-pressure decorative laminate, Grade VGS**] [Edges of Plastic-Laminate Shelves: [**PVC tape, 0.018-inch (0.460-mm) minimum thickness, matching laminate in color, pattern, and finish**] [**PVC T-mold matching laminate in color, pattern, and finish**] [**PVC edge banding, 0.12 inch (3 mm) thick, matching laminate in color, pattern, and finish**].
 - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade [**VGS**].
 - 2. Drawer Sides and Backs: [**Solid-hardwood lumber**].
 - 3. Drawer Bottoms: [**Hardwood plywood**].
- J. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.
- K. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As indicated by laminate manufacturer's designations.
 - 2. Match Architect's sample.
 - 3. As selected by Architect from laminate manufacturer's full range in the following categories:
 - a. Solid colors, [**gloss**] [**matte**] finish.
 - b. Solid colors with core same color as surface, [**gloss**] [**matte**] finish.
 - c. Wood grains, [**gloss**] [**matte**] finish.
 - d. Patterns, [**gloss**] [**matte**] finish.
- L. Provide dust panels of **1/4-inch (6.4-mm)** plywood or tempered hardboard above compartments and drawers, unless located directly under tops.

2.9 PLASTIC-LAMINATE COUNTERTOPS

- A. Grade: [**Premium**].

- B. High-Pressure Decorative Laminate Grade: **[HGS]**.
 - C. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
 - 1. As indicated by manufacturer's designations.
 - 2. Match Architect's sample.
 - 3. As selected by Architect from manufacturer's full range in the following categories:
 - a. Solid colors, **[gloss] [matte]** finish.
 - b. Solid colors with core same color as surface, **[gloss] [matte]** finish.
 - c. Wood grains, **[gloss] [matte]** finish.
 - d. Patterns, **[gloss] [matte]** finish.
 - D. Grain Direction: Parallel to cabinet fronts.
 - E. Edge Treatment: **[Same as laminate cladding on horizontal surfaces]**.
 - F. Core Material: **[Fire-retardant particleboard]**.
 - G. Core Material at Sinks: **Fire-retardant particleboard]**.
 - H. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.
 - I. Paper Backing: Provide paper backing on underside of countertop substrate.
- 2.10 SOLID-SURFACING-MATERIAL COUNTERTOPS
- A. Grade: **[Premium]**.
 - B. Solid-Surfacing-Material Thickness: **[3/4 inch (19 mm)]**.
 - C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
 - 1. **[As selected by Architect from manufacturer's full range]**.
 - D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
 - 1. Fabricate tops with shop-applied edges of materials and configuration indicated.
 - 2. Fabricate tops with **[loose backsplashes for field application]**.
 - E. Install integral sink bowls in countertops in shop.
 - F. Drill holes in countertops for plumbing fittings and soap dispensers in shop.
- 2.11 CLOSET AND UTILITY SHELVING
- A. Grade: **[Premium]**

- B. Shelf Material: **3/4-inch (19-mm)** [thermoset decorative panel with PVC or polyester edge banding.
- C. Cleats: **3/4-inch (19-mm)** [thermoset decorative panel]

2.12 SHOP FINISHING

- A. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. General: Shop finish transparent-finished interior architectural woodwork at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing opaque-finished architectural woodwork.
- D. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to Division 09 painting Sections for finishing architectural woodwork not indicated to be shop finished.
- E. Finishing Materials: Products shall comply with the testing and product requirements of the California Department of Health Services "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- F. Shop Priming: Shop apply the prime coat including backpriming, if any, for [**transparent-finished**] items specified to be field finished. Refer to Division 09 painting Sections for material and application requirements.
- G. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to back of paneling and to end-grain surfaces. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.
- H. Transparent Finish:
- I. Opaque Finish:
 - 1. Grade: **[Premium]**
 - 2. AWI Finish System: Nitrocellulose lacquer.
 - 3. AWI Finish System: Catalyzed lacquer.
 - 4. AWI Finish System: Acrylic lacquer.
 - 5. AWI Finish System: Conversion varnish.
 - 6. AWI Finish System: Catalyzed vinyl.
 - 7. AWI Finish System: Catalyzed polyurethane.
 - 8. AWI Finish System: Two-component polyester.
 - 9. WI Finish System 1a.: Nitrocellulose lacquer.
 - 10. WI Finish System 1b.: Acrylic lacquer.

11. WI Finish System 2: Water-reducible acrylic lacquer.
12. WI Finish System 3a.: Catalyzed lacquer.
13. WI Finish System 3b.: Catalyzed vinyl lacquer.
14. WI Finish System 4: Conversion varnish.
15. WI Finish System 5: Catalyzed polyurethane.
16. WI Finish System 7a.: Synthetic enamel.
17. WI Finish System 7b.: Opaque pigmented lacquer.
18. Color: [**As selected by Architect from manufacturer's full range**].
19. Sheen: [**Satin, 31-45**] gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

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

3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of **1/8 inch in 96 inches (3 mm in 2400 mm)**.
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Fire-Retardant-Treated Wood: Handle, store, and install fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions, including those for adhesives used to install woodwork.
- F. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails[**or finishing screws**] for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- G. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than **[36 inches (900 mm)] [60 inches (1500 mm)] [96 inches (2400 mm)]** long, except where shorter single-length pieces are necessary.[**Scarf running joints and stagger in adjacent and related members.**]

1. Fill gaps, if any, between top of base and wall with plastic wood filler, sand smooth, and finish same as wood base if finished.
 2. Install wall railings on indicated metal brackets securely fastened to wall framing.
 3. Install standing and running trim with no more variation from a straight line than **1/8 inch in 96 inches (3 mm in 2400 mm)**.
- H. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
1. Install cabinets with no more than **1/8 inch in 96-inch (3 mm in 2400-mm)** sag, bow, or other variation from a straight line.
 2. Maintain veneer sequence matching of cabinets with transparent finish.
 3. Fasten wall cabinets through back, near top and bottom, at ends and not more than **16 inches (400 mm)** o.c. with **[No. 10 wafer-head screws sized for 1-inch (25-mm) penetration into wood framing, blocking, or hanging strips] [No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish] [toggle bolts through metal backing or metal framing behind wall finish]**.
- I. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
 2. Install countertops with no more than **1/8 inch in 96-inch (3 mm in 2400-mm)** sag, bow, or other variation from a straight line.
 3. Secure backsplashes **[to tops with concealed metal brackets at 16 inches (400 mm) o.c.] [and] [to walls with adhesive]**.
 4. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- J. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
- K. Refer to Division 09 Sections for final finishing of installed architectural woodwork[**not indicated to be shop finished**].
- 3.3 ADJUSTING AND CLEANING
- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
 - B. Clean, lubricate, and adjust hardware.
 - C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064020

SECTION 07 21 50 - SOUND ATTENUATION BATTS

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: Glass fiber acoustical insulation for interior wall partitions and above ceiling thermal insulation, as indicated.

1.3 MATERIALS PROVIDED IN OTHER SECTIONS

- A. Division 07 Sections for "Insulation".
- B. Division 09 Sections for "Gypsum Drywall".
- C. Division 09 Section "Non-Structural Metal Framing".

1.4 REFERENCES

- A. American Society for Testing and Materials (ASTM).
 - 1. C 665 Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 2. E 84 Test Method for Surface Burning Characteristics of Building Materials.
 - 3. E 119 Test Method for Fire Tests of Building Construction Materials.
 - 4. E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C.

1.5 SUBMITTALS

- A. Product Data: Submit product literature, samples, and installation instructions for approved insulation.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect insulation from physical damage and from becoming wet, soiled, or covered with ice or snow. Comply with manufacturer's recommendations for handling, storage and protection during installation.
- B. Label insulation packages to include material name, production date and/or product code.

PART 2 - PRODUCTS

2.1 MANUFACTURER

- A. Owens Corning, as specified; equivalent products by Certainteed or Johns Manville may be submitted for approval.

2.2 MATERIAL

- A. Type: OC "Sound Attenuation Batts", unfaced glass fiber acoustical insulation complying with ASTM C 665, Type I.
 - 1. Size:
 - a. Thickness: as detailed, to provide indicated STC
 - b. Width: To suit stud spacing
 - 2. Surface Burning Characteristics: When tested in accordance with ASTM E 84.
 - a. Maximum flame spread: 10
 - b. Maximum smoke developed: 10
 - 3. Combustion Characteristics: Noncombustible, tested in accordance with ASTM E 136.
 - 4. Fire Resistance Ratings: Wall assemblies containing Owens Corning SAB have achieved fire resistance ratings when tested in accordance with ASTM E119. See listing documents for full assembly construction details.
 - 5. Sound Transmission Class: STC required, as indicated in details.
 - 6. Dimensional Stability: Linear shrinkage less than 0.1 %

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION

- A. Examine substrates and conditions under which insulation work is to be performed. A satisfactory substrate is one that complies with requirements of the section in which substrate and related work is specified.
- B. Obtain installer's written report listing conditions detrimental to performance of work in this section. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.
- C. Clean substrates of substances harmful to insulation.

3.2 INSTALLATION-GENERAL

- A. Comply with manufacturer's instructions for particular conditions of installation in each case.
- B. Sound Attenuation Batts may be friction-fit in place until the interior finish is applied. Install batts to fill entire stud cavity. If stud cavity is less than 96" in height, cut lengths to friction fit against floor and ceiling tracks. Walls with penetrations require that insulation be carefully cut to fit around outlets, junction boxes and other irregularities.

- C. Where walls are not finished on both sides or insulation does not fill the cavity depth, provide manufacturer approved supplementary support to hold insulation in place.
- D. Where insulation must extend higher than 8 feet, temporary support can be provided to hold product in place until the finish material is applied.
- E. Extend fiberglass insulation full thickness as shown over entire surface. Cut and fit tightly around obstructions, and fill voids with insulation. Install a single layer, unless otherwise shown, with joints staggered in one direction.
 - 1. Provide two layers for applications in excess of 6".

3.3 PROTECTION

- A. Protect installed insulation as recommended by approved manufacturer.

END OF SECTION 07 21 00

SECTION 07 24 19 – WATER-DRAINAGE EXTERIOR INSULATION & FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. This document is to be used in preparing specifications for an Exterior Insulation and Finish System (EIFS) with Moisture Drainage including:
 - a. An integral fluid applied air and water-resistive membrane barrier compatible with the substrate surface and adhesive application of the EIF system.
 - b. Accessory materials required for treating sheathing joints, fasteners, penetrations, rough openings, and material transitions compatible with substrate surfaces and the adhesive application of the EIF system.
 - c. Joint sealants compatible with specified EIFS for use in all exterior envelope joint waterproofing.
 - d. A comprehensive single source limited EIF system warranty inclusive of EIFS, fluid applied air and water-resistive membrane barrier, accessory materials, and sealants.

B. RELATED REQUIREMENTS:

1. 05 40 00 – Cold-formed Metal Framing
2. 06 16 00 – Sheathing
3. 07 28 00 – Air and vapor barrier membrane
4. 07 60 00 – Sheet Metal Flashing and Trim
5. 07 29 00 – Joint Sealants

1.2 REFERENCES

A. Reference Standards:

1. ASTM Standards:
 - a. ASTM B 117 Standard Practice for Operating Salt Spray (Fog) Apparatus
 - b. ASTM C 67 Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
 - c. ASTM C 150 Standard Specification for Portland Cement
 - d. ASTM C 297 Standard Test Method for Flatwise Tensile Strength of Sandwich Constructions
 - e. ASTM C 510 Standard Test Method for Staining and Color Change of Single- or Multicomponent Joint Sealants
 - f. ASTM C 518 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
 - g. ASTM C 639 Standard Test Method for Rheological (Flow) Properties of Elastomeric Sealants
 - h. ASTM C 661 Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer
 - i. ASTM C 679 Standard Test Method for Tack-Free Time of Elastomeric Sealants
 - j. ASTM C 719 Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle)1, 2

k.	ASTM C 793	Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants
l.	ASTM C 794	Standard Test Method for Adhesion-in-Peel of Elastomeric Joint Sealants
m.	ASTM C 920	Standard Specification for Elastomeric Joint Sealants
n.	ASTM C 1063	Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement Plaster.
o.	ASTM C 1177	Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing
p.	ASTM C 1184	Standard Specification for Elastomeric Joint Sealants
q.	ASTM C 1246	Standard Test Method for Effects of Heat Aging on Weight Loss, Cracking, and Chalking of Elastomeric Sealants After Cure
r.	ASTM C 1248	Standard Test Method for Staining of Porous Substrate by Joint Sealants
s.	ASTM C 1305	Standard Test Method for Crack Bridging Ability of Liquid-Applied Waterproofing Membrane
t.	ASTM C 1382	Standard Test Method for Determining Tensile Adhesion Properties of Sealants When Used in Exterior Insulation and Finish Systems (EIFS) Joints
u.	ASTM C 1396	Standard Specification for Gypsum Board
v.	ASTM C 1397	Standard Practice for Application of Class PB Exterior Insulation and Finish System (EIFS) and EIFS with Drainage
w.	ASTM D 412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
x.	ASTM D 624	Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
y.	ASTM D 968	Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
z.	ASTM D 1784	Standard Specification for Rigid PVC and CPVC Compounds
aa.	ASTM D 2247	Standard Practice for Testing Water Resistance of Coatings in 100% Relative Humidity
bb.	ASTM D 2898	Standard Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing
cc.	ASTM D 3273	Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
dd.	ASTM D 3330	Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape
ee.	ASTM D 4060	Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
ff.	ASTM D 4541	Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers
gg.	ASTM E 72	Standard Methods of Conducting Strength Tests of Panels for Building Construction
hh.	ASTM E 84	Standard Test Method for Surface Burning Characteristics of Building Materials
ii.	ASTM E 96	Standard Test Methods for Water Vapor Transmission of Materials
jj.	ASTM E 119	Standard Method for Fire Tests of Building Construction and Materials
kk.	ASTM E 831	Standard Test Method for Linear Thermal Expansion of Solid Materials by Thermomechanical Analysis
ll.	ASTM E1233	Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights, and Curtain Walls by Cyclic Air Pressure Differential

mm.	ASTM E 2098	Test Method for Determining the Tensile Breaking Strength of Glass Fiber Reinforcing Mesh for use in Class PB Exterior Insulation and Finish Systems
nn.	ASTM E 2134	Test Method for Evaluating the Tensile-Adhesion Performance of Exterior Insulation and Finish Systems (EIFS)
oo.	ASTM E 2178	Standard Test Method for Air Permeance of Building Materials
pp.	ASTM E 2273	Test Method for Determining the Drainage Efficiency of Exterior Insulation and Finish Systems (EIFS) Clad Wall Assemblies
qq.	ASTM E 2357	Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
rr.	ASTM E 2430	Standard Specification for Expanded Polystyrene (EPS) Thermal Insulation Boards for use in Exterior Insulation and Finish Systems (EIFS)
ss.	ASTM E 2486	Standard Test Method for Impact Resistance of Class PB and PI Exterior Insulation and Finish Systems (EIFS)
tt.	ASTM E 2568	Standard Specification for PB Exterior Insulation and Finish Systems
uu.	ASTM E 2570	Standard Test Method for Evaluating Water-Resistive Barrier (WRB) Coatings Used Under Exterior Insulation and Finish Systems (EIFS) or EIFS with Drainage

1.3 ADMINISTRATIVE REQUIREMENTS

A. Pre-Construction Meetings

1. The EIFS installer shall coordinate with the General Contractor to schedule, invite and administer a pre-construction meeting including but not limited to the architect of record, consultant(s), EIFS, sheathing board, accessory materials and sealant manufacturer's representatives and the owner to assure required integration of products selected as specified herein and for proper sequencing and installation detailing.

B. Coordinate for related specification and integration of Selected Materials as referenced in Section 2.02.B.1, 2.02.B.2 and 2.02.C herein below.

C. Sequencing

1. Provide jobsite grading prior to installation of Exterior Insulation and Finish System with Moisture Drainage so that the system may be terminated at 8 in above grade or as required by code.
2. Coordinate installation of sheathing board and accessory materials, flashing, foundation waterproofing, roofing membrane, windows, doors, and other penetrations of the exterior walls to provide a continuous air and water-resistive membrane barrier.
3. Provide protection of rough openings before installing windows, doors, and other penetrations of the exterior walls.
4. Coordinate installation of windows and doors so air and water-resistive membrane barrier accessory materials, transitions, flashings, etc. are connected to them to provide a continuous barrier.
5. Install window and door head flashings immediately after windows and doors are installed.
6. Install diverter flashings wherever water can enter the wall assembly to direct water to the exterior.
7. Install copings and sealants immediately after installation of the Exterior Insulation and Finish System with Moisture Drainage and when EIFS coatings are dry
8. Attach penetrations through Exterior Insulation and Finish System to structural support and provide water-tight seals at penetrations.

1.4 SUBMITTALS

- A. Submit product data as required by Section 01 33 00, Administrative Requirements.
- B. Submit shop drawings for panelized EIFS with Moisture Drainage showing wall layout, connections, details, expansion joints, and installation sequence.
- C. Submit two (2) samples of the Exterior Insulation and Finish System with Moisture Drainage for each finish, texture, and color to be used on the project. Use the same tools and techniques proposed for the actual installation. Make the samples of sufficient size to accurately represent each color and texture being utilized on the project .
- D. Submit a current copy of the manufacturer's Trained Contractor Certificate for the EIF system specified. Submit Owner/Architect-requested test results verifying the performance of the Exterior Insulation and Finish System with Moisture Drainage.
- E. Submit a copy of the manufacturer's installation details and application instructions.

1.5 CLOSEOUT SUBMITTALS

- A. Submit a copy of the manufacturer's recommended maintenance and repair manual
- B. Submit a copy of the Exterior Insulation and Finish System with Moisture Drainage manufacturer's comprehensive single source limited warranty.

1.6 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:
 - 1. A member in good standing of the EIFS Industry Members Association (EIMA).
 - 2. Manufacture Exterior Insulation and Finish System with Moisture Drainage materials at a facility covered by a current ISO 9001:2015 and ISO 14001:2015 certification. Certification of the facility is done by a registrar accredited by the American National Standards Institute, Registrar Accreditation Board (ANSI-RAB).
- B. Contractor's Qualifications:
 - 1. Knowledgeable in the proper installation of the Exterior Insulation and Finish System with Moisture Drainage.
 - 2. Possesses a current copy of the manufacturer's Trained Contractor Certificate for the EIF system specified.
 - 3. Successfully complete a minimum of three (3) projects of similar scope and scale to the specified project
- C. Insulation Boar Manufacturer Qualifications
 - 1. Listed by EIFS Manufacturer, and capable of producing the Expanded Polystyrene (EPS) in accordance with the current EIFS Manufacturer's Specification for Insulation Board
 - 2. Subscribe to the Dryvit Third Party Certification and Quality Assurance Program
- D. Mock-Up:
 - 1. Provide
 - a. Of suitable size as required to accurately represent the products being installed, as well as each color and texture to be utilized on the project.

- b. Prepared with the same products, tools, equipment and techniques required for the actual applications. Use finish from the same batch that is being used on the project.
- c. Available and maintained at the jobsite.

E. Regulatory Requirements:

1. Separate the EPS insulation board from the interior of the building by a minimum 15-minute thermal barrier.
2. Comply with local building codes for the use and maximum thickness of EPS insulation board.

F. Inspections:

1. Cooperate with independent, third-party inspectors when required by code or by contract documents.

1.7 DELIVERY, STORAGE AND HANDLING

1. Deliver all Exterior Insulation and Finish System with Moisture Drainage components and materials to the job site in the original, unopened packages with labels intact.
2. Inspect all Exterior Insulation and Finish System with Moisture Drainage components and materials upon arrival for physical damage, freezing or overheating. Do not use questionable materials.
3. Store all Exterior Insulation and Finish System with Moisture Drainage components and materials at the jobsite in a cool, dry location, out of direct sunlight, protected from weather and other sources of damage. Maintain minimum and maximum storage temperature as stated in the product data sheets or specifications for the materials selected.
4. Protect all products from inclement weather and direct sunlight.

1.8 SITE CONDITIONS

A. Ambient Conditions

1. Do not apply wet materials during inclement weather unless appropriate protection is provided. Protect materials from inclement weather until they are completely dry.
2. Verify the minimum air and wall surface temperatures at the time of application as stated in the product data sheets or specifications for the materials selected.
3. Maintain these temperatures with adequate air ventilation and circulation for a minimum of 24 hours (48 hours for specific Specialty Finishes) thereafter, or until the products are completely dry.

1.9 WARRANTY

1. Manufacturers' Limited EIF System Warranty
 - a. Manufacturer shall offer a limited material defect and labor to repair or replace defective material warranty stating the Products will be free from manufacturing defect and will perform as warranted in the manner specified for the stated term measured from the Date of Project Substantial Completion
 - b. A pre-construction meeting, including representatives of the Manufacturer, the Applicator, the Owner, and the Consultant (if applicable), shall be required prior to installation of the Products.
 - c. The term of this warranty may be extended for an additional 2 years with involvement on the project of a Manufacturer-approved, third-party consultant ("Consultant") engaged by the Owner or its authorized representative, at the

Owner's sole expense. Inspection reports generated by the Consultant shall be made available to the Manufacturer and the Owner.

- d.
2. The EIF system warranty shall additionally include the following for the term of the warranty or as specifically noted hereunder.
 - a. The EIF system warranty term shall be 20 years.
 - b. The EIFS will remain in a watertight condition when the EIFS is used in conjunction with approved Company Joinery and Sealants.
 - c. The EIFS will drain incidental moisture between the air/water-resistive barrier and the insulation board.
 - 1) Remedy includes repair or replacement of any sheathing or framing member that is damaged as a result of the EIF system failing to drain incidental moisture between the secondary weather barrier and the insulation board.
 - d. Finish will be UV fade resistant for 10 years, except for specially produced colors
 - 1) Specially produced colors will be UV fade resistant for 5 years when high-performance colorants are used to formulate.
 - e. The EIFS shall be eligible to receive a renewal of the original warranty if the Owner satisfactorily completes the specific renovation requirements published by the Manufacturer.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer Basis of Design:
 1. Dryvit Systems, Inc., One Energy Way, West Warwick, RI 02893, 800-556-7752, www.dryvit.com.
 2. Tremco, Inc., 3735 Green Road Beachwood, OH 44122 [800.321.7906](tel:800.321.7906), www.tremco.com.
- B. Substitution Limitations:
 1. All components of the Outsulation® Plus MD System® including EPS Insulation Board shall be supplied or obtained from Dryvit Systems, Inc., Tremco, Inc. or their authorized distributors. Substitutions or additions of materials manufactured or supplied by others will void the EIF system warranty.
 2. Alternate EIFS manufacturers must demonstrate equivalency for all elements of EIF system such as but not limited to:
 - a. Material components, compatibility and testing,
 - b. Standard and specialty finishes,
 - c. Color and Texture matching; and,
 - d. Warranty criteria as specified herein.
 3. Submit alternate EIFS manufacturer's complete data highlighting equivalency for review through Substitution Requirements as defined in Division 1.

2.2 DESCRIPTION

- A. System Description:
 1. The
 - a. An Air and Water-Resistive Membrane Barrier.
 - b. Accessory Materials.
 - c. Adhesive – installed in vertical ribbons to facilitate egress of incidental moisture
 - d. Expanded Polystyrene (EPS) insulation board
 - e. Base Coat

- f. Reinforcing Mesh
- g. Finish Coat
- h. Joint Sealants as specified herein and below

B. Materials:

1. Fluid-Applied Air and Water-Resistive Barrier:
 - a. Permeable:
 - 1) Dryvit Backstop® NT: A standard film vapor permeable, flexible, polymer-based non-cementitious water-resistive and air barrier coating available in Texture and Smooth versions. Backstop NT can be installed in ambient air and substrate surface temperatures of 40 °F (5 °C) and rising for a minimum 24 hours and exposed for up to 6 months during the construction process. Backstop NT Texture is additionally used for treatment of sheathing board joints, inside / outside corners and spotting of fastener heads.
2. Accessory Materials for Fluid Applied Air and Water-Resistive Barrier (AWRB):
 - a. Provide compatible accessory materials as required by project conditions for substrate, rough opening and penetration preparation, bridge expansion joints in substrate, material transitions and flashing integration to produce a complete air and water-resistant assembly.
 - 1) Dryvit Grid Tape™: An open weave fiberglass mesh tape with pressure sensitive adhesive. Used in combination with Backstop NT or Backstop NTX Texture for treating sheathing board joints and inside / outside corners and preparing rough openings and penetrations. Backstop NT or Backstop NTX Texture is used alone for spotting fastener heads.
 - 2) Dryvit AquaFlash®: Fluid-applied, water-based polymer transition membrane. Used in preparing rough openings and penetrations, bridging expansion joints in substrate, material transitions and flashing integration. AquaFlash can be installed in ambient air and substrate surface temperatures of 40 °F (5 °C) and rising for 24 hours.
 - a) Dryvit AquaFlash Mesh and Corners: Polyester reinforcing mesh for use with AquaFlash.
 - 3) Dryvit Backstop Flash and Fill: A flexible, waterproof, low temperature gun applied material. Used in substrate preparation, treating sheathing board joints, inside/outside corners and fastener heads, preparing rough openings and penetrations, bridging expansion joints in substrate material transitions and flashing integration. Backstop Flash and Fill can be installed in ambient air and substrate surface temperatures of 32 °F (0 °C) and rising for 24 hours.
 - 4) Tremco Tremco Dymonic 100: A high-performance, high-movement, single-component, medium-modulus, low-VOC, UV-stable, non-sag, gun applied polyurethane sealant. Used in substrate preparation, treating sheathing board joints and inside/outside corners and fastener heads, preparing rough openings and penetrations, bridging expansion joints in substrate, material transitions and flashing integration. Dymonic 100 can be installed in ambient air and substrate surface temperatures of 40 °F (5 °C) and rising. Where Dymonic 100 must be applied in temperatures below 40 °F, (5 °C), please refer to the Tremco Technical Bulletin for Applying Sealants in Cold Conditions (No. S-08-44 rev 1) that can be found at www.tremcosealants.com.
 - 5) Tremco Tremco ExoAir 110AT: A 22-mil composite impermeable membrane that is comprised of 16 mils of butyl and 6 mils of HDPP facer. Used in limited applications as a membrane flashing that will not interfere with the adhesive application of EIFS.

3. Drainage Components:
 - a. Drainage Track UV treated PVC "J" channel perforated with weep holes, complying with ASTM D 1784 and ASTM C 1063.
 - b. Acceptable manufacturers of Drainage Track:
 - 1) Starter Trac STWP – without drip edge by Plastic Components, Inc.
 - 2) Starter Trac STDE – with drip edge by Plastic Components, Inc.
 - 3) Universal Starter Track by Wind-lock Corporation.
 - 4) Sloped Starter Strip with Drip by Vinyl Corp.
 - c. Dryvit Drainage Strip™ corrugated plastic strip.
 - d. Dryvit AP Adhesive™ urethane-based adhesive used to attach Drainage Track and Dryvit Drainage Strip to the sheathing.
4. Adhesives:
 - a. Liquid polymer-based adhesive field mixed with Portland cement.
 - 1) Dryvit Barrier Primus®.
 - 2) Dryvit Genesis®.
 - b. Ready mixed dry blend cementitious, copolymer-based adhesive field mixed with water.
 - 1) Dryvit Primus® DM.
 - 2) Dryvit Genesis® DM.
 - 3) Dryvit Genesis® DMS.
 - 4) Rapidry DM™ 35-50
 - 5) Rapidry DM™ 50-75
5. Insulation Board:
 - a. Expanded Polystyrene; minimum thickness 25 mm (1 in); meeting Dryvit Specification [DS131](#) and ASTM E 2430.
6. Pre-Coated Insulation Starter Boards, Corners and Shapes:
 - a. Machine Coated Starter Boards, Corners and Shapes: Shall be produced with materials approved by Dryvit Systems, Inc. and be supplied by a fabricator approved by Dryvit Systems, Inc .
 - b. Non-Machine Coated Starter Boards, Corners and Shapes: Shall be produced with materials approved by Dryvit Systems, Inc.
7. Base Coat:
 - a. Liquid polymer-based base coat field mixed with Portland cement
 - 1) Dryvit Primus
 - 2) Dryvit Genesis
 - 3) Dryvit Dryflex
 - b. Ready mixed dry blend cementitious, copolymer-based base coat field mixed with water.
 - 1) Dryvit Primus DM
 - 2) Dryvit Genesis DM
 - 3) Dryvit Genesis DMS
 - 4) Rapidry DM 35-50
 - 5) Rapidry DM 50-75
 - 6) Dryvit NCB – Non-cementitious
8. Reinforcing Mesh:
 - a. Open-weave, glass fiber fabric treated for compatibility with other EIF system materials.
 - b. Provide
 - c. Provide for ultra high impact mesh assembly including Panzer 15 mesh for all EIFS clad wall areas within 6'-0" of grade and where additionally indicated on contract drawings.

Reinforcing Mesh ¹ /Weight oz/yd ² (g/m ²)	Minimum Tensile Strengths	EIMA Impact Classification	EIMA Impact Range in-lbs (Joules)		Impact Test Results in-lbs (Joules)	
Standard - 4.3 (146)	150 lbs/in (27 g/cm)	Standard	25-49	(3-6)	36	(4)
Standard Plus - 6 (203)	200 lbs/in (36 g/cm)	Medium	50-89	(6-10)	56	(6)
Intermediate™ - 12 (407)	300 lbs/in (54 g/cm)	High	90-150	(10-17)	108	(12)
Panzer® 15 ¹ - 15 (509)	400 lbs/in (71 g/cm)	Ultra High	>150	(>17)	162	(18)
Panzer 20 ¹ - 20.5 (695)	550 lbs/in (98 g/cm)	Ultra High	>150	(>17)	352	(40)
Detail Mesh® Short Rolls - 4.3 (146)	150 lbs/in (27 g/cm)	n/a	n/a	n/a	n/a	n/a
Corner Mesh™ - 7.2 (244)	274 lbs/in (49 g/cm)	n/a	n/a	n/a	n/a	n/a

* It shall be colored blue and bear the Dryvit logo for product identification
1. Shall be used in conjunction with Standard Mesh (recommended for areas exposed to high traffic)

9. Finish:
- a. Lightweight, water-based acrylic coating with integral color and texture; formulated with Dirt Pickup Resistance (DPR) chemistry.
 - 1) Available textures:
 - a) Sandpebble Fine® E

C. Joint Sealants:

1. Silicone Sealant:
 - a. Tremco Spectrem 1: An ultra low modulus, high-performance, one-part, moisture-curing silicone joint sealant with physical properties making it an ideal sealant for sealing dynamic joints.
 - b. Tremco Spectrem 3: A general-purpose, low-modulus, high performance, one-part, neutral-cure, non-staining, low dirt pickup, construction-grade silicone sealant.
 - c. Tremco Spectrem 4-TS: A multi-component, neutral-curing, non-staining, low dirt pick up, low-modulus silicone sealant specially formulated for use in dynamically moving building joints. Spectrem 4-TS offers color flexibility with the opportunity to tint the material on site.
 - 1) Coordination for custom sealant colors is required.
 - d. Where deemed necessary, use TREMprime Silicone Porous Primer.
 - e. See related specification section or consult with Tremco, Inc. for more information
2. Polyurethane Sealant:
 - a. Tremco Dymonic FC: A one component hybrid polyurethane sealant. Where deemed necessary, use TREMprime Silicone Porous Primer for porous surfaces and TREMprime Silicone Metal Primer for metals or plastics. Coordinate for primer use as indicated.

D. Jobsite-Mixed Materials:

1. Portland cement: verify is Type I or II, meeting ASTM C 150, white or gray in color, fresh and free of lumps.
2. Water: verify is clean and free of foreign matter.

E. Reference Documentation for Outsulation Plus MD System:

1. Data Sheet – DS929
2. Details – DS944
3. Application Instructions – DS934

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Verify access to electric power, clean water and a clean work area at the location where the Dryvit materials are to be applied.
2. Verify the deflection of the substrate does not exceed 1/240 times the span. Verify substrate is flat within 1/4 in (6.4 mm) in a 4 ft (1.2 m) radius.
3. Verify substrate is sound, dry, connections are tight; has no surface voids, projections, or other conditions that may interfere with the Exterior Insulation and Finish System with moisture drainage installation or performance.
4. Verify the slope of inclined surfaces are not less than 6:12 (27 °) were the length of the slope does not exceed 12 in (305 mm) or 3:12 (14 °) were the length of the slope does not exceed 4 in (102 mm).
5. Verify metal roof flashings have been installed in accordance with Sheet Metal and Air Conditioning Contractors National Association (SMACNA) standards.
6. Verify all rough openings are flashed in accordance with the Exterior Insulation and Finish System with Moisture Drainage manufacturer's installation details, or as otherwise necessary to prevent water penetration. Verify chimneys, balconies and decks have been properly flashed as necessary to prevent water penetration.
7. Verify windows and doors are installed and flashed per manufacturer's requirements and installation details.
8. Notify general contractor of all discrepancies prior to the installation of the Exterior Insulation and Finish System with moisture drainage.
9. Verify that expansion joints are installed:
 - a. Where expansion joints occur in the substrate system.
 - b. Where building expansion joints occur.
 - c. At floor lines in wood frame construction.
 - d. At floor lines of non-wood framed buildings where significant movement is expected.
 - e. Where the Exterior Insulation and Finish System with moisture Drainage abuts dissimilar materials.
 - f. Where the substrate type changes.
 - g. Where prefabricated panels abut one another.
 - h. In continuous elevations at intervals not exceeding 75 ft (23 m).
 - i. Where significant structural movement occurs, such as changes in roof line, building shape or structural system.
10. Vapor Retarders:

3.2 PREPARATION

- A. Protect the Exterior Insulation and Finish System with Moisture Drainage materials by permanent or temporary means from inclement weather and other sources of damage prior to, during, and following application until completely dry.
- B. Protect adjoining work and property during installation of the Exterior Insulation and Finish System with Moisture Drainage:
- C. Prepare the substrate to be free of foreign materials, such as oil, dust, dirt, form-release agents, efflorescence, paint, wax, water repellants, moisture, frost, and any other condition that may inhibit adhesion.

3.3 INSTALLATION

- A. Install the EIF system in accordance with ASTM C1397 and the Dryvit Outsulation Plus MD System Application Instructions, DS934. Apply base coat sufficient to fully embed the reinforcing mesh. The recommended method is to apply the base coat in two (2) passes.
- B. Apply sealant to base coat surface prepared in accordance with [DS153](#).
- C. Install high impact reinforcing mesh as specified at ground level, high traffic areas and other areas exposed to or susceptible to impact damage as designated on contract drawings.
- D. Install Machine Coated Dryvit EPS Shapes in accordance with Dryvit Publication [DS854](#).

3.4 SITE QUALITY CONTROL

- A. Exterior Insulation and Finish System with Moisture Drainage manufacturer assumes no responsibility for on-site inspections or application of its products.
- B. EIFS sub-contractor to certify in writing the quality of work performed relative to the substrate system, details, installation procedures, and as to the specific products used.
- C. EPS supplier, if requested, to certify in writing that the EPS meets the Exterior Insulation and Finish System with Moisture Drainage manufacturer's specifications.
- D. The sealant contractor, if requested, to certify in writing that the sealant application is in accordance with the sealant manufacturer's and the Exterior Insulation and Finish System with Moisture Drainage manufacturer's recommendations.

3.5 CLEANING

- A. Remove all excess Exterior Insulation and Finish System materials from the job site by the contractor in accordance with contract provisions and as required by applicable law.
- B. Leave all surrounding areas, where the Exterior Insulation and Finish System with Moisture Drainage has been applied, free of debris and foreign substances resulting from the EIFS sub-contractor's work.

END OF SECTION 07 24 19

SECTION 07 60 00 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Metal flashing and counter flashing and related expansion joints.
2. Metal gravel stops, trim and related expansion joints.
3. Metal gutters and downspouts (rain drainage) not specified elsewhere.
4. Metal soffit systems, vented and unvented.
5. Metal drip edge.
6. Miscellaneous metal trim, flashing, etc. not specified elsewhere.

1.3 RELATED WORK UNDER OTHER SECTIONS:

1. Division 04 Section Masonry work Flashing (fabric, composite, and/or metal) built in
2. Division 07 Section Roof Membrane Systems

1.4 SUBMITTALS:

- A. Product Data: For information only, submit copies of specifications, installation instructions and general recommendations by the manufacturer of flashing and sheet metal materials. Include published data or certified test data for each material showing compliance with the requirements.
- B. Samples: Submit 12" square samples of each specified metal which is to be exposed with a shop finish, as flashing, trim or rain drainage. Samples will be reviewed by Architect for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.
- C. Certificate: Submit certification indicating metal coping, fascias and gravel stop systems comply with ASNI/SPRI ES-1 "Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems".
- D. Mock-up: Submit 4 foot long section of metal fascia, fabricated from approved metal, indicating selected profile, attachment system, jointing and seaming system.

1.5 JOB CONDITIONS:

- A. Do not proceed with the installation of flashing and sheet metal work until curb and substrate construction, cant strips, blocking, reglets and other construction to receive the work is completed.

- B. Examine the substrate and the conditions under which flashing and sheet metal work is to be performed, and do not proceed with the work until unsatisfactory conditions have been corrected.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Exposed Sheet Metal: (Including gravel stops and rain drainage.)
1. Aluminum Sheet: Prefinished; .032" (20 gauge; 26,000 PSI yield strength); specially tempered to allow radius bends and forming without finish cracks.
 - a. Finish: Clean metal and apply conversion coating as per ASTM B 449. Prime with epoxy and finish with 0.8 dry mil coating of fluoropolymer in color as selected. (Provide 0.5 dry mil acrylic coating on concealed side.)
 - b. Texture: Smooth or embossed, as selected.
 - c. Warranty: Provide copies of written twenty (20) year warranty covering color fading, chalk and film integrity.
 2. Stainless Steel Sheet: AISI Type 302/304 stainless steel or strip, complying with ASTM A 167; dead soft; No. 2D conventional dull finish; or,
- B. Concealed Sheet Metal:
1. Stainless Steel Sheet: AISI Type 302/304 stainless steel or strip, complying with ASTM A 167; dead soft; 28 gauge (0.015 inches thick); No. 2D conventional dull finish; or,
 2. Copper Sheet: Cold-rolled sheet copper, complying with ASTM B 370, except soft temper; 28 gauge (16 oz./sq. ft.), CDA 2B (bright) finish.
- C. Miscellaneous Materials:
1. For metal work, provide the type, solder and fasteners recommended by the producer of the metal sheets.
 2. For non-metallic work, provide the types of substrate primers, adhesives, tapes and fasteners recommended by the producer of the non-metallic items.
 3. Roofing Cement: ASTM D 2822.
 4. Bituminous Coating: FS TT-C-494, or Mil-C-18480, or SSPC-Paint 12, cold-applied bituminous mastic, compounded for 15-mil dry film thickness coating.
 5. Glass-Fiber Mesh Fabric: 20-by-20 or 20-by-30 mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration; in the following color. Comply with ASTM D 3656. Color as selected.
- D. Fabricated Metal Flashing, Rain Drainage and Trim:
1. Shop fabricate metal flashing, trim, expansion joints, gutters, downspouts, conductor heads, scuppers, fascia, splash pans and similar items to comply with profiles and sizes shown, and to comply with standard industry details by SMACNA in the "Architectural Sheet Metal Manual". Provide watertight seams, and fold back metal to form a hem on the concealed side of exposed edges, where required. Fabricate work from the metal specified above.

- E. Drip Edge:
 - 1. Provide prefinished, prefabricated aluminum drip edges: Color selection by architect
- F. Gutters:
 - 1. Provide custom fabricated gutters and downspouts.
 - 2. Prefinished aluminum gutters, gauge as previously specified.
 - 3. Prefinished downspouts, gauge as previously specified.

PART 3 - EXECUTION

3.1 GENERAL INSTALLATION REQUIREMENTS:

- A. Comply with manufacturer's instructions and recommendations for handling and installation of flashing and sheet metal work.
- B. Performance: Coordinate the work with other work for the correct sequencing of items which make up the entire membrane or system of weatherproofing or waterproofing and rain drainage. It is required that the flashing and sheet metal work be permanently watertight, and not deteriorate in excess of manufacturer's published limitations.

3.2 INSTALLATION OF METAL WORK:

- A. Comply with details and profiles as shown, and SMACNA "Architectural Sheet Metal Manual" recommendations for installation of the work.
- B. For non-moving seams provide soldered flat-lock seams. Comply with metal producers' recommendations for tinning, soldering and cleaning the joints.
- C. Provide for thermal expansion of all exposed sheet metal work exceeding 15'-0" running length.
 - 1. Valleys and Gutters: 40'-0" maximum spacing, and located at high points in drainage system wherever possible.
 - a. Reduce above spacing to 30'-0" for aluminum or zinc alloy valleys and gutters.
 - 2. Flashing and Trim: 10'-0" maximum spacing, and located 2'-0" from corners and intersections.
- D. Conceal fasteners and expansion provisions. Fold back edges on concealed side of exposed edges, to form a hem. Where fasteners cannot be concealed, provide non-ferrous fasteners.
- E. Insert flashings into reglets, if shown. Anchor by mechanical means, including driven wedges of lead or other compatible metal, spaced 2'-0". Seal the joint with sealant as indicated.
 - 1. Refer to 0 790 00 section for sealants.
- F. Separate stainless steel work from dissimilar metals and from wood and cementitious materials. Separate with a course of polyethylene underlayment wherever possible. Apply a 15-mil dry film thickness bituminous coating to either the substrate or stainless steel where underlayment cannot be used for separation.

- G. Separate copper work from dissimilar metals by a 15-mil dry-film thickness bituminous coating, or by a heavy tinning of solder at spot-contacts.
- H. Aluminum Work: Bed base members in roofing cement. Anchor and seal in accordance with manufacturer's instructions. Clean exposed surfaces promptly to prevent the start of non-uniform oxidation or electrolytic action.
 - 1. Apply 15-mil dry film thickness bituminous coating to concealed aluminum surfaces which will be in contact with cementitious surfaces, dissimilar metals, wood or other absorptive substrates.
- I. Fabricate, support and anchor rain drainage to withstand thermal expansion stresses and full loading by water or ice, without damage, deterioration, or leakage.

END OF SECTION 07 60 00

SECTION 07 84 00 - FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 1. Through-penetration firestopping in fire rated wall and floor construction.
 2. Construction gap and joint firestopping within fire-rated walls, floors or floor-ceiling assemblies.
 3. Construction gap and joint firestopping at intersections of the same or different materials in fire-rated construction.
 4. Construction gap and joint firestopping at the top of fire-rated walls.
 5. Through-penetration and Construction gap and joint smoke stopping in smoke partitions.

1.3 RELATED SECTIONS

- A. Section 042000 "Unit Masonry".
- B. Section 079200 "Joint Sealants".
- C. Section 092900 "Gypsum Board".
- D. Division 23 - Heating, Ventilating and Air Conditioning.
- E. Division 26 - Electrical.

1.4 REFERENCES

- 1.5 Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirement shall govern.

- A. American Society for Testing and Materials (ASTM) Publications:
 1. ASTM E 84: Standard Test Methods for Surface Burning Characteristics of Building Materials.
 2. ASTM E 119: Methods of Fire Tests of Building Construction and Materials.
 3. E 136 Test Method for Behavior of Materials in a Vertical Tube Furnace at 750F.
 4. ASTM E 814: Standard Method of Fire Tests of Through-Penetration Firestops.
 5. E 1399 Cyclic Movement and Measuring Minimum and Maximum Joint Widths.
 6. E 1966 Test Method for Resistance of Building Joint.
 7. E 2174 Standard Practice for On-Site Inspection of Installed Fire Stops.
 8. ASTM C 719: Adhesion and Cohesion of Elastomeric Joint Sealants under Cyclic Movement.
 9. ASTM C 920: Standard Specification of Elastomeric Joint Sealants.

- B. E 05.11.14 Standard Test Method for Determining the Fire Endurance of Perimeter Fire Barrier Systems Using the Intermediate-Scale, Multi Story Test Apparatus (ISMA); ASTM permanent number assignment pending approval of Draft Factory Mutual (FM) Research:
 - 1. FM Approval Standard of Firestop Contractors – Class 4991
 - 2. Firestop Contractors International Association (F.C.I.A):
 - a. M.O.P. Manual of Practice
- C. International Firestop Council (IFC):
 - 1. Ref. 1 Recommended IFC Guidelines for Evaluating Firestop Engineering Judgments (April 2001)
 - 2. Ref. 2 Inspectors Field Pocket Guide
- D. National Fire Protection Association (NFPA):
 - 1. NFPA 70 - National Electric Code
 - 2. NFPA 101 - Life Safety Code
 - 3. NFPA 221 - Fire Walls and Fire Barriers (preliminary to be released)
 - 4. NFPA 251 - Fire Tests of Building Construction and Materials
- E. Underwriters Laboratories Inc. (UL) Publications:
 - 1. UL 263: Fire Tests of Building Construction and Materials
 - 2. UL 723: Surface Burning Characteristics of Building Materials.
 - 3. UL 1479: Fire Tests of Through-Penetration Firestops.
 - 4. UL 2079: Standard for Fire Tests of Joint Systems.
- F. Underwriters Laboratories “Fire Resistance Directory” (Current Year).
 - 1. Through-Penetration Firestop Device (XHJI)
 - 2. Fire-Resistive Ratings (BXUV)
 - 3. Through-Penetration Firestop Systems (XHEZ)
 - 4. Fill, Void, or Cavity Material (XHHW)
 - 5. Joint Systems (XHBN)

1.6 DEFINITION

- A. *Fire Rated Assembly*: Includes all fire rated walls, floors, floor/ceiling and roof system assemblies. Ratings shall be as per ASTM E 119 or UL 263.
- B. *Barriers*: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.
- C. *Firestopping*: Use of a material or combination of materials to fill or seal openings in a fire-rated assembly to restore the integrity of the assembly and prevent the spread of heat, fire, gases and smoke.
- D. *System*: Specific products and applications, classified and numbered by Underwriter’s Laboratories, Inc. to seal openings in fire-rated assemblies.
- E. *Penetration*: An opening or object passing through or into a fire-rated wall or floor that breaches the fire-rated assembly.
- F. *Construction Gaps*: Any gap, joint or opening (static or dynamic) between adjacent sections of walls or floors, at wall tops between top of wall and ceiling, exterior walls and structural floors or roof decks. Where dynamic movement is required the system must comply with UL 2079.

1.7 DESCRIPTION

- A. Design Requirements for furnishing and installing firestopping in fire rated construction:
1. All penetrations in fire-rated floor and wall assemblies including blank and penetrated openings.
 - a. Construction gaps (joints) between exterior curtain walls, the outer perimeter edge of structural floors, wall to wall, floor to floor, floor to wall, top of wall to roof deck, and any other linear opening that is fire-rated.

1.8 SUBMITTALS

- A. Submit in compliance with Section 013000.
1. Shop Drawings
 - a. Submit complete list of all firestop systems and materials to be utilized, including documentation of UL or FM classifications or approved third party testing. Include all of the individual materials required for each complete system. Indicate manufacturer's product name and number for each material.
 - b. Submit drawings of through-penetrations or construction joints, which indicates the firestop system to be utilized for each different firestopping application. Drawing shall indicate construction of wall or floor assembly; size, number and material of penetrating items; firestop systems designation; required F-rating, T-rating and remarks.
 - c. For installations or configurations not covered by UL or FM design number, a recommendation shall be obtained from the Manufacturer, in writing, for the specific application, signed by a certified engineer.
 2. Product Data
 - a. Submit copies of manufacturer's product data, Material Safety Data Sheets, specifications, recommendations, standard details and installations instructions for all firestop assemblies.
- B. Submit Statement of Contractor Qualifications.
- C. Past projects indicating required experience.

1.9 QUALITY ASSURANCE

- A. Utilize a **SINGLE** firm that is a member of the "Firestop Contractors International Association" (FCIA) in good standing. This Contractor will herein be referred to as the "Fire Stopping Contractor." The Fire Stopping Contractor will not be permitted to subcontract services to other firms to provide the services required of them, without prior written consent of the Owner. The Fire Stopping Contractor shall have **full responsibility for the application, installation, procurement of materials, and compliance with all quality control procedures established by the manufacturer and the project manual for all fire stopping and sprayed fire resistive materials and systems including but not limited to Sprayed Fire Resistive Materials, Fire Stops and Fire Resistive, Intumescent Mastic Coating Material** . The Fire Stopping Contractor shall have completed no less than five (5) projects of comparable size and complexity. In the event the Fire Stopping Contractor has need to propose subcontracted services during the course of the project, the proposed firm must also be a member in good standing with the FCIA and have also completed no less than five (5) projects of comparable size and complexity.
- B. The Fire Stopping Contractor shall be responsible for all sprayed fire resistive materials, firestops, Intumescent Mastic Coating Material and applicable and appurtenant systems throughout the entire project and shall perform the firestop work required of any and all trades, services and/or field

conditions that require firestops and sprayed fire resistive materials and systems without exception unless otherwise approved in writing.

- C. It is the intent of this Contract that there is a sole source responsibility in regards to Sections for fireproofing and firestopping. Waivers of this requirement (allowing installation by someone other than the Fire Stopping Contractor) will only be considered when the Fire Stopping Contractor has adequately presented the need to subcontract services in writing to the Owner. Consideration of the request will only be entertained with the condition that the individual entity will perform work under the direct supervision of the Fire Stopping Contractor and that the Fire Stopping Contractor will certify the installation/application of work by others at their (Fire Stopping Contractor) expense.
 - D. The Fire Stopping Contractor shall take care in planning the materials to be used, and estimate the project cost utilizing materials of a sole source manufacturer/ vendor for the various systems and assemblies specified throughout the facility whenever possible. In the event that a manufacturer or vendor does not produce or supply a product or system, that product or system shall specifically be brought to the attention of the Owner for review and approval outside of the normal submittal procedure for the Project.
 - E. The Fire Stopping Contractor shall make every effort to provide continuity in the labor force responsible for the identification of areas requiring fire stopping; logging each area identified, preparation of substrates and systems; mixing and assembly of materials; application and installation of materials and systems; reapplication as required, and other key installation and warranty components required for the various materials and systems throughout the project. In the event the labor force changes in any way, the Owner shall be notified in writing of the change and satisfactory evidence be provided that the new workforce has been adequately updated (orientation) on project status without exception.
 - F. The Fire Stopping Contractor shall assure that all applications of materials are performed by qualified, factory-trained applicators having proper equipment and training to complete the installations of all systems specified in this section and manufacturers individual requirements for certified or otherwise licensed applicators. Proof of such qualification shall be submitted with material and system submittals, without exception.
 - G. Do not commence work until submittals have been reviewed.
 - H. Provide Installation by an experienced firestopping contractor, certified, licensed or otherwise qualified by the firestopping manufacturer to install the manufacturer's products as per specified requirements.
 - I. Provide all firestopping materials manufactured by one manufacturer and manufactured in their own facilities and provide documentation of same.
 - J. Install material in accordance with manufacturer's written installation instructions.
 - K. Provide materials tested to provide fire rating at least equal to that of the construction.
- 1.10 DELIVERY, STORAGE AND HANDLING
- A. Deliver materials to project site in manufacturer's original packaging clearly identified.
 - B. Store and handle firestop materials in a location and manner providing protection from damage and exposure to the elements, in accordance with manufacturer's instructions.

- C. Material Safety Data Sheets (MSDS) will be available on the job site for all materials. Following manufacturer's guidelines for use, handling and disposal.

1.11 WARRANTY

- A. Provide all firestop and firesafing materials warranted, in writing, by the manufacturer against defects in manufacturing and materials.
- B. Completed installation shall be warranted, in writing, by the installer against defects in workmanship.

1.12 PROJECT CONDITIONS

- A. Existing Conditions:
 - 1. Conform to Manufacturer's printed instructions for installation.
 - 2. Verify existing conditions and substrates before starting work and correct unsatisfactory conditions.
 - 3. Proceed with installation only after penetrations of the substrate have been installed.
 - 4. Weather Conditions: Do not proceed with installation of firestop materials when temperature falls below 40° F.
- B. Environmental Requirements:
 - 1. Furnish adequate ventilation.
 - 2. Protect surrounding area to prevent contamination of adjacent surfaces by firestopping materials.
 - 3. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 4. Firestop materials used shall not require solvent- based chemicals for clean-up purposes.
 - 5. Products allowing silicons/silicas to become airborne before or during a fire shall not be used when electronic switching devices or painting operations are located within the same building.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Provide firestopping materials and systems meeting the requirements specified herein.
 - 1. Design and install all firestop products and systems so that the system will allow full restoration of the thermal and fire resistance properties of the assembly being penetrated with minimal repair if penetrants are subsequently removed or added.
 - 2. Protect penetrations containing loose electrical, data or communications cabling using firestopping products that allow unrestricted cable changes without damage to seal.
 - 3. Firestopping materials and systems must be intumescent or capable of filling through-openings created by the burning or melting of combustible pipes, pipe insulation materials or cable jacketing and the deflection of sheet metal due to thermal expansion.
 - 4. Firestop sealants must be elastomeric or flexible to allow for normal pipe movement
 - 5. All products used shall be water-resistant after drying or curing and shall be unaffected by high humidity, condensation or transient water exposure.
 - 6. Provide materials with a maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E 84.
 - 7. Provide materials with a minimum one year shelf life.
 - 8. Materials shall not affect or derate the properties of cables in energized cable applications.

9. Supply materials compatible with materials used in building construction.
10. Firestop materials must not shrink upon curing.
11. Firestop materials must be moisture-resistant and may not dissolve in water after curing.
12. All materials shall be asbestos free and non-carcinogenic. Materials should meet the requirements for use in a "Green Building" as defined by the US Green Building Council and the ASTM Green Building Sub-committee E 50.06.
13. Firestop materials shall not contain flammable or toxic solvents and shall not produce toxic or flammable outgassing during the drying or curing process.
14. Water-based, non-toxic firestop materials shall be used in lieu of silicone or solvent based materials.

2.2 THROUGH-PENETRATION FIRESTOPPING OF FIRE-RATED CONSTRUCTION

- A. Through-penetration firestop product(s) tested to ASTM E814 listed in the UL Fire Resistance Directory in which it is classified as a fill, void or cavity material or a firestop device. This should be classified for approval with the particular type of penetrating item and the wall or floor assembly that the item is penetrating in order to maintain the integrity required.
 1. All firestopping products must be from a single manufacturer.

2.3 Construction Gap and Joint FIRESTOPPING of fire-rated construction

- A. Identify the gap/joint to be sealed as a dynamic (movement) or static (no movement) system. Products used for dynamic joints must be tested to and passed UL 2079, Standard for Fire Tests of Joints.
- B. Firestopping between construction gaps or joints for concrete slabs/floors or concrete block or CMU walls. Joints should be classified as: Floor to Floor, Wall to Wall, Floor To Wall or Top of Wall.
- C. Firestopping between construction gaps or joints for top of gypsum wallboard partitions to the underside of a concrete slab or concrete filled fluted deck.
- D. Firestopping of control and expansion joints in a fire rated concrete partition and curtain walls.
- E. All firestopping products must be from a single manufacturer.

2.4 SMOKE-STOPPING AT SMOKE PARTITIONS

- A. Any system approved as a through-penetration or construction-gap firestop, provided that the system includes a specified smoke seal or will provide a smoke seal

2.5 ACCESSORIES

- A. Fill, void or cavity materials: As approved in the UL Fire Resistance Directory or Factory Mutual Approval Guide.
- B. Forming materials: As approved in the UL Fire Resistance Directory or Factory Mutual Approval Guide.

2.6 ACCEPTABLE MANUFACTURERS

- A. W. R. Grace "Flamesafe", 1330 Industry Rd., Hatfield, PA (800-334-8796) or 3M Fire Protection Products, St Paul, Minnesota

2.7 MATERIALS

- A. Intumescent Firestop Sealants
 - 1. FlameSafe® FS 1900 Intumescent Elastomeric Sealant
 - 2. 3M Fire Barrier Caulk CP25WB+
- B. Endothermic Water-Based Sealants
 - 1. FlameSafe® FS 900 Endothermic Sealant
 - 2. 3M Interam FireDam 150 Caulk
- C. Elastomeric Firestop Coating
 - 1. FlameSafe® FS2900 Intumescent Elastomeric Firestop Coating
 - 2. 3M FireDam Spray
- D. Intumescent Firestop Putty
 - 1. FlameSafe® FSP 1000 Intumescent Putty
 - 2. 3M Fire Barrier Moldable Putty+
- E. Firestop Mortar
 - 1. FlameSafe® Mortar Seal
 - 2. 3M Fire Barrier Mortar
- F. Firestop Bags
 - 1. FlameSafe® Intumescent Firestop Bags
- G. Firestop Sleeves
 - 1. FlameSafe® Intumescent Sleeve
- H. Wrap Strips
 - 1. FlameSafe® Intumescent Wrap Strip
 - 2. 3M Fire Barrier FS-195+ Wrap/Strip
- I. Restraining Collars
 - 1. FlameSafe® FSRC 100/ FSRC 150 Restraining Collars
 - 2. 3M Fire Barrier RC-1 Restricting Collar
- J. Composite Sheet
 - 1. 3M Fire Barrier CS-195+ Composite Sheet
- K. Accessories
 - 1. Forming or Damming Materials as specified by the manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine adjoining construction and the conditions under which the work is to be completed. Do not proceed with work until any unsatisfactory conditions detrimental to the proper and timely completion of the work have been corrected.
- B. Verify adjacent materials are clean, dry and ready to receive installation.
- C. Verify that openings and items (penetrations) passing through them are ready to receive the work of this section.
- D. Verify that field dimensions are as shown on the drawings and as recommended by the manufacturer.

3.2 PREPARATION

- A. Remove any incompatible materials (dirt, debris, greases, oils and solvents) which may inhibit the adhesion or physical properties of the firestop products.
- B. Beginning of installation means acceptance of existing conditions.

3.3 INSTALLATION

- A. Coordinate with fire protection and other trades to assure that all pipe, conduit, cable and other items which penetrate fire rated construction have been permanently installed prior to installation of firestops and smoke seals. Schedule and sequence work to assure that partitions and other construction that would conceal penetrations are not erected prior to the installation of firestop, firesafing and smoke seals.
- B. Apply firestops and smoke seals at all locations as required by national, municipal and local governing laws and codes, per approved submittals referenced above.
- C. Apply firestopping materials only when the temperature of the surfaces to be filled and surrounding air temperature comply with the manufacturer's printed instructions.
- D. Personal safety gear shall be utilized in accordance with manufacturer's instructions, material and environmental considerations.
- E. For applications not covered by the literature or installation guide/drawing. Call manufacturer's technical service engineer for assistance.

3.4 FIELD QUALITY CONTROL

- A. Verify that system(s) are installed in all specified and/or indicated locations in rated assemblies.
- B. Verify that proper, specified firestopping materials are used in the firestop system and that system is installed in strict accordance with the latest independent testing agency or manufacturer's latest published requirements.
- C. Where system design permits, remove damming or support materials only after it has been determined that the firestop materials have fully cured or dried.
- D. Install any covering materials or finish as per design requirements and manufacturer's instructions.

- E. After installation, properly identify all firestop systems. Identification shall occur at location where system has been installed and shall include:
 - 1. Identify the firestopping system that has been installed as being a "Rated Through-Penetration Firestop System - Do Not Disturb."
 - 2. Use label minimum 3" x 5", yellow and black OSHA colors with manufacturers; and building owner representative and/or contractor clearly identified.
- F. Do not proceed to enclose firestopping with other construction until local building inspectors have inspected the work and given approval to close the work.
- G. Where necessary, repairs shall be made and repaired installations shall be reinspected.

3.5 CLEAN-UP

- A. Remove excess firestopping materials from surfaces not required to be firestopped.
- B. Clean application equipment in water immediately after use.

END OF SECTION 07 84 00

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: The extent of each type of joint sealer is indicated. Provide "sealant" for all exterior joints, certain indicated interior joints, and where "mastic" is indicated. Provide "calking" at all remaining interior joints.
- B. The required applications include, but are not limited to the following:
 - 1. Pavement and sidewalk joints subjected to foot traffic.
 - 2. Exterior building wall joints.
 - 3. Flashing and coping joints.
 - 4. Miscellaneous concrete construction joints.
 - 5. Masonry control joints.
 - 6. Floor (interior) joints.
 - 7. Sealant between floor and plumbing fixtures.
 - 8. Partition and ceiling joints.
 - 9. Joints at openings and indicated frames or subframes.
 - 10. Equipment and isolation joints.
 - 11. Security sealant.

1.3 PRE-INSTALLATION MEETING:

- A. Pre-Installation Meeting: Meet at the project well in advance of the time scheduled for work, (a minimum of one week), and review requirements for the work and conditions which could possibly interfere with successful performance of the work. Require all parties concerned with the work, or required to coordinate with it, or to protect it thereafter, to attend the meeting, including:
 - 1. Owner or Representative
 - 2. General Contractor
 - 3. Installer
 - 4. Manufacturer(s) Representatives
 - 5. Architect

1.4 QUALITY ASSURANCE:

- A. At the Owner's option, testing of depth of joint material may be undertaken to insure compliance with the specification and conformance to manufacturer's specifications and recommendations for joint design. If the joint fails to comply with design requirements, the Contractor shall pay for the cost of testing and replacement of all affected joints.

1.5 SUBMITTALS:

A. Product Data:

1. For information only, submit copies of manufacturer's specifications, recommendations and installation instructions for each type of material required. Include manufacturer's published data, or letter of certification, or certified test laboratory report indicating that each material complies with the requirements and is intended generally for the applications shown.

B. Samples:

1. Submit samples of each color required (except black) for each type of joint sealer exposed to view. Install sample between two strips of material similar to or representative of typical surfaces where sealer will be used, held apart to represent typical joint widths. Samples will be reviewed for color and texture only. Compliance with all other requirements is the exclusive responsibility of the Contractor.

C. Guarantee:

1. Submit copies of written two-year guarantee agreeing to repair or replace joint sealers which fail to perform as air-tight and water-tight joints; or fail in joint adhesion, cohesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability; or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated.

- a. Provide guarantee signed by the Installer and Contractor.

1.6 JOB CONDITIONS:

- A. Examine the joint surfaces and backing, and their anchorage to the structure, and the conditions under which the joint sealer work is to be performed. Do not proceed with the joint sealer work until unsatisfactory conditions have been corrected.
- B. Weather Conditions: Do not proceed with installation of sealants under adverse weather conditions, or when temperatures are below or above manufacturer's recommended limitations for installation. Proceed with the work only when weather conditions are favorable for proper cure and development of high early bond strength. Where joint width is affected by ambient temperature variations, install elastomeric sealants when temperatures are in the lower third of manufacturer's recommended installation temperature range.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL:

- A. Colors: For exposed materials provide color as indicated or, if not indicated, as selected from manufacturer's standard colors. For concealed materials, provide the natural color which has the best overall performance characteristics.
- B. Hardness: As recommended by manufacturer for application shown.

- C. Modulus of Elasticity: Provide the lowest available modulus of elasticity which is consistent with exposure to weathering, indentation, vandalism, abrasion, support of loading, and other requirements.
- D. Compatibility: Before purchase of each required material, confirm its compatibility with each material it will be exposed to in the joint system.
- E. Size and Shape: As shown or, if not shown, as recommended by the manufacturer for the type and condition of joint, and for the indicated joint performance or movement.
- F. Grade of Sealant: For each application, provide the grade of sealant (non-sag, self-leveling, no-track, knife grade, preformed, etc.) recommended by the manufacturer for the particular condition of installation (location, joint shape, ambient temperature, and similar conditions), to achieve the best possible overall performance. Grades specified herein are for normal condition of installation.

2.2 SEALANTS (See Sealant Schedule at end of Section for specific use of sealants.)

A. Urethanes:

1. Type "A1": Two-Part Urethane: Self-Leveling, ASTM C920, Type M, Grade P, Class 25. (Fed. Spec. TT-S-00227E Type I, Class A.)
 - a. Chem-Calk CC-550, by Bostik.
 - b. Vulkem 245, by Tremco.
 - c. Vulkem 255, Wide-Joint, by Tremco.
 - d. NR-200 Urexpam, by Pecora Corporation.
 - e. Sikaflex-2c NS/SL, by Sika Corporation.
 - f. SL-2, by Sonneborn
2. Type "A2": Two-Part Urethane: Non-Sag, ASTM C920, Type M, Grade NS, Class 25. (Fed. Spec. TT-S-00227E Type II, Class A.)
 - a. Chem-Calk 500, by Bostik.
 - b. Vulkem 227, by Tremco.
 - c. Dynatrol II, by Pecora Corporation.
 - d. Sikaflex-2c NS/SL, by Sika Corporation.
 - e. Sonolastic NP 2, by Sonneborn Building Products, ChemRex Inc.
 - f. Dymeric, by Tremco
3. Type "A3": One-Part Urethane: Self-Leveling, ASTM C920, Type S, Grade P, Class 25. (Fed. Spec. TT-S-00230C Type I, Class A.)
 - a. Vulkem 45, by Tremco.
 - b. Urexpam NR-201, by Pecora Corporation.
 - c. Sonolastic SL1, by Sonneborn Building Products, ChemRex Inc.
4. Type "A4": One-Part Urethane: Non-Sag, ASTM C920, Type S, Grade NS, Class 25. (Fed. Spec. TT-S-00230C Type II, Class A.)
 - a. Chem-Calk 900, by Bostik.
 - b. Vulkem 116, by Tremco.
 - c. Sonolastic NP I, by Sonneborn Building Products, ChemRex Inc.
 - d. Dymonic, by Tremco.

B. Silicones:

1. Type "B1": One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25. Vertical Surfaces Only.
 - a. 795 Silicone Structural Glazing, Glazing, and Weatherproofing Sealant, by Dow Corning.
 - b. 864 Architectural Silicone, by Pecora Corporation.
 - c. Sonolastic 150 Silyl Terminated polyether, by Sonneborn
 - d. Spectrem 3, by Tremco.
2. Type "B2": One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25. Vertical Surfaces Only.
 - a. 795 Silicone Structural Glazing, Glazing, and Weatherproofing Sealant, by Dow Corning. (colors only)
 - b. 999-A, Dow Corning.
 - c. Construction 1200 Sealant, General Electric Company.
 - d. Sonolastic 150 Silyl Terminated polyether, by Sonneborn (Not for wet glazing)
 - e. Spectrem 2, by Tremco.
3. Type "B3": One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25. Vertical Surfaces Only.
 - a. 795 Silicone Structural Glazing, Glazing, and Weatherproofing Sealant, by Dow Corning. (colors only)
 - b. Construction 1200 Sealant, General Electric Company.
 - c. 999-A, Dow Corning.
 - d. 864 Architectural Silicone, by Pecora Corporation. (colors only)
 - e. Sonolastic 150 Silyl Terminated polyether, by Sonneborn
 - f. Spectrem 1, by Tremco.
4. Type "B4": One-Part Silicones: ASTM C920, Type S, Grade NS, Class 25.
 - a. 786 Mildew Resistant Silicone Sealant, Dow Corning.
 - b. SCS 1700 Sanitary Sealant, General Electric.
 - c. 898 Silicone Sanitary Sealant, Pecora Corporation.
 - d. Omniseal or Omniply (Sanitary applications), by Sonneborn
 - e. Tremsil, by Tremco.

C. Acrylics, Latex: (For interior use only.)

1. Type "C1": One-Part Acrylic Latex, Non-Sag, ASTM-C-834-76.
 - a. Chem-Calk 600, by Bostik.
 - b. LC-130, by MACCO Adhesives, The Glidden Company.
 - c. Easa-ply ALS, by W. R. Meadows, Inc.
 - d. AC-20+Silicone Acrylic Latex, by Pecora Corporation.
 - e. Sonolac, Sonneborn Building Products, ChemRex Inc.

D. Acoustical Sealants:

1. Type "D1":
 - a. AC-20 FTR Acoustical and Insulation Sealant, by Pecora Corporation.

- b. 60+ Unicrylic, by Pecora Corporation.
- c. Sheetrock Acoustical Sealant, by United States Gypsum.

E. Butyls:

- 1. Type "E1": One-Part Butyl, Non-Sag, FS TT-S-1657.
 - a. Chem-Calk 300, by Bostik.
 - b. BC-158 Butyl Rubber, by Pecora Corporation. (ASTM C1085)

F. Preformed Compressible & Non-Compressible Fillers:

- 1. Type "F1": Backer Rod - Closed cell polyethylene foam:
 - a. HBR Backer Rod, by Nomaco.
 - b. #92 Greenrod, by Nomaco.
 - c. Sonolastic Closed-Cell Backer Rod, Sonneborn Building Products, ChemRex Inc.
 - d. Soft Cell Backer Rod (Non-gassing), by Sonneborn.
- 2. Type "F2": Backer Rod - Open cell polyurethane foam:
 - a. Denver Foam, by Backer Rod Mfg. Inc.
 - b. Foam Pack II, by Nomaco.
- 3. Type "F3": Neoprene compression seals:
 - a. WE, WF, and WG Series, by Watson Bowman & Acme Corp.
 - b. Will-Seal 150 Precompressed Expanding Foam Sealants, by Will-Seal, a Division of Illbruck.
- 4. Type "F4": Butyl Rod:
 - a. Kirkhill Rubber Co. (714)529-4901.
- 5. Type "G1":
 - a. Bond Breaker Tape: Polyethylene tape of plastic as recommended by sealant manufacturer, to be applied to sealant-contact surfaces where bond to substrate of joint filler must be avoided for proper performance of sealant

2.3 MISCELLANEOUS ACCESSORIES:

- A. Joint Primer/Sealer: Provide the type of joint primer/sealer recommended by the sealant manufacturer for the joint surfaces to be primed or sealed.
- B. Bond Breaker Tape: Polyethylene tape or other plastic tape recommended by the sealant manufacturer to be applied to sealant-contact surfaces where bond to the substrate or joint filler must be avoided for proper performance of sealant. Provide self-adhesive tape where applicable.
- C. Sealant Backer Rod: Compressible rod stock of polyethylene foam, polyethylene jacketed polyurethane foam, butyl rubber foam, neoprene foam; or other flexible, permanent, durable non-absorptive material as recommended by the sealant manufacturer.

PART 3 - EXECUTION

3.1 Manufacturer's Instructions:

1. Comply with manufacturer's printed instructions except where more stringent requirements are shown or specified, and except where manufacturer's technical representative directs otherwise.

B. Joint Preparation:

1. Clean joint surfaces immediately before installation of sealant or calking compound. Remove dirt, insecure coatings, moisture and other substances which would interfere with bond of sealant or calking compound. Etch concrete and masonry joint surfaces and roughen vitreous or glazed joint surfaces as recommended by sealant manufacturer.
2. Prime or seal the joint surfaces where recommended by the sealant manufacturer. Do not allow primer/sealer to spill or migrate onto adjoining surfaces.

3.2 INSTALLATION:

- A. Set joint filler units at proper depth or position in the joint to coordinate with other work, including the installation of bond breakers, backer rods and sealants. Do not leave voids or gaps between the ends of joint filler units.
- B. Install sealant backer rod for liquid elastomeric sealants, except where shown to be omitted or recommended to be omitted by sealant manufacturer for the application shown.
- C. Install bond breaker tape where required by manufacturer's recommendations to ensure that elastomeric sealants will perform properly.
- D. Employ only proven installation techniques, which will ensure that sealants will be deposited in uniform, continuous ribbons without gaps or air pockets, with complete "wetting" of the joint bond surfaces equally on opposite sides. Fill sealant rabbet to a slightly concave surface, between a horizontal surface and vertical surface, fill joint to form a slight cove, so that joint will not trap moisture and dirt.
- E. Install sealants to depths recommended by the sealant manufacturer but within the following general limitations, measured at the center (thin) section of the bead:
 1. For sidewalks, pavements and similar joints sealed with elastomeric sealants and subject to traffic and other abrasion and indentation exposures, fill joints to a depth equal to 75% of joint width, but neither more than 5/8" deep nor less than 3/8" deep.
 2. For normal moving joints sealed with elastomeric sealants but not subject to traffic, fill joints to a depth equal to 50% of joint width, but neither more than 1/2" deep nor less than 1/4" deep.
 3. For joints sealed with non-elastomeric sealants and calking compounds, fill joints to a depth in the range of 75% to 125% of joint width.
 4. Spillage: Do not allow sealants or compounds to overflow or spill onto adjoining surfaces, or to migrate into the voids of adjoining surfaces. Clean the adjoining surfaces by whatever means may be necessary to eliminate evidence of spillage.
 5. Do not overheat hot-applied sealants.
 6. Recess exposed edges of joint fillers slightly behind adjoining surfaces, so compressed units will not protrude from the joint.

3.3 CURE AND PROTECTION:

- A. Cure sealants and calking compounds in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability. Advise the Contractor of procedures required for the cure and protection of joint sealers during the construction period, so that they will be without deterioration or damage (other than normal wear and weathering) at the time of acceptance.

3.4 SEALANT SCHEDULE

A. Exterior Joints:

1. Perimeters of exterior openings where frames and other penetrations meet exterior facade of building: precast concrete, brick, CMU, reinforced concrete.
 - a. Sealant Type – B1 (for prefinished materials only)
2. Expansion and control joints in exterior surfaces of cast-in-place concrete walls.
 - a. Sealant Type –A4
3. Expansion and control joints in exterior surfaces of unit masonry walls.
 - a. Sealant Type - A2
4. Coping joints, coping-to-facade joints, cornice and wash, or horizontal surface joints not subject to foot or vehicular traffic.
 - a. Sealant Type – A4
 - b. Sealant Type - B1 (for prefinished materials only)
5. Exterior joints in horizontal wearing and non-wearing surfaces.
 - a. Sealant Type - A1
 - b. Sealant Type - A3
 - c. Backer Material Type - F1
6. Setting bed for threshold and saddles.
 - a. Sealant Type - E1
7. Painted metal lap or flashing joints.
 - a. Sealant Type - B1

B. Interior Joints:

1. Seal interior perimeters of exterior openings.
2. Expansion and control joints on interior of exterior cast-in-place concrete walls.
3. Expansion and control joints on interior of exterior surfaces of masonry walls.
4. Perimeters of interior hollow metal and aluminum frames.
5. Interior masonry vertical control joints and intersecting masonry walls; CMU-to-CMU, CMU-to-concrete.
 - a. For all of the above interior joints:

- 1) Sealant Type – A4
 - 2) Sealant Type - B1 (for prefinished materials only)
6. Exposed interior control joints in drywall and concealed joints.
 - a. Sealant Type - C1
 - b. Sealant Type - D1
 7. Joints of underside of precast beams or planks.
 - a. Sealant Type - A2
 - b. Sealant Type - A4
 8. Perimeter of bath fixtures: sinks, urinals, water closets, basins, vanities, etc.
 - a. Sealant Type - B4
 9. Painted metal lap joints.
 - a. Sealant Type - B1
- C. Glazing:
1. General Purpose Glazing.
 - a. Sealant Type - B3
 2. End Damming.
 - a. Sealant Type - E1

END OF SECTION 07 90 00

SECTION 08 11 10 - METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: All steel door and frame work indicated on the drawings and herein specified, including cased opening, removable mullions, borrowed lites, transoms, access door and frames for cupola. etc.

1.3 RELATED WORK UNDER OTHER SECTIONS:

- A. Division 05 Section - Cold Form Metal Framing
- B. Division 08 Section - Glass and Glazing.
- C. Division 08 Section - Door Hardware.
- D. Division 08 Section - Aluminum Doors and Frames.

1.4 QUALITY ASSURANCE:

- A. Provide stock and indicated custom hollow metal work, which includes doors, door frames, frames for sidelights, transoms and other openings, and all related items, all manufactured by a single firm specializing in the production of this type of work.
- B. Provide stock doors and frames complying with the Steel Door Institute "Recommended Specifications for Standard Steel Doors and Frames" (ANSI/SDI 100, Latest Edition), except as herein specified.
 - 1. Manufacturers offering products to comply with the requirements for metal doors and frames include the following:
 - a. Steelcraft
 - b. Amweld Building Products
 - c. Ceco Corporation
 - d. Curries
 - e. Fenestra
 - f. Kewanee Corporation
 - g. Mesker Brothers Industries, Inc.
 - h. Pioneer Fireproof Door Co.
 - i. Republic Steel Corp.

- C. Fire-Rated Assemblies:

1. Where a fire-resistance classification (3-hour, 1-1/2 hour, etc. or "A", "B", etc.) is shown or scheduled for hollow metal work, provide fire-rated hollow metal doors and frames investigated and tested as a fire door assembly, complete with type of fire door hardware to be used. Identify each fire door and frame with UL or FM labels, indicating applicable fire rating of both door and frame.
2. Provide assemblies to comply with NFPA Standard No. 80, and as herein specified.
3. Oversize Assemblies: Where hollow metal assemblies are larger than size limitations established by NFPA and UL and FM, provide manufacturer's certification that assembly has been constructed with materials and methods equivalent to labeled construction.

1.5 SUBMITTALS:

A. Product Data:

1. For information only, submit a copy of manufacturer's specifications for fabrication and shop-painting, and installation instructions.

B. Shop Drawings:

1. Submit shop drawings for the fabrication and erection of hollow metal work. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Provide fabrication, erection and anchorage details at 3" to 1'-0" scale. Show anchorage and accessory items.
2. Provide a schedule of doors and frames using same reference numbers for details and openings as those indicated.

C. Label Construction:

1. Submit manufacturer's certification for oversize fire-rated doors and frames that each assembly has been constructed with materials and methods equivalent to requirements for labeled construction.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Deliver hollow metal work cartoned, or crated, to provide protection during transit and job storage.
- B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided the finish items are equal in all respects to new work and acceptable to the Architect; otherwise, remove and replace damaged items as directed.
- C. Store doors and frames at the building site under cover. Place units on at least 4" high wood sills or on floors in a manner that will prevent rust and damage. Avoid the use of non-vented plastic or canvas shelters which could create a humidity chamber. If the cardboard wrapper on the door becomes wet, remove the carton immediately. Provide a 1/4" space between stacked doors to promote air circulation.

1.7 JOB CONDITIONS:

- A. Examine the substrate and conditions under which hollow metal work is to be installed. Do not proceed with the work until unsatisfactory conditions have been corrected.

PART 2 - PRODUCTS

A. MATERIALS:

1. Hot-Rolled Steel Sheets and Strip:
 - a. Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.
2. Cold-Rolled Steel Sheets:
 - a. Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.
3. Galvanized Steel Sheets:
 - a. Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526 or A 642; with A60 (0.60 oz. per sf) oz. commercial zinc coating, mill phosphatized, complying with ASTM A 525.
4. Supports and Anchors:
 - a. Fabricate of not less than 16 gauge sheet steel. Galvanize after fabrication, units to be built into exterior walls, complying with ASTM A 153, Class B.
5. Inserts, Bolts and Fasteners:
 - a. Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A 153, Class C or D as applicable.
6. Shop-Applied Paint:
 - a. For steel surfaces, use rust-inhibitive enamel or paint, either air-drying or baking, medium gray color, suitable as a base for specified finish paints.
 - b. Paint galvanized surfaces with gray zinc dust-zinc oxide primer.

2.2 FABRICATION, GENERAL:

- A. Fabricate hollow metal units to be rigid, neat in appearance and free from defects, warp or buckle. Accurately form metal to required sizes and profiles. Where practical, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment to assure proper assembly at the project site. Weld exposed joints continuously, grind, dress, and make smooth, flush and invisible. Metallic filler to conceal manufacturing defects is not acceptable.
- B. Provide all hollow metal doors and frames receiving electromechanical hardware with wiring harness and Molex™ standardized concealed plug connectors to accommodate up to twelve (12) wires. Coordinate Molex™ connectors on end of the wiring harness to plug directly into the electrified hardware and the electric hinge.
- C. Exposed Fasteners:
 1. Provide countersunk flat Phillips or Jackson heads for exposed screws and bolts.
- D. Finish Hardware Preparation:
 1. Drill frames for door silencers and insert plastic construction plugs.
 2. Prepare hollow metal units to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided under Section 08700. Comply with applicable requirements of ANSI A115 "Specifications for Door and Frame Preparation".
 3. Reinforce hollow metal units to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.
 4. Locate finish hardware in accordance with "Recommended Locations for Builders' Hardware", published by the National Builders' Hardware Association.
 5. Doors and Frames: Provide doors and frames at access controlled openings with concealed wiring harnesses and electrical connectors to properly receive the specified electromechanical hardware.

E. Shop Painting:

1. Clean, treat and paint surfaces of fabricated hollow metal units, including galvanized surfaces, whether concealed or exposed in the finished work.
2. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before the application of the shop coat of paint.
3. Apply pretreatment to cleaned metal surfaces, using cold phosphate solution (SSPC-PT2), hot phosphate solution (SSPC-PT4) or basic zinc chromate-vinyl butyral solution (SSPC-PT3).
4. Prime finish: Doors and frames shall be thoroughly cleaned, and chemically treated to insure maximum paint adhesion. All surfaces of the door and frame exposed to view shall receive a factory applied coat of rust inhibiting primer, either air-dried or baked-on. The finish shall meet the requirements for acceptance stated in ANSI/SDI A250.10 "Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."

2.3 DOORS:

A. Provide Grade I, Model 1, full flush hollow steel construction.

1. Provide sound insulation filler of fiberboard, mineral-wool board, or manufacturer's standard insulation, solidly packed full door height to fill the voids between inner core reinforcing members.
2. For single-acting swing doors, bevel both vertical edges 1/8" in 2". For double-acting swing doors, round vertical edges with a 2-1/8" radius.
3. Astragals: 12 gauge x 1-1/2" wide steel, welded to full height of door, on active leaf.
4. Reinforce doors with rigid tubular frame where stiles and rails are less than 8" wide. Form tubular frame with 16 gage steel, welded to outer sheets.

B. Exterior Doors:

1. Fabricate exterior doors of two outer galvanized, stretcher-leveled steel sheets not less than 16 gage. Construct doors with smooth, flush surfaces without visible joints or seams on exposed faces or stile edges, except around glazed or louvered panel inserts.
2. Reinforce inside of doors with vertical galvanized sheet steel channel-shaped sections or interlocking Z-shaped sections not less than 20 gage. Space vertical reinforcing 6" o.c. and extend full door height. Spot-weld at 4" o.c. to both outer sheets.
 - a. Continuous truss-form inner core of 28 gage galvanized sheet steel reinforcing may be provided as inner reinforcement, in lieu of above. Spot-weld truss-form reinforcement 3" o.c. vertically and horizontally over entire surface of both sides.
3. Reinforce tops and bottoms of doors with 16 gage galvanized horizontal steel channels welded continuously to the outer sheets. Close top and bottom edges to provide weather seal, as integral part of door construction or by addition of inverted steel channels.
4. Insulated doors are to be completely filled with a rigid polyurethane core chemically bonded to all interior surfaces with a minimum insulation u-value of 0.11 (R 9) as tested on an operable door.

C. Interior Doors:

1. Fabricate interior doors of two outer cold-rolled, stretcher-leveled steel sheets not less than 18 gage. Construct doors with smooth, flush surfaces, without visible joints or seams on exposed faces or stile edges, except around glazed or louvered panel inserts.
2. Reinforce inside of doors with vertical, hot-rolled, 20 gage steel channel-shaped sections or interlocking Z-shaped steel sections. Space vertical reinforcing 6" o.c. and extend full door height. Spot weld at 4" o.c. to both outer sheets.

- a. Continuous truss-form inner core of 28 gage sheet metal reinforcing may be provided as inner reinforcement in lieu of above. Spot-weld truss-form reinforcing 3" o.c. vertically and horizontally over entire surface of both sides.
 3. Reinforce tops and bottoms of doors with 18 gage, horizontal steel channels, welded continuously to the outer sheets.
- D. Interior Doors, indicated to be galvanized:
1. Fabricate interior doors of two outer galvanized cold-rolled, stretcher-leveled steel sheets not less than 18 gage. Construct doors with smooth, flush surfaces, without visible joints or seams on exposed faces or stile edges, except around glazed or louvered panel inserts.
 2. Reinforce inside of doors with vertical galvanized 20 gage galvanized steel channel-shaped sections or interlocking Z-shaped steel sections. Space vertical reinforcing 6" o.c. and extend full door height. Spot weld at 4" o.c. to both outer sheets.
 - a. Continuous truss-form inner core of 28 gage sheet metal reinforcing may be provided as inner reinforcement in lieu of above. Spot-weld truss-form reinforcing 3" o.c. vertically and horizontally over entire surface of both sides.
 3. Reinforce tops and bottoms of doors with 18 gage, galvanized horizontal steel channels, welded continuously to the outer sheets.
- E. Finish Hardware Reinforcement:
1. Reinforce doors for required finish hardware, as follows:
 - a. Hinges: Steel plate 3/16" thick x 1-1/2" wide x 6" longer than hinge, secured by not less than 6 spot-welds.
 - b. Mortise locksets and dead bolts: 14 gage steel sheet, secured with not less than two spot-welds.
 - c. Cylinder Locks: 14 gage steel sheet, secured with not less than two spot-welds.
 - d. Flush Bolts: 14 gage steel sheet, secured with not less than two spot-welds.
 - e. Surface-Applied Closers: 12 gage steel sheet, secured with not less than six spot-welds.
 - f. Push Plates and Bars: 16 gage steel sheet, (except when through bolts are shown or specified), secured with not less than two spot-welds.
 - g. Surface Panic Devices: 14 gage sheet steel (except when through bolts are shown or specified), secured with not less than two spot-welds.
 - h. Automatic Door Bottoms: Reinforce for mortise-type units with 12 gage steel, and 16 gage for surface-applied units.
 2. Galvanize reinforcing at doors required to be galvanized.
- 2.4 FRAMES:
- A. Fabricate frames of full-welded unit construction, with corners mitered, reinforced, continuously welded full depth and width of frame.
 1. Knock-down type frames are not acceptable.
 - B. Form frames of galvanized steel sheets for exterior, and either cold or hot-rolled sheet steel for interior. Provide galvanized frames at interior doors required to be galvanized.
 1. Gage: Not less than 14, for exterior openings up to 4'-0" wide.
 2. Gage: Not less than 16, for interior openings up to 4'-0" wide.
 3. For openings over 4'-0" wide, increase thickness by at least two standard gages.
 - C. Finish Hardware Reinforcement:
 1. Reinforce frames for required finish hardware, as follows:

- a. Hinges: Steel plate 3/16" thick x 1-1/2" wide x 6" longer than hinge, secured by not less than six spot-welds.
 - b. Strike Plate Clips: Steel plate 3/16" thick x 1-1/2" wide x 3" long.
 - c. Surface-Applied Closers: 12 gage steel sheet, secured with not less than six spot-welds.
2. Galvanize reinforcing at doors required to be galvanized.
- D. Mullions and Transom Bars:
1. Provide closed or tubular mullions and transom bars, where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves same metal and thickness as frame.
 2. Provide removable mullions, where indicated. Weld a bottom closure piece within the mullion, so that insulation fill (provided under Division 7) will remain contained.
 3. Where installed in masonry, leave vertical mullions in frame open at the top so they can be filled with grout.
- E. Jamb Anchors:
1. Furnish jamb anchors as required to secure frames to adjacent construction, formed of not less than 18 gage galvanized steel.
 - a. Masonry Construction: Adjustable, flat or corrugated or perforated, shaped to suit frame size with leg not less than 2" wide by 10" long. Furnish at least 3 anchors per jamb up to 7'-6" height; 4 anchors up to 8'-0" jamb height; one additional anchor for each 24" or fraction thereof over 8'-0" height.
 - b. Metal Stud Partitions: Insert type with notched clip to engage metal stud, welded to back of frames. Provide at least 4 anchors for each jamb for frames up to 7'-6" in height; 5 anchors up to 8'-0" jamb height; one additional anchor for each 24" or fraction thereof over 8'-0" height.
 - c. In-place Concrete or Masonry: Anchor frame jambs with minimum 3/8" concealed bolts into expansion shields or inserts at 6" from top and bottom and 26" o.c., unless otherwise shown. Reinforce frames at anchor locations. Apply removable stop to cover anchor bolts.
- F. Floor Anchors:
1. Provide floor anchors for each jamb and mullion which extends to floor, formed of not less than 16 gage galvanized steel sheet, as follows:
 - a. Monolithic Concrete Slabs: Clip type anchors, with two holes to receive fasteners, welded to bottom of jambs and mullions.
 - b. Separate Topping Concrete Slabs: Adjustable type with extension clips. Terminate bottom of frames at finish floor surface.
- G. Head Anchors:
1. Provide two anchors at head of frames exceeding 42" wide for frames mounted in steel stud walls.
- H. Head Strut Supports:
1. Provide 3/8" x 2" vertical steel struts extending from top of frame at each jamb to supporting construction above, unless frame is anchored to masonry or to construction at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable bolted anchorage to frame jamb members.
- I. Structural Reinforcing Members:

1. Provide structural reinforcing members as a part of frame assembly, at mullions, transoms, or other locations which are to be built into frame.
- J. Head Reinforcing:
1. For frames over 4'-0" wide provide two continuous steel angles not less than 2" x 2" x 12 gage and width of opening, welded to back of frame at head.
- K. Spreader Bars:
1. Provide two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- L. Rubber Door Silencers:
1. Drill stops to receive three silencers on single-door frames and two silencers on double-door frames. Install plastic plugs to keep holes clear during construction.
- M. Frame Guards:
1. Provide 26 gage guards or mortar boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation.
- 2.5 STOPS AND MOLDINGS:
- A. Provide stops and moldings around glazed panels in hollow metal units and in frames to receive door.
 - B. Form fixed stops and moldings integral with frame. Provide removable stops on inside of hollow metal units exposed to exterior and on corridor side of interior units.
 - C. Provide removable stops and molds at other locations, formed of not less than 20 gage steel sheets, exterior, galvanized and interior cold-rolled. Secure with machine screws spaced uniformly not more than 12" o.c. Form corners with butted hairline joints.
 - D. Coordinate width of rabbet between fixed and removable stops with type of glass or panel and type of installation indicated.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Install hollow metal units and accessories in accordance with the final shop drawings, manufacturer's data, and as herein specified.
- B. Setting Masonry Anchorage Devices:
 1. Provide masonry anchorage devices for securing hollow metal frames to in-place concrete or masonry construction.
 2. Set anchorage devices opposite each anchor location, in accordance with details and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.
 3. Floor anchors may be set with powder-actuated fasteners instead of masonry anchorage devices and machine screws, if so indicated.
- C. Placing Frames:
 1. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving smooth and undamaged.

- a. In masonry construction, building-in of anchors and grouting of frames is included in Division 4 of these specifications.
 - b. At in-place concrete or masonry construction, set frames and secure in place with machine screws and masonry anchorage devices.
 - c. Place fire-rated frames in accordance with NFPA Standard No. 80.
 - d. Make field splices in frames welded and finished to match factory work.
 - e. Remove spreader bars only after frames or bucks have been properly set and secured.
- D. Door Installation:
1. Fit hollow metal doors accurately in their respective frames, within the following clearances:
 - a. Jambs and Head: 3/32".
 - b. Meeting Edges, Pairs of Doors: 1/8".
 - c. Bottom: 3/8", where no threshold or carpet.
 - d. Bottom, at threshold or carpet: 1/8".
 2. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.
- 3.2 ADJUST AND CLEAN:
- A. Final Adjustments:
 - B. Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise damaged.
 - C. Prime Coat Touch-Up:
 1. Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer. Continue this procedure throughout the construction process, so that no rusted or damage conditions exist prior to the finish painting specified in Division 9.

END OF SECTION 08 10 00

SECTION 08 21 10 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with wood-veneer faces.
 - 2. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.
- B. Related Sections:
 - 1. Division 06 Section "Interior Architectural Woodwork" for requirements for veneers from the same flitches for both flush wood doors and wood paneling.
 - 2. Division 08 Section "Glazing" for glass view panels in flush wood doors.
 - 3. Division 08 Section "Hollow Metal Doors & Frames".

1.3 SUBMITTALS

- A. Product Data: For each type of door indicated. Include details of core and edge construction and trim for openings. Include factory-finishing specifications.
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.
 - 1. Indicate dimensions and locations of mortises and holes for hardware.
 - 2. Indicate dimensions and locations of cutouts.
 - 3. Indicate requirements for veneer matching.
 - 4. Indicate doors to be factory finished and finish requirements.
 - 5. Indicate fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification:
 - 1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches, for each material and finish. For each wood species and transparent finish, provide set of three samples showing typical range of color and grain to be expected in the finished work.
 - 2. Corner sections of doors, approximately 8 by 10 inches, with door faces and edges representing actual materials to be used.
 - a. Provide samples for each species of veneer and solid lumber required.
 - b. Provide samples for each color, texture, and pattern of plastic laminate required.
 - c. Finish veneer-faced door samples with same materials proposed for factory-finished doors.
 - 3. Frames for light openings, 6 inches long, for each material, type, and finish required.

- E. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Source Limitations: Obtain flush wood doors from single manufacturer.
- C. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated.", WDMA I.S.1-A, "Architectural Wood Flush Doors." and WI's "Manual of Millwork."
 - 1. Provide AWI Quality Certification Labels or an AWI letter of licensing for Project indicating that doors comply with requirements of grades specified.
 - 2. Provide WI-Certified Compliance Certificate indicating that doors comply with requirements of grades specified.
 - 3. Provide WI-Certified Compliance Certificate for installation.
- D. Forest Certification: Provide doors made with not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- E. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10B.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

1.5 DELIVERY, STORAGE, AND HANDLING

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

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.

- b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Algoma Hardwoods, Inc.
 2. Chappell Door Co.
 3. Eggers Industries.
 4. Graham
 5. Lambton Doors.
 6. Marshfield Door Systems, Inc.
 7. Mohawk Flush Doors, Inc.; a Masonite company.
 8. Oshkosh Architectural Door Company.
 9. Vancouver Door Company.
 10. VT Industries Inc.

2.2 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- B. WDMA I.S.1-A Performance Grade: Heavy Duty.
- C. Provide all wood doors receiving electromechanical hardware with wiring harness and Molex™ standardized concealed plug connectors to accommodate up to twelve (12) wires. Coordinate Molex™ connectors on end of the wiring harness to plug directly into the electrified hardware and the electric hinge.
- D. Particleboard-Core Doors:
 1. Particleboard: ANSI A208.1, Grade LD-2.
 2. Blocking: Provide wood blocking in particleboard-core doors as follows:
 - a. 5-inch top-rail blocking, in doors indicated to have closers.
 - b. 5-inch bottom-rail blocking, in exterior doors and doors indicated to have kick, mop, or armor plates.
 - c. 5-inch midrail blocking, in doors indicated to have exit devices.
 3. Provide doors with either glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.
- E. Structural-Composite-Lumber-Core Doors:
 1. Structural Composite Lumber: WDMA I.S.10.
 - a. Screw Withdrawal, Face: 700 lbf.
 - b. Screw Withdrawal, Edge: 400 lbf.
- F. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

1. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
2. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

G. Mineral-Core Doors:

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

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors

1. Grade: Premium, with Grade AA faces.
2. Species: As indicated on drawings. If not indicated on drawings, provide Red Oak.
3. Cut: Plain sliced (flat sliced).
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet or more.
8. Room Match: Provide door faces of compatible color and grain within each separate room or area of building.
9. Core: Particleboard, Glued wood stave, or Structural composite lumber.
10. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering. Faces are bonded to core using a hot press.
11. WDMA I.S.1-A Performance Grade: Heavy Duty.

2.4 LIGHT FRAMES

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads as follows unless otherwise indicated.

1. Wood Species: Same species as door faces.
2. Profile: Manufacturer's standard shape.
3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.

B. Wood-Veneered Beads for Light Openings 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-protection rating indicated. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, DHI A115-W series standards, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
 - 3. Provide doors and frames at access controlled openings with concealed wiring harnesses and electrical connectors to properly receive the specified electromechanical hardware.
- C. Openings: Cut and trim openings through doors in factory.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."

2.6 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on bottom edges, edges of cutouts, and mortises.
- B. Finish doors at factory.
- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI TR-4 conversion varnish system.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Effect: Filled finish.
 - 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
 - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

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

END OF SECTION 08 14 16

SECTION 08 33 00 – FIRE SHUTTER

PART 1 - GENERAL

1.01 SUMMARY

- A. This section includes: Electric operated, automatic closing Counter-Shutter Fire Door.
 - 1. Provide doors with Underwriter's Laboratories, Inc. (UL) and Underwriter's Laboratories of Canada (ULC) label for the fire rating classification. 1 ½ hr.
 - 2. Cycle life: Design doors of standard construction for normal use of 10,000 cycles standard.
 - 3. Manually resettable drop out mechanism with optional release devices. (For automatically resettable doors see specs for Auto Fire-Shut®)
- B. Related Sections:
 - 1. Section 016000 – Product Requirements.
 - 2. Section 061000 – Rough Carpentry.
 - 3. Section 087000 – Door Hardware.
 - 4. Section 092900 – Gypsum Board.
 - 5. Section 099100 – Painting.
 - 6. Section 260000 – Electrical.
 - 7. Section 28310 – Fire Detection and Alarm.

1.02 REFERENCES

- A. ASTM A 653/A 653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- B. ASTM A 36 – Standard Specification for Carbon Structural Steel, Hot Rolled Steel
- C. ASTM A 123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- D. ASTM A 312 – Standard Specification for Seamless, Welded, and Heavily Cold Worked Austenitic Stainless Steel Pipes
- E. ASTM A 240 – Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
- F. ASTM A 276 – Standard Specification for Stainless Steel Bars and Shapes

1.03 SUBMITTALS

- A. Submit under provisions of Section 01300.
- B. Product Data: Provide manufacturer's standard details and catalog data. Provide installation instructions.
- C. Shop Drawings: Furnish shop drawings for architect's approval. Include elevation, sections, and details indicating dimensions, materials, finishes, conditions for anchorage and support of each door.

- D. Submit manufacturer's recommended operation, troubleshooting, and maintenance instructions.

1.04 QUALITY ASSURANCE

- A. Manufacturer: Rolling doors shall be manufactured by a firm with a minimum of five years experience.
- B. Fire-Rated Assemblies: Provide all doors with fire resistance rating required to comply with governing regulations which are inspected, tested, listed and labeled by UL, complying with NFPA 80 for class of opening. Provide UL label permanently fasted to each fire door assembly. Door shall be tested under UL10B and ULC10B, and provided with a 1 ½ hr. rating.
- C. Single-Source Responsibility: Manufacturer shall provide doors, tracks, motors, and accessories for each type of door. Secondary components shall come from a source acceptable to the manufacturer of the primary components.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packaging supplied by manufacturer with intact labels. Store materials away from harmful environmental conditions and construction.

1.06 WARRANTY

- A. Door Warranty: Provide two year written warranty from date of installation against deficiencies due to defects in materials or workmanship. Installer agrees to repair or replace any defects in materials or workmanship.
- B. Project Warranty: Refer to Conditions of the Contract for project warranty provisions.

PART 2 - PRODUCTS

2.01 MANUFACTURER

- A. Basis of Design: Alpine Overhead Doors, Inc.; 8 Hulse Road Suite 1S, East Setauket, NY 11733. Telephone 800-257-4634 or 631-473-9300. Fax 631-642-0800.
- B. Model: FIRE-SHUT® Rolling Counter Fire Door

2.02 MATERIALS

- A. Curtain:
 - 1. Slats: Constructed of interlocking, roll-formed 1¼" baby flat slats.
 - a) Material:
 - i) Galvanized steel, G90 coating exterior (G60 interior), Structural Quality Grade C, as per ASTM A 653/ A 653 M
Finish: Galvanized (Minimum coating conforming with Coating Designation G-01 is required)
– OR –
 - ii) ASTM 240 Stainless steel 300 series
Finish: Mill finish #2B
 - b) Gauge: Minimum 22 gauge as manufacturer standard.
 - 2. Endlocks or Windlocks (as required):
 - a) Stamped, hot-dipped, galvanized endlocks riveted (solid rivets, minimum ¼" thick) to each end of alternate slats to prevent lateral movement and to limit slat deflection and bending stress.

3. Bottom Bar: Two roll formed steel angles of minimum 1"x 3/4"x 1/8", designed to reinforce curtain bottom. (Size dependent on dimensions per manufacturer's standard)
 - a) Material:
 - i) Galvanized Steel as per ASTM A 653/ A 653 M
Finish: Gray shop prime
– OR –
 - ii) ASTM 240 Stainless Steel 300 Series
Finish: Mill finish #2B
 - b) [Weather Stripping]: Neoprene strip bolted between bottom angles.
- B. Guides:
 1. Laser cut 12 gauge steel, formed into box shape and fitted with removable bellmouth curtain stops to allow for curtain maintenance without removal of guides. Bellmouth stops shall be flush with guide groove. Bolt at 12" o.c.
 - a) Material:
 - i) ASTM A 36 Carbon Structural Steel
Finish: Gray shop prime coat
– OR –
 - ii) ASTM 276 Stainless Steel 300 Series
- C. Door Support Brackets and Mounting Plates:
 1. Steel plate not less than 3/16" thick. Provide ball bearings at rotating support points. Bolt plates to wall mounting angles with minimum 3/8" fasteners. Plate supports counterbalance assembly and forms end enclosures.
 - a) Material:
 - i) ASTM A 36 Carbon Steel:
Finish: Gray shop prime coat
– OR –
 - ii) ASTM 240 Stainless Steel 300 Series
- D. Counterbalance Assembly: Torsion
 1. Counterbalance assembly: Steel pipe barrel of a size capable of carrying a curtain load with a maximum deflection of 0.03" per foot of door width. Heat-treated helical torsion springs encased in a steel pipe and designed to include an overload factor of 25% to ensure minimum effort to operate. Sealed and prelubricated high speed ball bearing at rotating support points. Torsion spring charge wheel for applying spring torque and for future adjustments.
 - a) Material:
 - i) ASTM A 36 Carbon Structural Steel
Finish: Gray shop prime coat
– OR –
 - ii) A 312 Stainless Steel 300 Series
Finish: Mill finish

- b) Life Cycle: High Cycle springs designed to satisfy 10m through 400m life cycles. Consult engineering if height exceeds width for any cycle above 20m. (Cycle defined as one time opening and closing of door)

E. Hood:

1. 22 gauge steel. Formed to fit the contour of the end brackets with reinforced top and bottom edges. Fasten with minimum ¼" bolts at 10" o.c.
2. Shape: Square
3. Material:
 - a) Galvanized Steel as per ASTM A 653/ A 653 M
– OR –
 - b) ASTM 240 Stainless Steel 300 Series:

F. Locking:

1. Provide padlockable slide locks for latching and locking door on coil side bottom bar at each jamb extending into slots in guides. (Electric Interlocks recommended with motorized doors only)
2. Manual chain hoist: Provide padlockable chain keeper on guide.

2.03 OPERATION:

Opening/Closing Options: Motor Operator. Automatic closure is activated by fusible link.

A. Motor Operators:

1. Redi-Shut™ Gear Reduced Jackshaft Door Operator.
2. Sensing Edges (For double angle bottom bar): For motorized doors, sensing edges allow door to go up in case of obstruction.
 - a) Colors: Gray

B. Release Devices:

1. Fusible link with chain system:
 - a) Activation: Melting of fusible link at 165° Fahrenheit. When automatic closing is activated, chain shall disengage causing door to close.
 - b) Closing speed controlled by Integral Oscillating governor.
 - c) Average closing speed: No less than 6" per second and not more than 24" per second as per NFPA 80 Section 6, paragraph 4.1.5.

2.04 Mounting:

1. Interior face mounted on prepared opening.
2. Interior mounted between jambs and under lintel in a prepared opening.
3. Exterior face mounted on prepared opening.

2.05 Fire Ratings:

1. Underwriter's Laboratories:

Doors are constructed to conform within requirements specified by Underwriters Laboratories, Inc. (UL) and Underwriter's Laboratories of Canada (ULC). Doors are automatic and self-closing, Class (A) (B) (C) (D).

Class (A) – 3 hour approved for doors in dividing fire walls with openings not exceeding 120 sq. ft. in area

Class (B) – 1 ½ hour approved for doors, in vertical shaft openings not exceeding 120 sq. ft. in area.

Class (C) – ¾ hour approved for doors in corridor or room-partition opening not exceeding 120 sq. ft. in area.

Class (D) – 1 ½ hour approved for doors in exterior wall opening not exceeding 120 sq. ft. in area.

2. New York Materials, Equipment and Acceptance Division (MEA).

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Verify that dimensions are correct and project conditions are in accordance with manufacturer's installation instructions; do not proceed with installation until unacceptable conditions have been corrected.

3.02 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Ensure that units are installed plumb and true, free of warp or twist, and within tolerances specified by manufacturer for smooth operation.
- C. Preparation for opening and installation of fire door to be in strict compliance with NFPA-80.

3.03 FIELD TESTING

- A. Test doors for regular operation and automatic closing. Proper authorities having jurisdiction must witness test and sign Drop Test Form.

3.04 DEMONSTRATION

- A. Instruct the Owner's personnel in correct operation and maintenance of units.

3.05 ADJUST AND CLEAN

- A. Clean units in accordance with manufacturer's instructions.
- B. Restore slight blemishes in finishes in accordance with manufacturer's instructions to match original finish. Remove and provide new units where repairs are not acceptable to the Architect.

END OF SECTION 08 33 00

SECTION 08 43 10 - ALUMINUM STOREFRONT WINDOWS

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.
- B. As indicated in previous Sections of the Project Manual, this project is pursuing LEED Silver certification from the U.S. Green Building Council (USGBC). The contractor will be required to provide certification to the architect that materials under in this section conform to the requirements for LEED EQ Credits 4.1 & 4.2. Refer to section 018113 for additional LEED requirements regarding this section.

1.2 SUMMARY

- A. Section Includes:
 - 1. The extent of each type (operation and size) of aluminum window unit is shown.
- B. The applications of aluminum windows on the project include:
 - 1. Units set in masonry work and/or stud work as indicated on drawings.
- C. Design Criteria for this Project: Wind load, deflection and pressures in accordance with the governing Building Code or the ANSI Standard A58.1 "Components and Cladding", whichever is most stringent.

1.3 RELATED WORK:

- A. Division 07 Section "Flashing and Sheet Metal".
- B. Division 07 Section "Insulation".
- C. Division 07 Section "Joint Sealers".
- D. Division 07 Section "Air and Vapor Barrier".
- E. Division 08 Section "Glass and Glazing".

1.4 QUALITY ASSURANCE:

- A. Standards: The requirements for aluminum windows, and the terminology and standards of performance and fabrication workmanship, are those specified and recommended in ANSI/AAMA 101-93 and the applicable general recommendations published by NAAMM and AA.

1.5 SUBMITTALS:

- A. Product data for each type of window required, including:
 - 1. Construction details and fabrication methods.
 - 2. Profiles and dimensions of individual components.
 - 3. Data on hardware, accessories, and finishes.
 - 4. Recommendations for maintenance and cleaning of exterior surfaces.
- B. Shop drawings for each type of window required. Include information not fully detailed in manufacturer's standard product data and the following:
 - 1. Layout and installation details, including anchors, complete with windload calculations and structural fastening calculations, stamped and sealed by a professional engineer licensed in the State of the project location.
 - 2. Elevations at 1/4-inch = 1 foot scale, and typical window unit elevations at 3/4-inch = 1 foot scale.
 - 3. Full-size section details of typical composite members, including reinforcement and stiffeners.
 - 4. Location of weep holes.
 - 5. Panning details
 - 6. Hardware, including operators.
 - 7. Glazing details.
 - 8. Accessories.
- C. Test reports from a qualified independent testing agency indicating that each type, grade, and size of window unit complies with each performance requirement indicated. Test results based on use of down-sized test units will not be accepted.
 - 1. Manufacturer's certification of compliance with requirements of the AAMA standards for poured-and-debrided thermal breaks included in Quality Assurance article of this Section.
- D. Manufacturer: Provide aluminum units produced by a single firm, capable of showing prior successful production of units similar to those required.
- E. Performance and Testing: Comply with the air infiltration tests, water resistance tests and applicable load tests specified in ANSI/AAMA 101-93 for the type and classification of window unit required in each case.
- F. Labelling: Provide labels, on each window unit, indicating AAMA or window classification grade conformance to these specifications.
- G. Testing: Where manufacturer's standard window units comply with the requirements and have been tested in accordance with the specified tests, provide certification by the manufacturer of compliance with such tests; otherwise, perform the required tests through a recognized testing laboratory or agency and provide certified test results.
- H. Manufacturer's Data: For information only, submit copies of manufacturer's specifications, recommendations and standard details for aluminum window units, including fabrication, finishing, hardware and other components of the work. Include certified test laboratory reports as necessary to show compliance with the requirements.
- I. Samples: Submit samples of each required aluminum finish, on 24" long sections of extrusion shapes as required for the window units. Where color or texture of finish will vary slightly for the work, include 2 or more sections in each sample, to show the limits of such variations. Samples

will be reviewed for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.

1. Architect reserves the right to require samples which will show the fabrication techniques and workmanship of component parts, and the design of hardware and other exposed auxiliary items for window units, before fabrication of the work.
- J. Affidavit: Submit copies of manufacturer's current (within six months of installation) affidavit indicating conformance to the performance specification herein designated, as well as current testing laboratory certification.

PART 2 - PRODUCTS

2.1 MANUFACTURER:

- A. Kawneer #VG451T Framing System, for "fixed windows".

2.2 MATERIALS:

- A. Aluminum Extrusions: Alloy and temper recommended by window manufacturer for strength, corrosion resistance and application of required finish, but not less than 22,000 psi ultimate tensile strength and not less than 0.062" thickness at any location for main frame and sash members.
- B. Fasteners: Aluminum or stainless steel compatible with the aluminum window members, trim, hardware, anchors and other components of the window units.
1. Do not use exposed fasteners except where unavoidable for the application of hardware. Match the finish of the metal surrounding the fastener.
 2. Provide Phillips flat-head machine screws for exposed fasteners.
- C. Sealant: Provide type recommended by window manufacturer for the joint size and movement, to remain permanently elastic, non-shrinking and non-migrating. See Division 7 for installation of sealants.
- D. Glass and Glazing Materials: Sections 088000 and 088853.
- E. Muntins: Kawneer #735-005 Applied Muntins, 3/4" x 5/16".

2.3 FIXED WINDOWS:

- A. General: The following paragraphs define the operating arrangement for required types of sash (ventilators) in window units, and specify minimum provisions for each type. Provide non-bullet resistant window framing profiles to match bullet resistant framing profiles specified in Section 130650.
- B. Fixed Aluminum Windows: Except for special provisions as indicated for maintenance, cleaning and removal, no operating hardware or equipment is required.
1. Thermo-Break Type: Construct entire unit, with locked-in plastic or rubber thermo-breakers, so that none of the aluminum exposed to the exterior has metal to metal contact with the aluminum exposed on the interior.

2.4 WINDOW CLASSIFICATION (GRADE):

- A. General: The aforementioned classification(s) are related to the requirements of the AAMA/NWWDA Classification System, and AAMA/NWWDA 101 except to the extent more stringent requirements are specified.
1. Grade HC: For "Heavy Commercial" buildings.

2.5 FABRICATION AND ACCESSORIES:

- A. General: Provide manufacturer's standard fabrication and accessories, except where more specific or more stringent requirements are indicated and specified. Include complete system for assembly of components and anchorage of window units, and prepare sash for glazing.
- B. Sizes and Profiles: The required sizes for window units and the profile requirements, to match Section 130650, are shown. Variable dimensions (if any) are indicated along with maximum and minimum dimensions as required to achieve design requirements and coordination with other work.
1. The details shown are based upon standard details by Kawneer. It is intended that similar details by other manufacturers will be acceptable, provided they comply with the size requirements, and with minimum/maximum profile requirements as shown.
- C. Types and Classifications: The drawings indicate the required aluminum window types (defined to mean the manner of operation), whether for ventilation or for glass cleaning or other purposes. Except as otherwise shown, provide the classification or grade (quality and weight) specified herein.
- D. Coordination of Fabrication: Where possible, check actual window openings in the construction work by accurate field measurement before fabrication, and show recorded measurements on final shop drawings. However, coordinate fabrication schedule with construction progress as directed by Contractor to avoid delay of the work. Where necessary, proceed with fabrication without field measurements, and coordinate installation tolerances to ensure proper fit of window units.
- E. Provide subframes for window units where shown, of the profile and dimensions indicated but not less than 0.062" thickness extruded aluminum; with mitered or coped corners, welded and dressed smooth or with concealed mechanical joint fasteners; with anchors; finish to match window units.
- F. Provide mullions and cover plates as shown, matching window units, and complete with anchors for support to structure and for installation of window units. Allow for erection tolerances and provide for movements of window units due to thermal expansion and building deflections, in the manner indicated.

2.6 ALUMINUM WINDOW FINISHES:

- A. Natural Anodized Finish: NAAMM AA-C22A41, Class I (minimum thickness of 0.7 mils), natural aluminum color.

2.7 PREGLAZED FABRICATION:

- A. It is required that the window units, wherever installation requirements will permit, be glazed in the shop, prior to installation. However, Contractor, at his option, may elect to glaze the units after installation to facilitate the overall project construction requirements. See 088000 and 088853 sections for glass and glazing requirements.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Comply with manufacturer's specifications and recommendations for the installation of window units, hardware, operators, and other components of the work.
 - 1. Muntins: Provide muntins, at windows, as indicated on drawings.
 - 2. Do not install window until after wall opening has been properly and completely flashed at head, jamb and sill by other trades.
- B. Set units plumb, level and true to line, without warp or rack of frames or sash. Anchor securely in place. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.
- C. Set sill members and other members in a bed of compound as shown, or with joint fillers or gaskets as shown to provide weathertight construction. Refer to Division 7 for compounds, fillers and gaskets to be installed concurrently with window units.
 - 1. Compounds, joint fillers and gaskets (if any) to be installed after the installation of window units are specified in the Division 7.
 - a. Install low-expansion polyurethane foam insulation around frame, concealed from view.
- D. Clean aluminum surfaces promptly after installation of windows, exercising care to avoid damage of the protective coating (if any). Remove excess glazing and sealant compounds, dirt and other substances. Lubricate hardware and other moving parts. Remove labels only after each window unit has been reviewed and accepted.
- E. Advise Contractor of protective treatment and other precautions required through the remainder of the construction period, to ensure that window units will be without damage or deterioration (other than normal weathering) at the time of acceptance.

END OF SECTION 08 43 10

SECTION 087100 – DOOR HARDWARE

GENERAL

RELATED DOCUMENTS

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

SUMMARY

This Section includes commercial door hardware for the following:

- Swinging doors.
- Sliding doors.
- Other doors to the extent indicated.

Door hardware includes, but is not necessarily limited to, the following:

- Mechanical door hardware.
- Electromechanical door hardware, power supplies, back-ups and surge protection.
- Cylinders specified for doors in other sections.

Related Sections:

- Division 08 Section "Door Hardware Schedule".
- Division 08 Section "Hollow Metal Doors and Frames".
- Division 08 Section "Interior Aluminum Doors and Frames".
- Division 08 Section "Flush Wood Doors".
- Division 08 Section "Access Control Hardware".

Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

- ANSI A117.1 - Accessible and Usable Buildings and Facilities.
- ICC/IBC - International Building Code.
- NFPA 80 - Fire Doors and Windows.
- NFPA 101 - Life Safety Code.
- NFPA 105 - Installation of Smoke Door Assemblies.
- State Building Codes, Local Amendments.

Standards: All hardware specified herein shall comply with the following industry standards:

- ANSI/BHMA Certified Product Standards - A156 Series
- UL10C – Positive Pressure Fire Tests of Door Assemblies

SUBMITTALS

Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.

Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."

Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

Content: Include the following information:

- Type, style, function, size, label, hand, and finish of each door hardware item.
- Manufacturer of each item.
- Fastenings and other pertinent information.
- Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
- Explanation of abbreviations, symbols, and codes contained in schedule.
- Mounting locations for door hardware.
- Door and frame sizes and materials.

Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

Shop Drawings: Details of electrified access control hardware indicating the following:

Wiring Diagrams: Upon receipt of approved schedules, submit detailed system wiring diagrams for power, signaling, monitoring, communication, and control of the access control system electrified hardware. Differentiate between manufacturer-installed and field-installed wiring. Include the following:

- Elevation diagram of each unique access controlled opening showing location and interconnection of major system components with respect to their placement in the respective door openings.
- Complete (risers, point-to-point) access control system block wiring diagrams.

Electrical Coordination: Coordinate with related Division 26 Electrical Sections the voltages and wiring details required at electrically controlled and operated hardware openings.

Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for locksets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders.

Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware and their nearest service representatives. The final

copies delivered after completion of the installation test to include "as built" modifications made during installation, checkout, and acceptance.

Warranties and Maintenance: Special warranties and maintenance agreements specified in this Section.

QUALITY ASSURANCE

Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

Installer Qualifications: Installers, trained by the primary product manufacturers, with a minimum 3 years documented experience installing both standard and electrified builders hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor in good standing by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.

Scheduling Responsibility: Preparation of door hardware and keying schedules.

Source Limitations: Obtain each type and variety of Door Hardware specified in this Section from a single source, qualified supplier unless otherwise indicated.

Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.

Regulatory Requirements: Comply with NFPA 70, NFPA 80, NFPA 101 and ANSI A117.1 requirements and guidelines as directed in the model building code including, but not limited to, the following:

NFPA 70 "National Electrical Code", including electrical components, devices, and accessories listed and labeled as defined in Article 100 by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

Where indicated to comply with accessibility requirements, comply with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," ANSI A117.1 as follows:

Handles, Pulls, Latches, Locks, and other Operating Devices: Shape that is easy to grasp with one hand and does not require tight grasping, tight pinching, or twisting of the wrist.

Door Closers: Comply with the following maximum opening-force requirements indicated:

Interior Hinged Doors: 5 lbf applied perpendicular to door.
Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

Thresholds: Not more than 1/2 inch high. Bevel raised thresholds with a slope of not more than 1:2.

NFPA 101: Comply with the following for means of egress doors:

Latches, Locks, and Exit Devices: Not more than 15 lbf to release the latch. Locks shall not require the use of a key, tool, or special knowledge for operation.

Thresholds: Not more than 1/2 inch high.

Fire-Rated Door Assemblies: Provide door hardware for 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 (neutral pressure at 40" above sill) or UL-10C.

Test Pressure: Positive pressure labeling.

Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

- Function of building, purpose of each area and degree of security required.
- Plans for existing and future key system expansion.
- Requirements for key control storage and software.
- Installation of permanent keys, cylinder cores and software.
- Address and requirements for delivery of keys.

Pre-Submittal Conference: Conduct coordination conference in compliance with requirements in Division 01 Section "Project Meetings" with attendance by representatives of Supplier(s), Installer(s), and Contractor(s) to review proper methods and the procedures for receiving, handling, and installing door hardware.

Prior to installation of door hardware, conduct a project specific training meeting to instruct the installing contractors' personnel on the proper installation and adjustment of their respective products. Product training to be attended by installers of door hardware (including electromechanical hardware) for aluminum, hollow metal and wood doors. Training will include the use of installation manuals, hardware schedules, templates and physical product samples as required.

Inspect and discuss electrical roughing-in, power supply connections, and other preparatory work performed by other trades.

Review sequence of operation narratives for each unique access controlled opening.

Review and finalize construction schedule and verify availability of materials.

Review the required inspecting, testing, commissioning, and demonstration procedures

At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

DELIVERY, STORAGE, AND HANDLING

Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

COORDINATION

Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.

Door and Frame Preparation: Related Division 08 Sections (Steel, Aluminum and Wood) doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

WARRANTY

General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

Structural failures including excessive deflection, cracking, or breakage.

Faulty operation of the hardware.

Deterioration of metals, metal finishes, and other materials beyond normal weathering.

Electrical component defects and failures within the systems operation.

Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

Special Warranty Periods:

Ten years for mortise locks and latches.

Five years for exit hardware.

Twenty five years for manual surface door closers.
Two years for electromechanical door hardware.

MAINTENANCE SERVICE

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

Continuing Service: Beginning at Substantial Completion, and running concurrent with the specified warranty period, provide continuous (6) months full maintenance including repair and replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door opening operation. Provide parts and supplies as used in the manufacture and installation of original products.

PRODUCTS

SCHEDULED DOOR HARDWARE

General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.

Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:

Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.

Substitutions: Requests for substitution and product approval for inclusive mechanical and electromechanical door hardware in compliance with the specifications must be submitted in writing and in accordance with the procedures and time frames outlined in Division 01, Substitution Procedures. Approval of requests is at the discretion of the architect, owner, and their designated consultants.

HANGING DEVICES

Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

Quantity: Provide the following hinge quantity, unless otherwise indicated:

Two Hinges: For doors with heights up to 60 inches.
Three Hinges: For doors with heights 61 to 90 inches.
Four Hinges: For doors with heights 91 to 120 inches.
For doors with heights more than 120 inches, provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches.

Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:

Widths up to 3'0": 4-1/2" standard or heavy weight as specified.
Sizes from 3'1" to 4'0": 5" standard or heavy weight as specified.

Hinge Weight and Base Material: Unless otherwise indicated, provide the following:

Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.

Hinge Options: Comply with the following where indicated in the Hardware Sets or on Drawings:

Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the following applications:

Out-swinging exterior doors.
Out-swinging access controlled doors.
Out-swinging lockable doors.

Acceptable Manufacturers:

Hager Companies (HA).
McKinney Products (MK).
Stanley Hardware (ST).

Continuous Geared Hinges: ANSI/BHMA A156.26 certified continuous geared hinge with minimum 0.120-inch thick extruded 6060 T6 aluminum alloy hinge leaves and a minimum overall width of 4 inches. Hinges are non-handed, reversible and fabricated to template screw locations. Provide concealed flush mount (with or without inset), full surface, or half surface, in standard and heavy duty models, as specified in the Hardware Sets. Concealed continuous hinges to be U.L. listed for use on up to and including 90 minute rated door installations and U.L. listed for windstorm components where applicable. Factory cut hinges for door size and provide with removable service power transfer panel where indicated at electrified openings.

Acceptable Manufacturers:

Bommer Industries (BO).
McKinney Products (MK).
Pemko Manufacturing (PE).

POWER TRANSFER DEVICES

Concealed Quick Connect Electric Power Transfers: Provide concealed wiring pathway housing mortised into the door and frame for low voltage electrified door hardware. Furnish with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.

Acceptable Manufacturers:

Corbin Russwin (RU) - EPTL.
McKinney (MK) - EL-EPT.
Securitron (SU) - EL-CEPT Series.
Von Duprin (VD) - EPT-10 Series.

Electric Door Hardware Cords: Provide electric transfer wiring harnesses with standardized plug connectors to accommodate up to twelve (12) wires. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Provide a connector for through-door electronic locking devices and from hinge to junction box above the opening. Wire nut connections are not acceptable. Determine the length required for each electrified hardware component for the door type, size and construction, minimum of two per electrified opening.

Acceptable Manufacturers:

McKinney Products (MK) – QC-C Series.

Provide one each of the following tools as part of the base bid contract:

- a. McKinney Products (MK) - Electrical Connecting Kit: QC-R001.
McKinney Products (MK) - Connector Hand Tool: QC-R003.

DOOR OPERATING TRIM

Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified automatic, self-latching, and manual flush bolts and surface bolts. Manual flush bolts to be furnished with top rod of sufficient length to allow bolt location approximately six feet from the floor. Furnish dust proof strikes for bottom bolts. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

Acceptable Manufacturers:

Door Controls International (DC).
Rockwood Manufacturing (RO).
Trimco (TC).

Door Push Plates and Pulls: ANS/BHMA A156.6 certified door pushes and pulls of type and design specified below or in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

Push/Pull Plates: Minimum .050 inch thick, size as indicated in hardware sets, with beveled edges, secured with exposed screws unless otherwise indicated.

Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.

Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.

Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

Acceptable Manufacturers:

Hiawatha, Inc. (HI).
Rockwood Manufacturing (RO).
Trimco (TC).

CYLINDERS AND KEYING

General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.

Cylinders: Original manufacturer cylinders complying with the following:

Mortise Type: Threaded cylinders with rings and straight- or clover-type cam.

Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

Bored-Lock Type: Cylinders with tailpieces to suit locks.

Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

Keyway: Manufacturer's Standard.

Patented Cylinders: ANSI/BHMA A156.5, Grade 1, certified cylinders employing a utility patented and restricted keyway requiring the use of patented controlled keys. Provide bump resistant, fixed core cylinders as standard with solid recessed cylinder collars. Cylinders are to be factory keyed where permanent keying records will be established and maintained.

Provide a 6 pin multi-level master key system comprised of patented controlled keys and security and high security cylinders operated by one (1) key of the highest level. Geographical exclusivity to be provided for all security and high security cylinders and UL437 certification where specified.

Level 1 Cylinders: Provide utility patented controlled keyway cylinders that are furnished with patented keys available only from authorized distribution.

Level 2 Cylinders: Provide utility patented controlled keyway and side bar locking incorporating unique angled bottom pins for geographical exclusivity. Cylinders constructed to provide protection against bumping and picking.

Level 3 Cylinders: Provide utility patented controlled keyway and side bar locking incorporating unique angled bottom pins for geographical exclusivity. Cylinders to be UL437 certified and constructed to provide protection against bumping, picking, and drilling.

Refer to hardware sets for specified levels.

Acceptable Manufacturer:

Sargent Manufacturing (SA) - Degree Series.

Corbin Russwin (RU) – Access 3 Series.

Keying System: Each type of lock and cylinders to be factory keyed. Conduct specified "Keying Conference" to define and document keying system instructions and requirements. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner. Incorporate decisions made in keying conference, and as follows:

Master Key System: Cylinders are operated by a change key and a master key.

Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.

Great-Grand Master Key System: Cylinders are operated by a change key, a master key, a grand master key, and a great-grand master key.

Existing System: Master key or grand master key locks to Owner's existing system.

Keyed Alike: Key all cylinders to same change key.

Key Quantity: Provide the following minimum number of keys:

Top Master Key: One (1)

Change Keys per Cylinder: Two (2)

Master Keys (per Master Key Group): Two (2)

Grand Master Keys (per Grand Master Key Group): Two (2)

Construction Keys (where required): Ten (10)

Construction Control Keys (where required): Two (2)

Permanent Control Keys (where required): Two (2)

Construction Keying: Provide construction master keyed cylinders or temporary keyed construction cores where specified. Provide construction master keys in quantity as required by project Contractor. Replace construction cores with permanent cores. Furnish permanent cores for installation as directed under specified "Keying Conference".

Key Registration List: Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

Acceptable Manufacturers:

Lund Equipment (LU).

MMF Industries (MM).

Telkee (TK).

Key Control Software: Provide one network version of "Key Wizard" branded key management software package that includes one year of technical support and upgrades to software at no charge. Provide factory key system formatted for importing into "Key Wizard" software.

MECHANICAL LOCKS AND LATCHING DEVICES

Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified mortise locksets furnished in the functions as specified in the Hardware Sets. Locksets to be manufactured with a corrosion resistant, stamped 12 gauge minimum formed steel case and be field-reversible for handing without disassembly of the lock body. Lockset trim (including knobs, levers, escutcheons, roses) to be the product of a single manufacturer. Furnish with standard 2 3/4" backset, 3/4" throw anti-friction stainless steel latchbolt, and a full 1" throw stainless steel bolt for deadbolt functions.

Acceptable Manufacturers:

Corbin Russwin Hardware (RU) – ML2000 Series.

Sargent Manufacturing (SA) – 8200 Series.

Yale Locks and Hardware (YA) – 8800FL Series.

Lock Trim Design: As specified in Hardware Sets.

LOCK AND LATCH STRIKES

Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

Standards: Comply with the following:

Strikes for Mortise Locks and Latches: BHMA A156.13.

Strikes for Bored Locks and Latches: BHMA A156.2.

Strikes for Auxiliary Deadlocks: BHMA A156.5.

Dustproof Strikes: BHMA A156.16.

CONVENTIONAL EXIT DEVICES

B. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.

Fire Exit Removable Mullions: Provide keyed removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions to be used only with exit devices for which they have been tested.

Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is not acceptable except in any case where the door light extends behind the device as in a full glass configuration.

Flush End Caps: Provide heavy weight impact resistant flush end caps made of architectural metal in the same finish as the devices as in the Hardware Sets. Plastic end caps will not be acceptable.

Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty trim with cold forged escutcheons, beveled edges, and four threaded studs for thru-bolts.

Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets. Provided free-wheeling type trim where indicated.

Where function of exit device requires a cylinder, provide an interchangeable core type keyed cylinder (Rim or Mortise) as specified in Hardware Sets.

Vertical Rod Exit Devices: Provide and install interior surface and concealed vertical rod exit devices as Less Bottom Rod (LBR) unless otherwise indicated.

Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

Rail Sizing: Provide exit device rails factory sized for proper door width application.

Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Mounting rails to be formed from smooth stainless steel, brass or bronze architectural materials no less than 0.072" thick, with push rails a minimum of 0.062" thickness. Painted or aluminum metal rails are not acceptable. Exit device latch to be investment cast stainless steel, pullman type, with deadlock feature.

Acceptable Manufacturers:

Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
Sargent Manufacturing (SA) - 80 Series.
Yale Locks and Hardware (YA) - 7000 Series.

1.2 ELECTROMECHANICAL CONVENTIONAL EXIT DEVICES

A. Electrified Conventional Push Rail Devices (Heavy Duty): Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified below.

1. Acceptable Manufacturers:

Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
Sargent Manufacturing (SA) - 80 Series.
Yale Locks and Hardware (YA) - 7000 Series.

Electrified Options: As indicated in hardware sets, provide electrified exit device options including: electric latch retraction, electric dogging, outside door trim control, exit alarm, delayed egress, latchbolt monitoring, lock/unlock status monitoring, touchbar monitoring and request-to-exit signaling. Unless otherwise indicated, provide electrified exit devices standard as fail secure.

DOOR CLOSERS

All door closers specified herein shall meet or exceed the following criteria:

2. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

Standards: Closers to comply with UL-10C and UBC 7-2 for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.

Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.

Where closers are indicated to have mechanical dead-stop, provide heavy duty arms and brackets with an integral positive stop.

Where closers are indicated to have mechanical hold open, provide heavy duty units with an additional built-in mechanical holder assembly designed to hold open against normal wind and traffic conditions. Holder to be manually selectable to on-off position.

Where closers are indicated to have a cushion-type stop, provide heavy duty arms and brackets with spring stop mechanism to cushion door when opened to maximum degree.

Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics. Provide drop plates or other accessories as required for proper mounting.

Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates, and through-bolt or security type fasteners as specified in the door Hardware Sets.

Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

Acceptable Manufacturers:

Corbin Russwin Hardware (RU) - DC8000 Series.

Sargent Manufacturing (SA) - 351 Series.

Norton Door Controls (NO) - 7500 Series.

Yale Locks and Hardware (YA) - 4400 Series.

ARCHITECTURAL TRIM

Door Protective Trim

3. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
4. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
5. Metal Protection Plates: ANSI/BHMA A156.6 certified metal protection plates (kick, armor, or mop), beveled on four edges (B4E), fabricated from the following:

Stainless Steel: 300 series, .050-inch thick, with countersunk screw holes (CSK).

Fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets.

Metal Door Edging: Door protection edging fabricated from a minimum .050-inch thick metal sheet, formed into an angle or "U" cap shapes, surface or mortised mounted onto edge of door. Provide appropriate leg overlap to account for protection plates as required. Height to be as specified in the Hardware Sets.

Acceptable Manufacturers:

Hiawatha, Inc. (HI).
Rockwood Manufacturing (RO).
Trimco (TC).

DOOR STOPS AND HOLDERS

- B. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.

Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.

Acceptable Manufacturers:

Hiawatha, Inc. (HI).
Rockwood Manufacturing (RO).
Trimco (TC).

Overhead Door Stops and Holders: ANSI/BHMA A156.6, Grade 1 certified overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.

Acceptable Manufacturers:

Rixson Door Controls (RF).
Rockwood Manufacturing (RO).
Sargent Manufacturing (SA).

ARCHITECTURAL SEALS

- C. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- D. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- E. Fire Labeled Gasketing: 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 UL-10C.

Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and UBC 7-2, Fire Tests of Door Assemblies.

Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.

Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.

Acceptable Manufacturers:

Pemko Manufacturing (PE).
Reese Enterprises, Inc. (RS).
Zero International (ZE).

1.3 ELECTRONIC ACCESSORIES

Power Supplies: Provide Nationally Recognized Testing Laboratory Listed 12VDC or 24VDC (field selectable) filtered and regulated power supplies. Include battery backup option with integral battery charging capability in addition to operating the DC load in event of line voltage failure. Provide the least number of units, at the appropriate amperage level, sufficient to exceed the required total draw for the specified electrified hardware and access control equipment.

Acceptable Manufacturers:

Corbin Russwin Hardware (RU) – 782.
Sargent Manufacturing (SA) – 3500 Series.
Securitron (SU) - BPS Series.
Yale Locks and Hardware (YA) 782.

1.4 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

1.5 FINISHES

Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

- A. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

EXECUTION

EXAMINATION

Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.

Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

1.6 PREPARATION

Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.

Wood Doors: Comply with ANSI/DHI A115-W series.

INSTALLATION

Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."

Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.

Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

FIELD QUALITY CONTROL

Field Inspection: Supplier will perform a final inspection of installed door hardware and state in report whether work complies with or deviates from requirements, including whether door hardware is properly installed, operating and adjusted.

ADJUSTING

Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

CLEANING AND PROTECTION

Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.

Clean adjacent surfaces soiled by door hardware installation.

Clean operating items as necessary to restore proper finish. and provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

DEMONSTRATION

Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

DOOR HARDWARE SCHEDULE

Refer to drawings for hardware schedule.

END OF SECTION 087100

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK:

- A. The types of metal stud systems required include:
 - 1. Screw-type steel studs for drywall work.
 - 2. Suspension system for interior gypsum board ceilings, soffits and grid systems.

1.3 RELATED WORK UNDER OTHER SECTIONS:

- A. Division 07 Section "Sound Attenuation Batts"
- B. Division 07 Section "Thermal Insulation"
- C. Division 09 Section "Gypsum Board."
- D. Division 13 Section "Metal Building System"
- E. Division 26 Section - Metal or plastic grommets to protect electric cable and wire.

1.4 SUBMITTALS:

- A. Product Data: For information only, submit copies of manufacturer's specifications and installation instructions for each type of metal stud and accessories including other data as may be required to show compliance with these specifications.
- B. Evaluation Reports: Submit evaluation reports certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 accreditation criteria for inspection agencies.

1.5 QUALITY ASSURANCE:

- A. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified in accordance with the product-certification program of the Steel Framing Industry Association (SFIA) or a similar organization that provides a verifiable code-compliance program.
- B. U.L. Rated Assemblies: Where metal studs are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide studs identical with units, tested and shown in the applicable UL design of the "Fire Resistance Index" and Gypsum Association "GA-600" latest edition..

C. Manufacturer: Provide steel studs, of the type(s) indicated, produced by one of the following:

1. Punched-type non-load-bearing wall studs:

- a. Marino Corporation
- b. [ClarkDietrich](#)

2. Screw-type lightgauge drywall studs:

- a. Marino Corporation
- b. [ClarkDietrich](#)

1.6 PRODUCT DELIVERY AND STORAGE:

A. Protect metal studs from rusting and damage. Deliver to the project site in manufacturer's unopened containers or bundles, fully identified with name, brand, type and grade. Store off the ground in a dry ventilated space, as required by AISI S202, "Code of Standard Practice for Cold-Formed Steel Framing."

PART 2 - PRODUCTS

2.1 GENERAL:

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Installation standard ASTM C 754.

C. System Components: Comply with AISI S220 and ASTM C645, Section 10. With each type of metal stud required, provide manufacturer's standard runners (tracks), shoes, clips, ties, stiffeners, fasteners, door jamb reinforcers and accessories as recommended by the manufacturer for the applications indicated, to provide a complete metal stud system.

D. Punched Steel Non-Load-Bearing Studs: Manufacturer's standard formed steel studs of the height, depth, shape and gage indicated; and with the section modulus indicated, if any; with punched webs to facilitate erection of system and passage of mechanical/electrical service lines.

- 1. Gage: As scheduled.
- 2. Depth of Section: As shown.
- 3. Steel: AISI S220 and ASTM C645, Section 10.
- 4. Finish: Hot-dip zinc coating complying with AISI S220; ASTM A [653](#), **G40 (Z120)**; or **coating with equivalent corrosion resistance G90**. Galvannealed products are unacceptable.
 - a. Coating shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.
 - b. Product: ClarkDietrich; [DiamondPlus®](#) Coating on ProSTUD and ProTRAK [**20**].
- 5. Face of Flanges: Screw type (knurled to facilitate use of self-drilling tapping fasteners).

E. Drywall Screw-Type Steel Studs: Manufacturer's standard formed lightgauge steel studs complying with AISI S220 and ASTM C 645, Section 10, of the height, size, and gage indicated; with punched webs to facilitate erection of system and passage of

mechanical/electrical service lines.

1. Product: ClarkDietrich; [ProSTUD](#) and [ProTRAK](#) [20 (20 EQ) 70 ksi (483 MPa)] product with Smart Edge technology or comparable product.
 2. Gage: 25 gage minimum [\[0.0150 inch\]](#) [\[0.0179 inch\]](#), however, provide 20 gage [\[0.0181 inch\]](#) [\[0.0296 inch\]](#) studs in unbraced partitions over 10 feet in height, and at all door jambs hereinafter specified.
 3. Provide 20 gage [\(0.0329 inch\)](#) or heavier studs at partitions indicated to receive fiberglass reinforced cementitious board, and at gypsum drywall partitions indicated to be finished with ceramic tile.
 4. Provide ~~18-gage~~ 20 gage (0.0296 inch) or heavier studs at walls indicated to receive Security Mesh.
 5. Depth of Section: As indicated.
 6. Flange Width: Not less than 1.25".
 7. Shape: "Cee" shape (returned flanges).
 8. Face of Flanges: Screw-type (knurled to facilitate use of self-drilling tapping fasteners).
- F. Miscellaneous Metal Accessories: Provide 3/4" channels, 7/8" furring members or miscellaneous furring items, as indicated and required.
- G. Suspension Systems:
1. Tie-wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch (1.59 mm) diameter wire, or double strand of 0.048-inch (1.21 mm) diameter wire.
 2. Hanger Attachments to Concrete:
 - a. Anchors: Capable of sustaining a load equal to 5 times that imposed as determined by ASTM E 488.
 - b. Powder-Actuated Fasteners: Capable of sustaining, a load equal to 10 times that imposed as determined by ASTM E 1190.
 3. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16-inch (4.12 mm) in diameter.
 4. Carrying Channels: Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.053-inch (1.34 mm) and minimum 1/2 inch wide flanges.
 - a. Depth: As indicated on drawings, if not indicated provide 2 inches (51 mm).
 5. Furring Channels (Furring Members):
 - a. Cold-Rolled Channels: 0.053-inch (1.34 mm) base-steel thickness, with minimum 1/2 inch (13 mm) wide flanges, 3/4 inch (19 mm) deep.
 - b. Steel Studs and Runners: AISI S220 and ASTM C 645, Section 10. Use either steel studs and runners or steel studs and runners of equivalent minimum base-steel thickness.
 - 1) Product: ClarkDietrich; [ProSTUD](#) and [ProTRAK](#) [20 (20 EQ) 70 ksi (483 MPa)] product with Smart Edge technology or comparable product.
 - 2) Minimum Base-Steel Thickness: As indicated on drawings. If not indicated, not less than 20 gauge [\[0.0181 inch\]](#) [\[0.0296 inch\]](#).
 - 3) Depth: As indicated on drawings. If not indicated depth should be not less than 2-1/2 inches (64 mm).
 6. Hat-Shaped, Rigid Furring Channels: AISI S220, 7/8-inch (22 mm) deep.

- a. Product: ClarkDietrich; [Hat-Shaped, Rigid Furring Channels](#), or comparable product.
 - b. Minimum Base-Steel Thickness: As indicated on drawings. If not indicated, thickness should be not less than 25 gauge (0.0179 inch).
7. Resilient Furring Channels: 1/2-inch (13 mm) deep members designed to reduce sound transmission.
- a. Product: ClarkDietrich; [RC Deluxe \(RCSD\)](#) Resilient Channel or comparable product.
 - b. Configuration: [**Asymmetrical**].

PART 3 - EXECUTION

3.1 INSTALLATION:

A. General:

1. Manufacturer's Instructions: Install metal stud systems in accordance with manufacturer's printed or written instructions and recommendations.
 - a. Coordinate requirements and recommendations with GA-600 latest edition for wall construction type and/or sound ratings.
2. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately to the layout at base and tops of studs. Secure tracks for the type of construction involved, except do not exceed 24" o.c. spacing for nail or power-driven fasteners, nor 16" o.c. for other types of attachment. Provide fasteners at corners and ends of tracks.
 - a. Isolation of Stud Systems from Structures: Where stud systems abut ceiling or deck construction or vertical structural elements, provide slip or cushion-type joint between stud system and structure to prevent the transfer of structural loads or movements to stud systems, unless otherwise shown.
3. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
4. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.
5. Where wire-tying is indicated for assembly of stud system components, tie with either single 16 gage or double 18 gage wire except as otherwise indicated. Wrap to form either saddle-tie or figure-eight, depending upon type of member intersection.
6. Install supplementary framing, blocking and bracing in the metal stud system where walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings and similar work requiring attachment to the wall or partition. Where type of supplementary support is not indicated, comply with the stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the item supported. In addition, provide horizontal bracing in all partitions 8'-0" high or greater, whether or not required by the stud manufacturer.
7. Height of Partition Stud Systems: Terminate top of all partitions at underside of construction above, unless shown otherwise.
8. Stud Spacing: Space studs at 16" o.c., maximum, install studs so flanges within framing system, point in same direction.

B. Installation of Exterior Curtain Wall Stud System:

1. Secure studs to top and bottom runner tracks by either welding or screw fastening at both inside and outside flanges, or provide manufacturer's special stud shoes or clips for stud anchorage.
2. Frame wall openings larger than 2'-0" square with double stud at each jamb of frame except where more than two are either shown or indicated in manufacturer's instructions. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of the wall. Install at least one stiffener above and below each wall opening, not more than 6" above head and 6" below sill. Extend stiffeners to not less than 2 regular studs each side of jamb studs, and weld or wire-tie to each stud and jack stud intersected. Secure stud system all around to wall opening frame in the manner indicated.
3. Frame both sides of expansion and control joints, as shown for the wall system, with a separate stud and do not bridge the joint with components of the stud system.

C. Installation of Stud System to Receive Gypsum Board:

1. Runner Tracks: At partition corners and intersections, butt runner tracks, except leave clearance where base course of gypsum board is to run through.
2. Friction fit studs to runner tracks by positioning and rotating into place. Provide positive attachment to tracks for studs located at partition corners and intersections, and adjacent to openings, and for jack studs located above and below openings. Attach with either self-tapping screws or by use of clinching tool, at both flanges of stud.
3. At partition corners and intersections, provide a minimum of 3 studs, positioned to support each surface of partition; or provide 2 studs with the second stud installed after the base course of gypsum board has been run through, and screw anchor the second stud through the gypsum board to the first stud at 2' o.c. spacing.
4. Install full length studs between runner tracks wherever possible. If necessary, splice studs by nesting with a minimum lap of 8" and fasten laps with 2 screws through each flange.
5. Frame door openings with vertical studs securely attached to each jamb of door frame. On head of door frame install runner track; cut flanges at ends, bend web 90 degrees and screw attach to jamb studs. Install jack studs over door opening, spaced same as full-height studs. Where control joints are shown to extend upward from door jambs, install an unattached cripple stud spaced 1/2" from jamb or strut stud(s). Space next full-height stud not more than 6" from jamb or strut stud(s).
 - a. Provide jamb stud(s) at swing/hinged-door openings as follows:
 - 1) Door widths up to 4'-0" - 2-25 gage or 1-20 gage
 - 2) Door opening in excess of 4' - 2-20 gage
 - b. Attach jamb studs to metal door frames with metal clips, each with two screws into jamb stud.
6. Frame openings other than door openings in the same manner as required for door openings, and install framing below sills of openings to match framing required above door heads.
7. Frame both sides of expansion and control joints as shown for the partition system, with a separate stud and do not bridge the joint with components of the stud system.

D. Installation of Suspension Stud System to Receive Gypsum Board:

1. Install suspension system components according to spacings indicated, but not greater than spacings required by reference installation standards for assembly types.
2. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
3. Suspend hangers from building structure as follows:
 - a. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - 1) Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - b. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - c. Do not attach hangers to steel roof deck.
 - d. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 - e. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 - f. Do not connect or suspend steel framing from ducts, pipes, or conduit.
4. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
5. Seismic Bracing: Sway-brace suspension systems with hangers used for support at 8'-0" o.c. each way.
6. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

E. Z-Furring Members:

1. Erect insulation, specified in Division 07 Section "Thermal Insulation," vertically and hold in place with Z-furring members spaces 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or power-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Interior gypsum board.
- 2. Tile backing panels.

B. Related Requirements:

- 1. Division 07 Section "Sound Attenuation Batts"
- 2. Division 09 Section "Non-Structural Metal Framing" for non-structural framing and suspension systems that support gypsum board panels.
- 3. Division 09 Section "Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

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

B. Samples: For the following products:

- 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.

1.4 QUALITY ASSURANCE

- A. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.

- 1. Install mockups for the following:

- a. Each level of gypsum board finish indicated for use in exposed locations.

- 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
- 3. Simulate finished lighting conditions for review of mockups.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 DELIVERY, STORAGE AND HANDLING

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

1.6 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Low-Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

- A. Recycled Content of Gypsum Panel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. American Gypsum.
 2. CertainTeed Corp.
 3. Georgia-Pacific Gypsum LLC.
 4. Lafarge North America Inc.
 5. National Gypsum Company.
 6. USG Corporation.
- B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch (15.9 mm).
 2. Long Edges: Tapered.
- C. Gypsum Ceiling Board: ASTM C 1396/C 1396M.
1. Thickness: 5/8 inch (12.7 mm).
 2. Long Edges: Tapered.
- D. Moisture- and Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.
1. Core: As indicated, 5/8 inch (15.9 mm), Type X, unless otherwise noted.
 2. Long Edges: Tapered.
 3. Mold Resistance: ASTM D 3273, score of 10.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

- A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; GlasRoc Sheathing.
 - b. Georgia-Pacific Gypsum LLC; Dens-Glass Gold.
 - c. National Gypsum Company; Gold Bond, e(2)XP.
 - d. USG Corporation; Securock Glass Mat Sheathing.
 2. Core: As indicated, 5/8 inch (15.9 mm), Type X, unless otherwise noted.

2.5 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; GlasRoc Tile Backer.

- b. Georgia-Pacific Gypsum LLC; DensShield Tile Backer.
2. Core: As indicated on Drawings, 5/8 inch (15.9 mm), Type X, unless otherwise noted.
3. Mold Resistance: ASTM D 3273, score of 10.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.

1. Material: Galvanized steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
2. Shapes:
 - a. Corner bead.
 - b. Bullnose bead.
 - c. Casing bead / LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Exterior Trim: ASTM C 1047.

1. Material: Hot-dip galvanized steel sheet.
2. Shapes:
 - a. Corner bead.
 - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - c. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper.
2. Exterior Gypsum Soffit Board: Paper.
3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints, rounded edges, and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.

4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

D. Joint Compound for Exterior Applications:

1. Exterior Gypsum Soffit Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

E. Joint Compound for Tile Backing Panels:

1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
2. Cementitious Backer Units: As recommended by backer unit manufacturer.
3. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

1. Laminating adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

D. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
2. Recycled Content of Blankets: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.

E. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Pecora Corporation; AC-20 FTR.
 - d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - e. USG Corporation; SHEETROCK Acoustical Sealant.
2. 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).
- F. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- G. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels. Control joints to be installed minimum 24'-0" o.c. until noted otherwise.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 2. Fit gypsum panels around ducts, pipes, and conduits.

3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 1. Wallboard Type: As indicated on Drawings.
 2. Type X: As indicated on Drawings.
 3. Flexible Type: Apply in double layer at curved assemblies.
 4. Ceiling Type: As indicated on Drawings.
 5. Foil-Backed Type: As indicated on Drawings.
 6. Abuse-Resistant Type: As indicated on Drawings.
 7. Moisture- and Mold-Resistant Type: As indicated on Drawings.
 8. Type X: Where required for specific fire-resistance-rated assembly indicated.
 9. Glass-Mat Interior Type: As indicated on Drawings.
 10. Skim-Coated Type: As indicated on Drawings.
- B. Single-Layer Application:
 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.
 2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches (400 mm) minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
- D. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.

3.4 APPLYING TILE BACKING PANELS

- A. Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch (6.4-mm) gap where panels abut other construction or penetrations.
- B. Cementitious Backer Units: ANSI A108.11, at wet areas, and where indicated.
- C. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. Bullnose Bead: Use where indicated.
 3. LC-Bead: Use at exposed panel edges.
 4. L-Bead: Use where indicated.
 5. U-Bead: Use at exposed panel edges.
 6. Curved-Edge Cornerbead: Use at curved openings.
- D. Exterior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.
- E. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 2: Panels that are substrate for tile.
 3. Level 3: Where indicated on Drawings.
 4. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
 5. Level 5: Where indicated on Drawings.
 - a. Primer and its application to surfaces are specified in other Division 09 Sections.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Ceramic, Glass, and Porcelain tile.
2. Waterproof membrane.
3. Crack isolation membrane.
4. Tile backing panels.
5. Metal edge strips.

B. Related Sections:

1. Division 07 Section "Joint Sealants."
2. Division 09 Section "Gypsum Board."

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:
1. Level Surfaces: Minimum 0.60 minimum.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- D. Samples for Verification:
1. Full-size units of each type and composition of tile and for each color and finish required. For mosaic tile in color blend patterns, provide full sheets of each color blend.
 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. Make samples at least 12 inches (300 mm) square, but not fewer than 4 tiles. Use grout of type and in color or colors approved for completed Work.
 3. Full-size units of each type of trim and accessory for each color and finish required.
 4. Stone thresholds in 6-inch (150-mm) lengths.
 5. Metal edge strips in 6-inch (150-mm) lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product, signed by product manufacturer.
- D. Material Test Reports: For each tile-setting and -grouting product.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from one source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer for each product:
 - 1. Waterproof membrane.
 - 2. Crack isolation membrane.
 - 3. Joint sealants.
 - 4. Cementitious backer units.
 - 5. Metal edge strips.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of each type of floor tile installation.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- E. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. FloorScore Compliance: Tile for floors shall comply with requirements of FloorScore Standard.
- D. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tiles units taken from one package show same range in colors as those taken from other packages and match approved Samples.

- E. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.
- F. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.

2.2 TILE PRODUCTS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

- Daltile
- Florida Tile
- American Olean

- B. Tile Type T-1

Manufacturer: DAL TILE

1. Style: Outlander
2. Color: Marine Rectangle Palazzo OU55
3. Composition: Colorbody Porcelain.
4. Module Size: 12" x 24"
5. Thickness: 5/16"
6. Face: Pattern of design indicated, with square edges.
7. Surface: Slip-resistant: ≥ 0.42 DCOF
8. Finish: Matte - Per manufacturer's standard on selected material.
9. Grout Color: Epoxy Grout as selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tiles where applicable, and matching characteristics of adjoining flat tiles. Provide shapes as follows, selected from manufacturer's standard shapes:

- C. Tile Type T-2

Manufacturer: DAL TILE

1. Style: Outlander
2. Color: Marine Rectangle Grande OU55
3. Composition: Colorbody Porcelain.
4. Module Size: 12" x 24"
5. Thickness: 5/16"
6. Face: Pattern of design indicated, with square edges.
7. Surface: Slip-resistant: ≥ 0.42 DCOF
8. Finish: Matte - Per manufacturer's standard on selected material.

9. Grout Color: Epoxy Grout as selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tiles where applicable, and matching characteristics of adjoining flat tiles. Provide shapes as follows, selected from manufacturer's standard shapes:

D. Tile Type TB-1

Manufacturer: DAL TILE

1. Style: Emerson Wood Plank
2. Color: Balsam Fir EP04
3. Composition: Colorbody Porcelain.
4. Module Size: 8"x48"
5. Thickness: 5/16"
6. Face: Pattern of design indicated, with square edges.
7. Surface: Slip-resistant: ≥ 0.42 DCOF
8. Finish: Matte - Per manufacturer's standard on selected material.
9. Grout Color: Epoxy Grout as selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable, and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

E. Tile Type FT-1

Manufacturer: DAL TILE

1. Style: Emerson Wood Plank
2. Color: Ash White EP06
3. Composition: Colorbody Porcelain.
4. Module Size: 8" x 48"
5. Thickness: 5/16"
6. Face: Pattern of design indicated, with square edges.
7. Surface: Slip-resistant: ≥ 0.42 DCOF
8. Finish: Matte - Per manufacturer's standard on selected material.
9. Grout Color: Epoxy Grout as selected by Architect from manufacturer's full range.
10. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable, and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

F. Tile Type FT-2

Manufacturer: DAL TILE

1. Style: Emerson Wood Plank
2. Color: Balsam Fir EP04
3. Composition: Colorbody Porcelain.
4. Module Size: 24" x 24"
5. Thickness: 5/16"
6. Face: Pattern of design indicated, with square edges.
7. Surface: Slip-resistant: ≥ 0.42 DCOF
8. Finish: Matte - Per manufacturer's standard on selected material.

9. Grout Color: Epoxy Grout as selected by Architect from manufacturer's full range.
Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable, and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

2.3 TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Schluter KERDI Board Panels
 - b. C-Cure; C-Cure Board 990.
 - c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
 - d. USG Corporation; DUROCK Cement Board.
 2. Thickness: 1/2 inch or As indicated.
- B. Fiber-Cement Underlayment: ASTM C 1288, in maximum lengths available to minimize end-to-end butt joints.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. CertainTeed Corp.; FiberCement Underlayment.
 - b. James Hardie; Hardiebacker 500.
 2. Thickness: 1/2 inch or as indicated.

2.4 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
- B. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, SBS-modified-bituminous sheet with woven reinforcement facing; 0.040-inch (1.01-mm) nominal thickness.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. National Applied Construction Products, Inc.; Strataflex.
- C. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Laticrete
 - b. Boiardi Products; a QEP company; Elastiment 323 Cement Based Waterproofing, Anti-Fracture/Crack Suppression Membrane.
 - c. C-Cure; UltraCure 971.
 - d. MAPEI Corporation; Mapelastic (PRP 315).
 - e. Southern Grouts & Mortars, Inc.; Southcrete 1100.
 - f. TEC; a subsidiary of H. B. Fuller Company; Triple Flex Waterproofing, Crack Isolation Membrane & Mortar.
- D. Urethane Waterproofing and Tile-Setting Adhesive: One-part, liquid-applied urethane[, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24),[, that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers,"] in a consistency suitable for trowel application and intended for use as both waterproofing and tile-setting adhesive in a two-step process.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bostik, Inc.; Durabond D-200 or Hydroment Ultra-Set or Hydroment Ultra-Set Advanced.

2.5 SETTING MATERIALS

- A. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3., with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24)., that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Bostik, Inc.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 - d. Mer-Kote Products, Inc.
 - e. TEC; a subsidiary of H. B. Fuller Company.

2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.

2.6 GROUT MATERIALS

- A. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D.
 1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
 - a. Bostik, Inc.
 - b. Custom Building Products.
 - c. Laticrete International, Inc.
 - d. MAPEI Corporation.
 - e. Mer-Kote Products, Inc.
 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 deg F (60 deg C) and 212 deg F (100 deg C), respectively, and certified by manufacturer for intended use.

2.7 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."
 1. Sealants shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 2. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
 3. Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. DAP Inc.; 100 percent Silicone Kitchen and Bath Sealant.
 - b. Dow Corning Corporation; Dow Corning 786.
 - c. GE Silicones; a division of GE Specialty Materials; Sanitary 1700.
 - d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
 - e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
 - f. Tremco Incorporated; Tremsil 600 White.
- D. Chemical-Resistant Sealants (when indicated): For chemical-resistant floors, provide chemical-resistant elastomeric sealant of type recommended and produced by chemical-resistant mortar and grout manufacturer for type of application indicated, with proven service record and compatibility with tile and other setting materials, and with chemical resistance equivalent to mortar/grout.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Atlas Minerals & Chemicals, Inc.

2.8 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless-steel, ASTM A 666, 300 Series exposed-edge material.
- C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F (49 to 60 deg C) per ASTM D 87.
 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.

2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors composed of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - b. Tile floors composed of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. Where adjoining tiles on base, walls, or trim are specified or indicated to be same size, align joints.
 - 2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Paver Tile: 1/8 inch.
 2. Glazed Wall Tile: 1/16 inch (1.6 mm).
 3. Decorative Thin Wall Tile: 1/16 inch (1.6 mm).
- G. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- H. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile, where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated. At outside edge of wall tile full height of tile work.
- J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION (when required)

- A. Install cementitious backer units and fiber-cement underlayment and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated. Use Latex-Portland cement mortar for bonding material unless otherwise directed in manufacturer's written instructions.

3.5 WATERPROOFING INSTALLATION (when required)

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.
- B. Do not install tile or setting materials over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.6 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove epoxy grout residue from tile as soon as possible.
 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
 3. Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.7 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
- B. Contractor shall follow the appropriate installation methods & techniques per TCA for both the required tile and underlayments for subsurface conditions to be covered.
1. Tile Installation F125A: Thin-set mortar on crack isolation membrane; TCA F125A.
 - a. Tile Type: Porcelain Tile
 - b. Thin-Set Mortar: Latex Portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.
- C. Interior Wall Installations, Masonry or Concrete:
1. Tile Installation W202: Thin-set mortar; TCA W202.
 - a. Tile Type: Porcelain Tile
 - b. Thin-Set Mortar: Latex Portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.
 2. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment over cleavage membrane; TCA W244.
 - a. Tile Type: Glass Tile
 - b. Thin-Set Mortar: Dry-set or Latex Portland cement mortar.

- c. Grout: Water-cleanable non sanded epoxy grout.
3. Tile Installation W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board; TCA W245.
- a. Tile Type: Glazed Ceramic / Porcelain
 - b. Thin-Set Mortar: Dry-set or Latex Portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.
- D. Interior Wall Installations, Metal Studs or Furring:
1. Tile Installation W244: Thin-set mortar on cementitious backer units or fiber cement underlayment over cleavage membrane; TCA W244.
- a. Tile Type: Porcelain, Glazed Ceramic
 - b. Thin-Set Mortar: Dry-set or Latex Portland cement mortar.
 - c. Grout: Water-cleanable epoxy grout.
2. Tile Installation W245: Thin-set mortar on coated glass-mat, water-resistant gypsum backer board; TCA W245.
- a. Tile Type: Glass
 - b. Thin-Set Mortar: Dry-set or Latex Portland cement mortar.
 - c. Grout: Water-cleanable non-sanded grout.

END OF SECTION 09 30 00

SECTION 09 51 00 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract per Division 01 Specification Sections apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Acoustical panel ceilings, exposed suspension.

1.3 QUALITY ASSURANCE:

- A. Standards for Terminology and Performance: Applicable publications by the Acoustical and Insulating Materials Association (AIMA), including "Performance Data, Architectural Acoustical Materials".

1.4 SUBMITTALS:

- A. Product Data:
 - 1. For information only, submit copies of manufacturer's product specifications and installation instructions for each acoustical ceiling material required, and for each suspension system, including certified laboratory test reports and other data as required to show compliance with these specifications.
 - 2. Include manufacturer's recommendations for cleaning and refinishing acoustical units, including precautions against materials and methods which may be detrimental to finishes and acoustical performance.
- B. Certificates:
 - 1. Submit certifications that materials proposed herein conform to the fire test data requirements of ASTM E84.
 - 2. Flame Spread: ASTM E84, Less than 25.
- C. Samples:
 - 1. Submit 12" square samples for each acoustical unit required. In each set of samples show the full range of exposed color and texture to be expected in the completed work. Architect's review will be for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.
 - 2. Submit 12" long samples of each exposed runner and molding. Architect's review will be for color and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.

D. Extra Stock:

1. Upon completion, deliver extra stock of maintenance materials to the Owner. Furnish full size units matching the units installed, packaged with protective covering for storage, and identified with appropriate labels.
 - a. Acoustical Units: Furnish an amount equal to 2.0% of the amount installed.

1.5 JOB CONDITIONS:

- A. Space Enclosure: Do not deliver materials or install ceilings until space has been enclosed and is weather-tight, and until wet-work in the space has been completed and is nominally dry, and until work above ceilings has been completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

PART 2 - PRODUCTS

2.1 CEILING UNITS:

- A. Manufacturers and products: Provide products from one manufacturer, unless otherwise specified or approved. The following manufacturers offer products herein specified:
 1. Armstrong World Industries, as specified.
- B. Equivalent products by the following manufacturers may be submitted for approval:
 1. USG Interiors, Inc.
- C. Acoustical Panels:
 1. General: Except as otherwise indicated, provide manufacturer's standard lay-in panels of the type recommended by the manufacturer for the application indicated. Provide sizes shown by reflected ceiling plans or, if not otherwise indicated, 24" x 24" grid-size panels. Provide white washable finish; "fissured" texture, unless otherwise specified or shown.
 - a. Mark Type: ACT-1 (Basis of Design)
 - Style: Calla
 - Surface Texture: Smooth
 - Composition: Mineral Fiber
 - Color: White
 - Size: 24" x 24"
 - Edge Profile: Square Tegular 15/16"
 - Noise Reduction Coefficient (NRC): ASTM C 423 Classified w/ UL label on product carton 0.85
 - Ceiling Attenuation Class (CAC): ASTM C 1414; Classified with UL label on product carton 35
 - Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton 170
 - Flame Spread: ASTM E 1264; Class A (HPVA)
 - Light Reflectance (LR) White Panel: ASTM E 1477; 0.85
 - Dimensional Stability: HumiGuard Plus

- Recycle Content: Up to 76% total recycled content. (Total recycled content: pre-consumer, post-consumer and post-industrial)
 - Acceptable Product: Calla Ultima Tegular, as manufactured by Armstrong World Industries.
- b. Mark Type: ACT-2 (Basics of Design)
- Style: Lyra PB 8361PB
 - Surface Texture: Smooth
 - Composition: Fiberglass
 - Color: Toffee Chestnut (WTC)
 - Size: 24" X 24"
 - Edge Profile: Square tegular 15/16"
 - Noise Reduction Coefficient (NRC): ASTM C 423; Classified with UL label on product carton 0.95
 - Ceiling Attenuation Class (CAC): N/A
 - Sabin: N/A
 - Articulation Class (AC): ASTM E 1111; Classified with UL label on product carton 190
 - Flame Spread: ASTM E 1264; Class A (UL)
 - Light Reflectance (LR) White Panel: ASTM E 1477; 0.88
 - Dimensional Stability: HumiGuard Plus
 - Recycle Content: Post-Consumer – 12% Pre-Consumer – 59%
 - Acceptable Product: LYRA Plant Based, as manufactured by Armstrong World Industries.

2.2 MISCELLANEOUS MATERIALS:

- A. Acoustical Sealant: A heavy-bodied, non-shrinking, non-drying, non-sag grade mastic compound intended for interior sealing of concealed construction joints.

PART 3 - EXECUTION

3.1 INSPECTION AND PREPARATION WORK:

- A. Coordination: Provide and coordinate location of required inserts, clips or slots for the fastening of suspension systems.
- B. Examine the conditions under which the acoustical ceiling work is to be performed and do not proceed with the work until unsatisfactory conditions have been corrected.
- C. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid the use of less-than-half width units at borders, and comply with reflected ceiling plans.

3.2 INSTALLATION:

- A. General: Install materials in accordance with manufacturer's printed instructions, and to comply with governing regulations, fire resistance rating requirements as indicated, and industry standards applicable to the work.

- B. Arrange acoustical units and orient directionally-patterned units (if any) in the manner shown by reflected ceiling plans; or, if not shown, install pattern running parallel to the shorter direction of the room or space.
- C. Install suspension systems to comply with ASTM C 636, with hangers supported only from building structural members as indicated. Locate hangers near each end and spaced 4'-0" along each carrying channel or direct-hung runners, unless otherwise indicated.
1. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eye-screws or other devices which are secure and appropriate for the substrate, and which will not deteriorate or fail with age or elevated temperatures.
 2. Install acoustical ceiling components which comply with the requirements of ASTM E 580 "Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Seismic Restraint".
 - a. Rivet cross tees at four feet on center to edge molding.
 - b. Install compression struts and secure system with tie wires.
 - 1) Provide hanger wires splayed at 45 degrees, within three inches of intersection between main runner and cross runner.
 - 2) Provide compression strut and splayed hanger wires, as follows:
 - a) One assembly for each light fixture.
 - b) Located within six feet of wall.
 - c) Located at 12 feet on center.
- D. Install edge moldings of the type indicated at edges of each acoustical ceiling area, and at locations where edge of units would otherwise be exposed after completion of the work.
1. Sealant Bed: Apply continuous ribbon of acoustical sealant, concealed on back of vertical leg before fastening to vertical surface.
 2. Secure moldings to building construction by fastening with screw-anchors into the substrate, through holes drilled in vertical leg. Space holes not more than 3" from each end and not more than 16" o.c. along each molding.
 3. Level moldings with ceiling suspension system, to a level tolerance of 1/8" in 12'-0".
 4. Miter corners of moldings accurately to provide hair-line joints, securely connected to prevent dislocation.
- E. Cope exposed flanges of intersecting suspension system members, so that flange faces will be flush (cope flange of member supported by other member).
- F. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members.
1. Install hold-down clips in areas for fire-resistance ratings and where indicated or specified; space as recommended by panel manufacturer, unless otherwise indicated or required.
 2. Install cover panels above recessed lighting fixtures, in accordance with fire rating requirements.
- G. Install edge trim moldings where needed to conceal edges of acoustical units which would otherwise be exposed to view after completion of the work. Anchor with fasteners, or if not possible, secure in place with permanent adhesive.

- H. At reveal edge panels, Cut and reveal or rabbet edges of panels at borders to ensure panels lie flat on supporting grid.

3.3 CLEANING AND PROTECTION:

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings and suspension members; comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.
- B. Protect the acoustical ceilings, including temperature and humidity limitations and dust control, so that the work will be without damage and deterioration at the time of acceptance.

END OF SECTION 09 51 00

SECTION 09 65 00 - RESILIENT FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. All of the Contract Documents, including General and Supplementary conditions and Division 0 – Bidding Documents, Contract Forms and Conditions of the Contract and Division 1 – General Requirements, apply to the work in this Section.
- B. Carefully examine all the Contract Documents for requirements which affect the work of this Section. The exact scope of this Section cannot be determined without a thorough review of all specifications sections and other Contract Documents.
- C. Where referred to, Standard Specifications, Recommendations of Technical Societies, and/or Manufacturer's Associations, plus Codes of Federal, State, and Local Agencies shall include all amendments current as of date of issue of these specifications.

1.3 SUMMARY

A. Section Includes:

- 1. Luxury vinyl composition floor plank
- 2. Resilient base.
- 3. Resilient molding accessories.

B. References:

- 1. ASTM International
 - a. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials
 - b. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source
 - c. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials
 - d. ASTM F710 Standard Practice for Preparing Concrete to Receive Resilient Flooring
 - e. ASTM F1861 Standard Specification for Resilient Wall Base
 - f. ASTM F386 Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces

2. National Fire Protection Association (NFPA):
 - a. NFPA 253 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - b. NFPA 258 Test Method for Specific Density of Smoke Generated by Solid Materials
 - c. NFPA 255 Test Method of Test of Surface Burning Characteristics of Building Materials

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of product indicated.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MATERIALS MAINTENANCE SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Floor Tile: Furnish 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.
 2. Resilient Wall Base and Molding Accessories: Furnish not less than 10 linear feet (3 linear m) for every 500 linear feet (150 linear m) or fraction thereof of each type, color, pattern and size of resilient product installed.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide resilient flooring materials manufactured in the United States of America by a firm with a minimum of 10 years' experience with resilient flooring materials of type equivalent to those specified.
 1. Provide resilient flooring products, including wall base, accessories and subfloor preparation products from one manufacturer to ensure color matching and compatibility.
 2. Manufacturer shall be capable of providing technical training and technical field service representation.
- B. Installer Qualifications: Installer must be professional, licensed, insured and acceptable to manufacturer of resilient flooring materials. Project Managers or Field Supervisors must be INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager) for the requirements of the project.
- 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.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.

1.9 PROJECT CONDITIONS

- A. Maintain temperature and humidity at service levels or the ambient temperature must remain steady ($\pm 10^{\circ}$ F) and be between 65° F and 85° F for at least 48-hours prior to, during and after installation. The ambient relative humidity is recommended to be between 40% and 65% RH; avoid dew point conditions.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55° F (13° C) or more than 95° F (35° C).
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

- A. Colors and Patterns:
 - a. As selected by Architect from full range of industry colors. Architects reserve the right to select, allocate and vary colors throughout the building including floor patterns which will be determined by the Architect at a future time.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide **product indicated on Drawings** or comparable product by one of the following:
 - Shaw Contract
 - Mannington
 - Milliken

2.2 VINYL FLOORING

- 1. Mark Type: LVT-1
 - a. Manufacturer: Interface
 - b. Type: High Performance Luxury Vinyl Tile
 - c. Style: Natural Woodgrains A002
 - d. Size: 25 cm x 1m (9.845"x39.38")
 - e. Color: Washed Maple A00211
 - f. Installation Layout: Ashlar
 - g. Installation: Direct Glue
 - h. Testing Requirements:

- IIC Sound Rating ASTM E492-09: 64Ic
- Slip Resistance ASTM D2047: >0.55 wet/dry, ADA Compliant
- Static Load Limit ASTM F970: 1500 psi
- Flexibility ASTM F137: Passes
- Resistance to Heat ASTM F1514: Passes
- Resistance to Light ASTM F1515: Passes
- Radiant Flux ASTM E 648: Class I
- Smoke Density: ASTM E-662: ≤ 450
- Thickness ASTM F386: Passes
- Residual Indentation ASTM F1914: Passes
- Resistance to Chemicals ASTM F925: Passes

2.3 RESILIENT WALL BASE

1. Mark Type: RB-1

- a. Manufacturer: Roppe
- b. Type: Rubber Wall Base Cove
- c. Style: Pinnacle Rubber Base
- d. Size: 4"
- e. Color: 150 Dark Grey
- f. Testing Requirements:
 - Resilient Wall Base ASTM F1861: Type TS, Group 1, Styles A, B, & C
 - Critical Radiant Flux ASTM E648 (NFPA 235): Class 1, ≥ 0.45 W/cm²
 - Smoke Density ASTM E662 (NFPA 258): Passes, ≤ 450
 - Flammability ASTM E84: Class B
 - Surface Burning CAN/ULC-S102.2: 50 Flame Spread Rating, 175 Smoke Developed Classification
 - Chemical Resistance ASTM F92: Excellent with chemicals listed in standard, additional chart available

2. Mark Type: RB-1

- a. Manufacturer: Roppe
- b. Type: Rubber Wall Base Straight
- c. Style: Pinnacle Rubber Base
- d. Size: 4"
- e. Color: 150 Dark Grey
- f. Testing Requirements:
 - Resilient Wall Base ASTM F1861: Type TS, Group 1, Styles A, B, & C
 - Critical Radiant Flux ASTM E648 (NFPA 235): Class 1, ≥ 0.45 W/cm²
 - Smoke Density ASTM E662 (NFPA 258): Passes, ≤ 450
 - Flammability ASTM E84: Class B
 - Surface Burning CAN/ULC-S102.2: 50 Flame Spread Rating, 175 Smoke Developed Classification
 - Chemical Resistance ASTM F92: Excellent with chemicals listed in standard, additional chart available

2.4 RESILIENT MOLDING ACCESSORIES

1. Mark Type: TS-1

- a. Manufacturer: Johnsonite
- b. Type: Rubber Transition Strip
- c. Style: Slim Line Transition
- d. Size: 10" x 72"
- e. Color: 150 Dark Grey

2. Mark Type: TS-2
 - a. Manufacturer: Johnsonite
 - b. Type: Rubber Transition Strip
 - c. Style: Slim Line Transition
 - d. Size: 10" x 72"
 - e. Color: 150 Dark Grey

3. Mark Type: TS-3
 - a. Manufacturer: Johnsonite
 - b. Type: Rubber Transition Strip
 - c. Style: Slim Line Transition
 - d. Size: 10" x 72"
 - e. Color: 150 Dark Grey

2.5 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Install with water-resistant material recommended by manufacturer specified for the site conditions and follow adhesive label for proper use.
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

2.3 MAINTENANCE PRODUCTS

- A. Cleaners: Provide cleaning product material recommended by manufacturer and follow cleaner label for proper use.
 1. Product Name: NC-900
Product Description: All-Purpose pH Neutral Cleaner.
Product Usage: For initial, daily, or routine maintenance and spot cleaning.
 2. Product Name: PR-930
Product Description: Performance Finish Remover.
Product Usage: For removal of finish that has been accidentally or erroneously applied to material.

PART 3 - EXECUTION

3.1 GENERAL

- A. General Contractor Responsibilities:
 1. Supply a safe, climate-controlled building and subfloor as detailed in Roppe Technical Data Sheets.
 2. Ensure substrate meets the requirements of ASTM F710, Roppe Technical Data Sheets and Excelsior Technical Data Sheets.
 3. Confirm the porosity of all substrates to ensure proper adhesive usage.

4. Provide a secure storage area that is maintained permanently or temporarily at normal operating temperature and humidity conditions (except walk in freezers or similar) between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring, so the flooring contractor can acclimate the flooring materials per manufacturer's instructions.
5. Provide an installation area that is weather tight and maintained either permanently or temporarily at ambient service temperature and humidity (except walk in freezers or similar), normal operating temperature and humidity conditions (except walk in freezers or similar) between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring per the manufacturer's instructions.
6. Ensure areas with direct prolonged exposure to sunlight are protected with protective UVA/UVB restrictive coatings or films.
7. Areas where the base are installed that are subject to direct sunlight through doors or windows should have them covered using blinds, curtains, cardboard or similar for the time of the installation and 72-hours after the installation to allow the adhesive to cure. Note: These areas should be installed using wet adhesives only.
8. Conduct initial maintenance prior to final usage per the Roppe Care & Maintenance Documents. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.

B. Flooring Contractor Responsibilities:

1. Provide trained installers that are professional, licensed, insured and acceptable to manufacturers of resilient flooring materials.
2. Ensure installers or installation teams meet one of the following requirements:
 - a. Have completed INSTALL (International Standards & Training Alliance) or CFI (Certified Floorcovering Installers) training programs and/or are certified by INSTALL or CFI.
 - b. Are being supervised by Project Managers or Field Supervisors that are INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager).
3. Follow all requirements in the appropriate Roppe and/or Excelsior Technical Data Sheets, Care & Maintenance Documents, Warranties and other technical documents or instructions.

3.2 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate that is less than the maximum allowed by the carpet manufacturer.
 - b. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum relative humidity level measurement that is less than the maximum allowed by the carpet manufacturer.
 - c. Contractor shall provide copies of drawing(s) indicating test locations and copies of test results.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.4 FLOOR PLANK INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor plank.
- B. Lay out floor planks from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
 - 1. Lay planks square with room axis and in patterns as directed by Architect.
- C. Match floor planks for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain direction in quarter turn to adjacent tiles.

- D. Scribe, cut, and fit floor planks to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor planks into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor planks as marked on substrates. Use chalk or other non-permanent, non-staining marking device.
- G. Install floor planks on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor planks to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
 - 1. Use adhesive applied to substrate in compliance with the flooring manufacturer's recommendations, including those for trowel notching, adhesive mixing and adhesive open and working times.
- I. Roll floor planks as required by manufacturer.

3.5 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible.

3.6 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.

- B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and resilient floor covering that would otherwise be exposed.

3.7 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tiles.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil in accordance with manufacturer's recommendations.
- C. Protect floor products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor products until Substantial Completion.

END OF SECTION 09 65 00

SECTION 09 65 13 - RESILIENT WALL BASE

PART 1 - GENERAL

1.1 GENERAL PROVISIONS

- A. Attention is directed to the CONTRACT AND GENERAL CONDITIONS and all Sections within DIVISION 01 - GENERAL REQUIREMENTS which are hereby made a part of this Section of the Specifications.

1.2 DESCRIPTION OF WORK

- A. Work Included: Provide labor, materials, and equipment necessary to complete the work of this Section, including but not limited to the following:

1. Resilient wall base and accessories.
2. Substrate preparation.

- B. Related Work: The following items are not included in this Section and are specified under the designated Sections:

1. Section 03 30 00 CAST-IN-PLACE CONCRETE for concrete substrate; slab surface tolerances;
2. Section 06 10 00 ROUGH CARPENTRY for plywood substrate and surface tolerances.

- C. References (Industry Standards):

1. ASTM International (ASTM):
 - a. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - b. ASTM E648 Standard Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.
 - c. ASTM E662 Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - d. ASTM F710 Standard Practice for Preparing Concrete to Receive Resilient Flooring.
 - e. ASTM F1861 Standard Specification for Resilient Wall Base.
 - f. ASTM F386 Standard Test Method for Thickness of Resilient Flooring Materials Having Flat Surfaces.
2. National Fire Protection Association (NFPA):
 - a. NFPA 253 Test Method for Critical Radiant Flux of Floor Covering Systems Using a Radiant Energy Source
 - b. NFPA 258 Test Method for Specific Density of Smoke Generated by Solid Materials
 - c. NFPA 255 Test Method of Test of Surface Burning Characteristics of Building Materials

1.3 SUBMITTALS

- A. General: Submit listed submittals in accordance with Conditions of the Contract and Division 1 Submittal Procedures.
- B. Product Data: Submit manufacturer's technical data sheet, care & maintenance document, submittal and/or warranty for each material and accessory proposed for use (available at www.Roppe.com).
- C. Samples: Submit representative samples of each product specified for verification.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Provide resilient flooring materials manufactured in the United States of America by a firm with a minimum of 10 years' experience with resilient flooring materials of type equivalent to those specified.
1. Manufacturer's quality management system must have ISO 9001:2000 approval.
 2. Provide resilient flooring products, including wall base, accessories, and subfloor preparation products from one manufacturer to ensure color matching and compatibility.
 3. Manufacturer shall be capable of providing technical training and technical field service representation.
- B. Installer Qualifications: Installer must be professional, licensed, insured and acceptable to manufacturer of resilient flooring materials. Project Managers or Field Supervisors must be INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager) for the requirements of the project.
- C. Sustainable Design Requirements:
1. Construction waste take back program for the purpose of reducing jobsite waste by taking back uninstalled waste flooring. Information is available at <https://Allstate.com/impact/>.
 2. Wall base and accessories that are easily cleaned and do not require coatings and stripping or use chemicals that may be hazardous to human health.
 3. Supply all required products that are CA 01350 compliant.
 4. Wall base and accessories that are free of materials known to be teratogenic, mutagenic, or carcinogenic.
 5. Wall base and accessories that contain no polyvinyl chloride or plasticizers.
 6. Wall base and accessories that contain no halogens.
 7. Wall base and accessories that contain no asbestos.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in labeled packages. Store and handle in strict compliance with manufacturer's recommendations. Protect from damage due to weather, excessive temperatures, and construction operations.
- B. Deliver materials sufficiently in advance of installation to condition materials to the required temperature for 48-hours prior to installation.

1.6 PROJECT CONDITIONS

- A. Maintain temperature and humidity at service levels or the ambient temperature must remain steady ($\pm 10^{\circ}$ F) and be between 65° F and 85° F for at least 48-hours prior to, during and after installation. The ambient relative humidity is recommended to be between 40% and 65% RH; avoid dew point conditions.

1.7 WARRANTY

- A. Provide manufacturer's standard limited commercial warranty to cover manufacturing defects.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

- A. Roppe Corporation 1602 North Union Street | Fostoria, Ohio 44830-1158 P: 800 537 9527
- B. Requests for substitutions will be considered in accordance with the provisions of Section 01 60 00 -Product Requirements.

2.2 RESILIENT WALL BASE

- A. Mark Type: RB-1

Rubber Wall Base:

1. Product Name: Pinnacles

- | | | |
|-----|---|--|
| 2. | Material Specification: | ASTM F1861, Type TS: Rubber, Style B: Cove base |
| 3. | Material Height: | 4" (101.6 mm) |
| 4. | Material Thickness:
ASTM F386 | 1/8" (3.2mm) |
| 5. | Material Length: | 4' sections (1.22 m), 120' (36.58 m) |
| 6. | Limited Warranty: | 1 year, Manufacturing Only |
| 7. | Material & Composition: | 100% vulcanized homogenous rubber compound comprised of a premium blend & SBR rubber materials |
| 8. | Color: | 150 Dark Gray |
| 9. | Surface Burning
ASTM E84-91A/NFPA 255 | Class B |
| 10. | Smoke Density:
ASTM E662/NFPA 258 | Passes (<450), 157 (flaming) - 197 (non-flaming) |
| 11. | Substrate Preparation: | Per ASTM F710 and Roppe Technical Data Sheet |
| 12. | Flammability/Critical Radiant Flux:
ASTM E648 / NFPA 253 | Class 1(>0.45 Watts per sq. cm.), .082 W/cm2 |
| 13. | Surface Burning
CAN/ULC-S102.2 | FSR 50, SDS 175 |

B. Mark Type: RB-2

Rubber Wall Base:

- | | |
|----------------------------------|---|
| Product Name: | Pinnacles |
| Material Specification: | ASTM F1861, Type TS: Rubber, Style B: Cove base |
| Material Height: | 4" (101.6 mm) |
| Material Thickness:
ASTM F386 | 1/8" (3.2mm) |

Material Length:	4' sections (1.22 m), 120' (36.58 m)
Limited Warranty:	1 year, Manufacturing Only
Material & Composition:	100% vulcanized homogenous rubber compound comprised of a premium blend & SBR rubber materials
Color:	139 Deep Navy
Surface Burning ASTM E84-91A/NFPA 255	Class B
Smoke Density: ASTM E662/NFPA 258	Passes (<450), 157 (flaming) - 197 (non-flaming)
Substrate Preparation:	Per ASTM F710 and Roppe Technical Data Sheet
Flammability/Critical Radiant Flux: ASTM E648 / NFPA 253	Class 1(>0.45 Watts per sq. cm.), .082 W/cm2
Surface Burning CAN/ULC-S102.2	FSR 50, SDS 175

2.3 INSTALLATION PRODUCTS:

A. Acrylic Adhesives

1. Product Name: WB-600
Product Description: Acrylic Wall Base Adhesive
Product Usage: For standard, interior wall base installations over porous substrates only.
2. Product Name: AW-510
Product Description: Acrylic Wet-Set Adhesive
Product Usage: For interior wall base installations that require a more aggressive bond over porous substrates only
3. Product Name: C-630
Product Description: Water-Based Contact Adhesive
Product Usage: For interior wall base installations that require a more aggressive bond over porous or non-porous substrates.

2.4 MAINTENANCE PRODUCTS:

A. Cleaners

4. Product Name: NC-900
Product Description: All-Purpose pH Neutral Cleaner
Product Usage: For initial, daily, or routine maintenance and spot cleaning.
5. Product Name: PR-930

Product Description:

Performance Finish Remover.

Product Usage:

For removal of finish that has been accidentally or erroneously applied to material.

PART 3 - EXECUTION

3.1 GENERAL

A. General Contractor Responsibilities:

1. Supply a safe, climate-controlled building and subfloor as detailed in Allstate's Technical Data Sheets.
2. Ensure substrate meets the requirements of ASTM F710, Allstate Technical Data Sheets and Excelsior Technical Data Sheets.
3. Ensure horizontal concrete substrates have been tested per ASTM F2170 and/or ASTM F1869 to confirm that concrete relative humidity and/or moisture vapor emission rates are within tolerance of the approved adhesive.
4. Confirm the porosity of all substrates to ensure proper adhesive usage.
5. Provide a secure storage area that is maintained permanently or temporarily at normal operating temperature and humidity conditions (except walk in freezers or similar) between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring, so the flooring contractor can acclimate the flooring materials per manufacturer's instructions.
6. Provide an installation area that is weather tight and maintained either permanently or temporarily at ambient service temperature and humidity (except walk in freezers or similar), normal operating temperature and humidity conditions (except walk in freezers or similar) between 65° F and 85° F and between 40% and 65% relative humidity, for at least 48-hours prior to and during the application of the flooring per the manufacturer's instructions.
7. Ensure areas with direct prolonged exposure to sunlight are protected with protective UVA/UVB restrictive coatings or films.
8. Areas of the flooring that are subject to direct sunlight through doors or windows should have them covered using blinds, curtains, cardboard or similar for the time of the installation and 72-hours after the installation to allow the adhesive to cure. Note: These areas should be installed using wet adhesives only.
9. Protect newly installed flooring with construction grade paper or protective boards, such as Masonite or Ram Board, to prevent flooring damage, especially by other trades. Limit usage and foot traffic according to the adhesive's requirements. When moving appliances or heavy furniture, protect flooring from scuffing and tearing using temporary floor protection.
10. Ensure furniture casters are made of a soft material and have a contact point of at least 1" in width to limit indentation and flooring damage. All rolling chairs or seating must have a resilient flooring chair pad installed over the finished floor to protect floor covering. All fixed furniture legs must have permanent felt or soft rubber floor protectors installed on all contact points to reduce indentation. Floor protectors must have a flat contact point of at least 1" in width and must cover the entire bottom surface of the furniture leg.
11. Conduct initial maintenance prior to final usage per the Allstate Care & Maintenance Documents. Do not conduct initial maintenance until adhesive has cured per the adhesive technical data.

B. Flooring Contractor Responsibilities:

1. Provide trained installers that are professional, licensed, insured and acceptable to manufacturer of resilient flooring materials.
2. Ensure installers or installation teams meet one of the following requirements:
 - a. Have completed INSTALL (International Standards & Training Alliance) or CFI (Certified Floorcovering Installers) training programs and/or are certified by INSTALL or CFI.
 - b. Are being supervised by Project Managers or Field Supervisors that are INSTALL (International Standards & Training Alliance) certified, CFI (Certified Floorcovering

Installers) Certified and/or an FCICA (The Flooring Contractors Association) CIM (Certified Installation Manager).

3. Follow all requirements in the appropriate Allstate and/or Excelsior Technical Data Sheets, Care & Maintenance Documents, Warranties and other technical documents or instructions.

3.2 EXAMINATION

- A. General: Follow guidelines laid out in Division 01, Section 017100 – Examination and Preparation, as well as Section 014300 – Quality Assurance.
- B. Verification of Conditions: Inspect all substrates to ensure they are clean, smooth, permanently dry, flat, and structurally sound.

3.3 SUBSTRATE PREPARATION

- A. General: Follow guidelines laid out in Division 01, Section 017100 – Examination and preparation. All work required to ensure substrate or subfloor meets manufacturers guidelines are the responsibility of the general contractor.
- B. Preparation: Ensure substrate meets the requirements of ASTM F710, Allstate Technical Data Sheets and Excelsior Technical Data Sheets. Substrates must be free of visible water or moisture, dust, sealers, paint, sweeping compounds, curing compounds, residual adhesives and adhesive removers, concrete hardeners or densifiers, solvents, wax, oil, grease, asphalt, visible alkaline salts or excessive efflorescence, mold, mildew and any other extraneous coating, film, material, or foreign matter.

3.4 INSTALLATION

- A. General: Follow all relevant guidelines detailed in Division 01, as well as flooring and adhesive manufacturer's technical data sheets.
- B. Interface With Other Work: If caulking or sealing is required after installation, please contact the manufacturer for a suitable, matching caulk.

3.5 CLEANING & MAINTENANCE

- A. General: Clean up installation area and sweep, dust, or wipe material to remove any dirt, dust, or debris.
- B. Initial Maintenance: Conduct initial maintenance per the manufacturer's Care & Maintenance documents (www.Roppe.com).

3.6 CLOSEOUT ACTIVITIES

- A. General: Follow all federal, state, and local requirements and Division 01 Section 017600 – Protecting Installed Construction and Section 017800 – Closeout Submittal requirements for these activities.
- B. Protection: Protect newly installed material with construction grade paper or protective boards, such as Masonite or Ram Board, to protect material from damage by other trades. Limit usage and foot traffic according to the adhesive's requirements. When moving appliances or heavy furniture, protect wall base from scuffing and tearing using temporary floor protection.

END OF SECTION 09 65 13

SECTION 096800 - CARPETING

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

- B. Section Includes:
 - 1. Floor Covering:
 - a. All scheduled and shown floors.

QUALITY ASSURANCE:

- C. Installer: Engage a carpet installation firm, which has at least five (5) years successful experience in carpet installations similar in size and type to the carpeting requirements of this project.
- D. Manufacturer's Representative: Obtain carpeting materials from only manufacturers who will, when requested, send a qualified technical representative to the project site, to advise the Installer of proper installation procedures.
- E. Flame Spread Rating: Provide only carpet which has been tested and conforms to the following:
 - 1. Federal Flammability Standard DOC-FF-1-70 (The Pill Test).
 - 2. ASTM E 84 (Tunnel Test), rating 75 or less.
 - 3. UL Standard 992 (Chamber Test).
 - 4. Radiant Panel Test ASTM E 648.

SUBMITTALS:

- F. Product Data: For information only and prior to submission of samples, submit copies of manufacturer's data on carpet and carpeting materials, certifying that materials comply with requirements of these specifications: also including installation instructions and maintenance recommendations.
 - 1. Include certified laboratory test reports for flammability as required hereinbefore.
- G. Samples: Submit 18" x 27" samples of each type, color, texture and pattern of carpeting required. Submit three 6" long samples of carpet edge guard stripping. Architect's review of samples will be for color, pattern and texture only. Compliance with other requirements is the exclusive responsibility of the Contractor.
- H. Extra Stock: Deliver extra stock and scraps of unused carpet to Owner's attic stock, as directed by the Owner, in accordance with hereinafter specified requirements.

- I. Pre-installation Meeting: As previously specified.

JOB CONDITIONS:

- J. Space Enclosure: Do not deliver materials or install carpeting until space has been enclosed and is weather-tight, and until wet-work, including painting, in the space has been completed and is nominally dry, and until work above ceilings has been completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.
- K. Examine the substrate, and the conditions under which the carpeting is to be installed, and do not proceed with the work until unsatisfactory conditions have been corrected.

PART 2 - PRODUCTS**CARPET:**

- A. Mark Type: CPT-1

1. Modular Carpet Tile

- a. Specifications

- Manufacturer: Mohawk Group
- Collection: Emanating Echoes
- Style: Introspective Thoughts (GT344)
- Color: Collins 979
- Product Size: 24" x 24"
- Primary Backing: EcoFlex ONE
- Construction: Pattern Perfect
- Fiber System: Duracolor Tricor Premium Nylon
- Dye Method: Solution Dyed
- Technologies: Permanent, Built into the Fiber Stain Release; EcoSentry Soil Protection
- Installation Layout: Horizontal Brick Ashlar
- Testing Requirements:
 - GSA Stain Release: Passes
 - Flammability (ASTM E648): Passes – Class 1- Glue Down
 - Smoke Density (ASTM E662): Passes – ≤ 450
 - Static Propensity (AATC 134): < 3.5 KV

- B. Mark Type: CPT-2

1. Modular Carpet Tile

- a. Specifications

- Manufacturer: Mohawk Group
- Collection: Emanating Echoes
- Style: Introspective Thoughts (GT344)
- Color: Charlotte 939
- Product Size: 24" x 24"
- Primary Backing: EcoFlex ONE

- Construction: Pattern Perfect
- Fiber System: Duracolor Tricolor Premium Nylon
- Dye Method: Solution Dyed
- Technologies: Permanent, Built into the Fiber Stain Release; EcoSentry Soil Protection
- Installation Layout: Horizontal Brick Ashlar
- Testing Requirements:
 - GSA Stain Release: Passes
 - Flammability(ASTM E648): Passes – Class 1- Glue Down
 - Smoke Density (ASTM E662): Passes – ≤ 450
 - Static Propensity (AATC 134): < 3.5 KV

C. Mark Type: CPT-3

1. Entryway System Carpet Tile

a. Specifications

- Manufacturer: Mannington
- Collection: Frixion
- Style: Inertia
- Color: Fluid 32367
- Product Size: 18" x 36"
- Primary Backing: Infinity 2 Modular
- Construction: Textured Patterned Loop
- Fiber System: Type 6,6 Nylon
- Dye Method: Solution Dyed
- Technologies: Colorsafe XGuard
- Installation Layout: Horizontal Brick Ashlar
- Testing Requirements:
 - Dimensional Stability (Aachen Test): Passes
 - Electrostatic Propensity (AATCC 134): Less than 3.0 kV
 - Flooring Radiant Panel (ASTM E648): Passes – Class 1; ≥ 0.45 watts/cm²
 - Smoke Density (ASTM E662): Passes – ≤ 450
 - Methenamine Pill Test (ASTM D2859): Passes
 - Hexapod (ASTM D5252) TARR: 3.5 - Severe

SCHEDULE 1 - SYSTEM DESCRIPTION

1. Performance Requirements: Provide flooring which has been manufactured, fabricated and installed to performance criteria certified by manufacturer.

ACCESSORY MATERIALS:

- B. Carpet Reducers/Edges: Vinyl carpet manufacturer's suggested trim accessories for the installation specified; colors as selected. Adhesive for Carpet: Provide adhesive, as recommended by the carpet manufacturer or cushion manufacturer, which will allow removal of carpet or cushion at any time without damage to carpet or cushion. Provide adhesive which complies with flame spread rating required for the carpet installation, if any. Coordinate with Division 3 to insure selected adhesive is compatible with curing/sealing compounds installed.

- C. Miscellaneous Materials: Provide the types of seaming tape, thread, nails, adhesives, and other accessory items recommended by the carpet manufacturer and Installer for the conditions of installation and use, without failure during the life of the carpet.

EXTRA OR SURPLUS MATERIALS:

- D. Carpet Overrun: Limit production overrun on each carpet to amount necessary to ensure complete installation without extra seams. Deliver all unused carpet and large scraps, to the Owner for his "attic stock". Dispose of scraps less than 2 sq. ft. in area, or less than 8" in width. Attic stock to consist of no less than one full box of each pattern type and color.

PART 3 - EXECUTION

PREPARATION:

- A. Measure each space to receive carpeting, as a basis of supplying, cutting and seaming the carpet. Do not scale the Architect's drawings or calculate sizes from dimensions shown.
- B. Vacuum substrate immediately prior to carpet installation and remove all deleterious substances which would interfere with the installation or be harmful to the work.

INSTALLATION:

C. General:

1. Comply with manufacturer's instructions and recommendations. Place seams in the directions indicated, and as accepted on shop drawings, if any. Maintain direction of pattern and texture, including lay of pile. Do not seam weft to warp, except as directed.
2. Extend carpet under open-bottomed and raised-bottom obstructions, and under removable flanges of obstructions. Extend carpet into closets and alcoves of rooms indicated to be carpeted, unless another floor finish is indicated for such spaces. Extend carpet under all movable furniture and equipment, unless otherwise indicated.
3. Install carpet edge guard at every location where edge of carpet is exposed to traffic, except where another device, such as an expansion joint cover system or threshold, is indicated with an integral carpet binder bar.

D. Glued-Down Installation:

1. Install a test sample to demonstrate proper adhesion and removal capability of the bonding system. Demonstrate installation and removal procedure to Owner's personnel, with Architect present.
2. Cut and fit sections of carpet of each room of space, prior to application of adhesive.
3. Apply adhesive, and separate release agent, if any, in accordance with manufacturer's instructions, complying with procedure demonstrated to be satisfactory by test sample. Butt carpet seams and edges tightly together, eliminate air pockets, and roll to ensure uniform bond everywhere.
 - a. Cement the edges of the backing together in accordance with manufacturer's instructions.
 - b. Remove adhesive from face promptly upon exposure.

E. Miscellaneous Installations:

1. On stairs and similar substrates, install carpet by a secure method recognized to be durable and safe for traffic on stairs. Conceal edges and avoid seams at points of high wear.

CLEANING AND PROTECTION:

- F. Remove debris from installation, carefully sorting pieces to be saved from scraps to be disposed of.
- G. Vacuum carpet with a commercial machine, with rotating agitator or beater in the nozzle. Remove soiled spots.
- H. Protect the carpeted areas, during the remainder of the construction period, so that carpet will be in undamaged and unsoiled condition at the time of acceptance. Recommended type of non-staining, non-adhesive cover material that should be used for protective cover.

END OF SECTION 09 68 00

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Acoustic wall panels
2. Aluminum Trim

B. Related Sections

1. Section 061050 – Miscellaneous Rough Carpentry
2. Section 064000 – Architectural Woodwork
3. Section 092116 – Gypsum Board Assemblies
4. Division 23 – Mechanical Diffusers, vents and other mechanical items
5. Division 26 – Electrical lights and other ceiling mounted electrical items

C. Alternates

1. Prior Approval: Proposed product substitutions may be submitted to the Architect no later than ten (10) working days prior to the date established for receipt of bids. Substitutions will only be considered if submitted with manufacturer's complete product information, including acoustical data and an 18" x 18" sample. Acceptance of substituted product is contingent on the Architect's approval and that substituted products comply with all specified requirements of this section. Approved products will be set forth by Addenda to all bidders.

1.3 SUBMITTALS

- A. Comply with Section 013300 – Submittal Procedures
- B. Product Data: Manufacturer's technical data and installation instructions for each type of wall panel required.
- C. Certifications: Certified test reports showing compliance with performance requirements specified.
- D. Samples: Submit a minimum of three (3) samples of each panel type and finish type required. Include samples that show the range of variation expected in grain, texture and color.
- E. Shop drawings: Submit shop drawings showing overall layout with dimensions and details of penetrations and intersections with other materials or building components.

- F. Submit operation and maintenance data for installed products. Include precautions relating to harmful cleaning materials and methods that would affect the service life of the panels.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide acoustic wall panels from a single Manufacturer with at least 2 years of prior experience fabricating projects of similar size and complexity.
- B. Installer: Installation shall be done by qualified Carpenters experienced in the installation of architectural woodwork. Installers must receive training on handling, cutting, machining and field finishing the specified product prior to receiving materials on site.
- C. Fire Performance Characteristics: Class A as tested by an independent accredited testing facility. Tests: ASTM E84. Flame spread: 25 or less. Smoke developed: 450 or less as specified by State or local codes.
- D. Coordination of Work: Installing contractor shall organize and conduct a pre-installation survey of temperature, humidity, and construction elements attaching, penetrating, or concealed behind the acoustic wall panels.
- E. Acoustic wall panels to be manufactured from no less than 38 percent post-industrial recycled materials by weight.

1.5 REFERENCES

- A. Test Methods:
 - 1. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method performed by an independent testing agency.
 - 2. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
 - 3. ASTM D 1037 Linear Expansion with Change in Moisture Content.
 - 4. American Society for Testing and Materials: Standard Specifications (ASTM)
 - 5. ASTM D 256 - Izod Impact Strengths (ft #/in)
 - 6. ASTM D 570 - Water Absorption (%)
 - 7. ASTM D 638 - Tensile Strengths (psi) & Tensile Modulus (psi)
 - 8. ASTM D 790 - Flexural Strengths (psi) & Flexural Modulus (psi)
 - 9. ASTM D 2583- Barcol Hardness
 - 10. ASTM D 5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 11. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver panels to the project in original, unopened packages. Inspect containers for visible damage and report any questionable condition to the shipper and manufacturer immediately.
- B. Store products in a fully enclosed, clean, dry space out of direct sunlight and protected from damage with temperature controlled between 50 and 86 degrees F.
- C. Handle products carefully to avoid damaging panel surfaces or chipping edges. Report any damage immediately. Installation of damaged panels is not covered by the manufacturer's warranty.

1.7 PROJECT CONDITIONS

- A. Do not install acoustic wall panels until space is enclosed and weather-proofed, wet work is completely dry, and ambient temperature and humidity conditions are maintained at the levels indicated for the project when occupied for its intended use.
- B. Permit panels to reach room temperature, 50 to 86 degrees F, and stabilized moisture content of 25% to 55% RH for at least 72 hours before installation per AWI standards. Building should be enclosed and HVAC systems functioning in continuous operation with relative humidity maintained between 25 and 55 percent.

1.8 WARRANTY

- A. Provide manufacturer's standard one year written product warranty per Section 01770 – Closeout Procedures Manufacturer's warranty is limited to decorative or acoustical panel materials only.

1.9 MAINTENANCE

- A. Maintenance Instructions: Provide manufacturers with standard maintenance and cleaning instructions for finishes provided.
- B. Extra Materials
 - 1. Deliver no less than *1 carton* of each type, color, and pattern of material.
 - 2. Extra materials shall be from the same production run as the original materials.
 - 3. Extra materials shall remain in the manufacturer's original unopened packaging and stored in a fully enclosed, clean, dry space out of direct sunlight and protected from damage with temperature controlled between 50 degrees F and 86 degrees F.

PART 2 – PRODUCTS

2.1 ACCEPATABLE MANUFACTURER

- A. Marlite; 1 Marlite Drive, Dover, OH 44622. 800-377-1221 FAX (330) 343-4668 Email: info@marlite.com www.marlite.com.
- B. Product:
 - 1. FRP-1 : Standard FRP
 - 2. FRP-2 : Decorative FRP Wall Panels - Symmetrix™ SmartSeam FRP

2.2 PANELS: FRP-1

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319.
- B. Finishing: Pebbled

- C. Dimensions:
1. Thickness – 0.090 “(2.29mm) nominal
 2. Width - 4'-0” (1.22m) nominal
 3. Length – 9'-0” nominal
- D. Tolerance:
1. Length and Width: +/-1/8 “(3.175mm)
 2. Square - Not to exceed 1/8 “for 8-foot (2.4m) panels or 5/32 “(3.96mm) for 10-foot (2.4m) panels.
- E. Panels Edge Treatment: Panels will be edge banded with the matching materials and finish, or as specified by the architect, to match or contrast with the panel face.
- F. Properties for FRP: Resistant to rot, corrosion, denting, peeling, and splintering.
1. Flexural Strength - 1.7×10^4 psi per ASTM D 790.
 2. Flexural Modulus – 6.0×10^5 psi per ASTM D 790.
 3. Tensile Strength – 8.0×10^3 psi per ASTM D 638.
 4. Tensile Modulus – 9.43×10^3 psi per ASTM D 638.
 5. Water Absorption - 0.17% per ASTM D 570.
 6. Barcol Hardness (scratch resistance) 22 - per ASTM D 2583.
 7. Izod Impact Strength – 7.0 ft. lbs./in ASTM D 256.
 8. Mold & Mildew – pass per ASTM D 3273.
- G. Panel Sizes: Panels come standard 4' h x 9' w. Refer to drawings for amount of material needed.
- H. Flame Resistance: Class 1(A) rating based on ASTM E-84 Standard Test Method for Surface Burning Characteristics in Building Materials. Some veneer species and other face materials may not achieve an overall Class 1(A) rating. Check with local building codes for requirements or exemptions.
- I. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
- J. Panel Stability: Linear contraction or expansion to not exceed 0.4% maximum variation in width or height per ASTM D1037.
- K. Color: P 151 Light Grey (Class A)

- L. Size: As indicated in the drawings. standard sizes are:
1. 48" x 96" [1.2m x 2.4m] x .090" (3mm) nom.
 2. 48" x 108" [1.2m x 2.7m] x .090" (3mm) nom.
 3. 48" x 120" [1.2m x 3m] x .090" (3mm) nom

2.2.1 Panels: FRP-2

- A. Fiberglass reinforced thermosetting polyester resin panel sheets complying with ASTM D 5319. Finishing: BlueSky™ Advanced Finishing System: Spray-applied Sani-coat Sealer covers entire panel including grooves and features water-based coatings and controlled, low-temperature inline curing.
- B. Finish: Satin
- M. Dimensions:
1. Thickness – 0.090 "(2.29mm) nominal
 2. Width - 4'-0" (1.22m) nominal
 3. Length – 4'-0" nominal
- N. Tolerance:
1. Length and Width: +/-1/8 "(3.175mm)
 2. Square - Not to exceed 1/8 "for 8-foot (2.4m) panels or 5/32 "(3.96mm) for 10-foot (2.4m) panels.
- O. Panels Edge Treatment: Panels will be edge banded with the matching materials and finish, or as specified by the architect, to match or contrast with the panel face.
- P. Properties for FRP: Resistant to rot, corrosion, denting, peeling, and splintering
1. Flexural Strength – 0.9 x 104 psi per ASTM D 790.
 2. Flexural Modulus – 6.0 x 106 psi per ASTM D 790.
 3. Tensile Strength – 11.5 x 103 psi per ASTM D 638.
 4. Tensile Modulus – 0.45 x 106 psi per ASTM D 638.
 5. Barcol Hardness (scratch resistance) – 28 per ASTM D 2583.
 6. Izod Impact Strength – 6.0 ft. lbs./in ASTM D 256
 7. Thermal Coefficient of Lineal Expansion – 2.22 x 10⁻⁵ in/in/F per ASTM D 696

8. Water Absorption – 0.15% per ASTM D 570.
 9. Specific Gravity – 1.8 per ASTM D 792.
 10. Cross-cut Adhesion – 0 removed per ASTM D 3359
 11. Mold & Mildew – Pass per ASTM D 3273
- Q. Panel Sizes: Panels come standard 4' h x 4' w. Refer to drawings for amount of material needed.
- R. Tile Pattern: 8" x 4" tiles, panel size 4' x 4' nominal
- S. Flame Resistance: Symmetrix SmartSeam FRP Panels with BlueSky Advanced Finishing are available in Class C (III) Fire-ratings
- T. Back Surface: Smooth. Imperfections which do not affect functional properties are not cause for rejection.
- U. Panel Stability: Linear contraction or expansion to not exceed 0.4% maximum variation in width or height per ASTM D1037.
- V. Color: Grey Panel and White Grooves SYM SS920

2.3 MOLDINGS

Aluminum Harmonizing Trim: Heavy weight extruded aluminum 6063-T5 alloy prefinished by Marlite to harmonize.

A 551 Inside Corner, 4' length

A 560 Outside Corner, 4' length

A 565 Division, 4' length

A 570 Edge, 4' length

Color: [Factory Oven-Baked Finish to harmonize spec'd panel]

2.4 ACCESSORIES

- a. Adhesive: Either of the following construction adhesives complying with ASTM C 557.
 - Marlite C-551 FRP Adhesive - Water- resistant, non-flammable adhesive.
 - Marlite C-915 Construction Adhesive - Flexible, water-resistant, solvent based adhesive, formulated for fast, easy application.
 - Titebond Advanced Polymer Panel Adhesive – VOC compliant, non-flammable, environmentally safe adhesive.
- b. Sealant:
 - Marlite Brand MS-250 Clear Silicone Sealant.
 - Marlite Brand MS-251 White Silicone Sealant.
 - Marlite Brand - Color Match Sealant.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Inspect installation area and conditions under which work is to be performed for compliance with all manufacturers' environmental requirements. All wet work in the installation area must be complete, cured and dry prior to installation. Do not proceed until all unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Installation must be done by qualified carpenters experienced in the installation of architectural woodwork. The firm must demonstrate successful experience installing materials of similar type and quality of those required for this project. The use of proper carpentry tools and techniques will be required for the installation.
- B. Comply with manufacturer's instruction and recommendations for installation of wall panels consistent with industry standards.
- C. Confirm all field dimensions are coordinated with shop drawings.
- D. Coordinate the exact size, location and sequencing of panels including penetrations by all building components.
- E. Lay out wall panels per approved shop drawings. Report any interferences or deviations before proceeding.
- F. Install panels with manufacturer's recommended gap for panel field and corner joints.
- G. Adhesive trowel and application method to conform to adhesive manufacturer's recommendations.
- H. Apply panel moldings to all panel edges using silicone sealant providing for required clearances.
- I. All moldings must provide for a minimum 1/8 " (3mm) of panel expansion at joints and edges, to insure proper installation.
- J. Apply sealant to all moldings, channels and joints between the system and different materials to assure watertight installation.

3.3 ADJUSTING AND CLEANING

- A. Clean soiled surfaces of wall panels per manufacturer's instructions.
- B. Remove and replace damaged or discolored materials not in compliance with manufacturer's tolerances.
- C. Adjust tiles after installation so that surfaces are aligned with gaps or reveals between units straight and consistent in width.

END OF SECTION 09 77 20

SECTION 09 91 00 – PAINTING INTERIOR & EXTERIOR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Painting and finishing of interior and exterior exposed items and surfaces throughout the project, except as otherwise indicated.
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.
3. Field painting of exposed bare and covered pipes and ducts, and hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under the mechanical and electrical work, except as otherwise noted.

- B. "Paint", as used herein, is defined as all coating systems materials, including primers, emulsions, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.

- C. Paint all exposed surfaces except where the natural finish of the material is specifically noted as a surface not to be painted. Where items or surfaces are not specifically mentioned, paint these the same as adjacent similar materials or areas.

D. Paint prefinished metal items such as:

1. Door light stops and moldings.
2. Electric panels in finished areas.
3. Prefinished door frames.
4. Door astragals and moldings.
5. Fire extinguisher cabinets.
6. Radiation covers, cabinet unit heater covers and other "primed" mechanical equipment, electro-statically.

- E. Color Coding and Identification: Is specified in respective sections of Divisions 21, through Division 28.

- F. Colors: As selected.

1.3 PAINTING NOT INCLUDED:

- A. The following categories of work are not included as part of the field-applied finish work, or are included in other sections of these specifications.

1. Shop Priming: Unless otherwise specified, shop priming of ferrous metal items is included under the various sections for structural steel, miscellaneous metal, hollow metal work, and similar items. Also, for fabricated components such as architectural woodwork, wood

- casework, and shop-fabricated or factory-built mechanical and electrical equipment or accessories.
2. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing is specified for such items as (but not limited to) metal toilet enclosures, prefinished partition systems, acoustic materials, architectural woodwork and casework, light fixtures, switchgear and distribution cabinets. Prefinished items to be painted are hereinbefore indicated.
 3. Concealed Surfaces: Unless otherwise indicated, painting is not required on surfaces such as walls or ceilings in concealed areas and generally inaccessible areas, foundation spaces, furred areas, utility tunnels, pipe spaces, duct shafts and elevator shafts.
 4. Finished Metal Surfaces: Metal surfaces of anodized aluminum, stainless steel, chromium plate, copper, bronze and similar finished materials will not require finish painting. (Note: Copper tubing and piping is not a finished metal.)
 5. Operating Parts and Labels:
 - a. Moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts will not require finish painting.
 - b. Do not paint over code-required labels, such as Underwriters' Laboratories and Factory Mutual, or equipment identification, performance rating, name, or nomenclature plates. Permanently remove all other labels, prior to painting.

1.4 QUALITY ASSURANCE:

- A. Product Data: For information only, submit copies of manufacturer's technical information including paint label analysis and application instructions for each material proposed for use.
 1. Submit a list of manufacturer's products proposed for use.
 2. Upon approval of the list, submit a detailed schedule of each surface to be painted, and include the specific sealer, primer, underbody and finish coats proposed for each such surface.
 3. After approval is granted, submit complete color catalog(s) for color selections.
- B. Samples: Submit samples for review of color and texture only. Compliance with all other requirements is the exclusive responsibility of the Trade Contractor. Provide a listing of the material and application for each coat of each finish sample.
 1. On actual wood surfaces, provide two 12" x 12" samples of each natural and stained wood finish as required. Label and identify each as to location and application.
- C. Maintenance Sample Stock: Provide the Owner with one (1) gallon, air-tight covered, of each applied paint color for future use. Identify each container with manufacturer's name, number and color designation.
- D. Submit certification that materials proposed herein conform to the above requirements and to the fire test requirements of ASTM E84, Class "A" - 0-25 Flame Spread.
 1. Flame Spread Rating: Provide materials with ratings in accordance with NFPA #101, "Life Safety Code", 25 or less in exitways, corridors, stairways, storage rooms or other areas of high hazard; 75 or less elsewhere.
- E. VOC Compliance: Provide LOW VOC materials conforming to the State and local regulations as relating to VOC/VOS requirements at the time of application, and as follows:

1. VOC Compliance: All paints and coatings must comply with Green Seal Testing Program Limits as follows:
 - a. Non-Flat Primer / Paint: 150g/L. VOC Limit
 - b. Flat Primer / Paint: 50g/L. VOC Limit

F. Mock-Up:

1. Before proceeding with the Work of this Section, finish one complete space or item of each color scheme required. Show selected colors, finish textures, materials and workmanship.
2. Accepted sample spaces or items will serve as the standard for similar work throughout the project.

1.5 DELIVERY AND STORAGE:

A. Delivery:

1. Deliver all materials to the job site in original, new and unopened packages and containers bearing manufacturer's name and label, and application instructions thereon.
2. Provide labels on each container with the following information:
 - a. Name of title of material.
 - b. Fed. Spec. number, if applicable.
 - c. Manufacturer's stock number.
 - d. Manufacturer's name.
 - e. Contents by volume, for major pigment and vehicle constituents.
 - f. Thinning instructions.
 - g. Application instructions.

B. Storage:

1. Provide a secure space for the storage of all paint materials and equipment for the exclusive use of this work and maintain and leave it free from fire hazards due to improperly stored rags or thinners.

1.6 JOB CONDITIONS:

- A. Apply water-base paints when the temperature of surfaces to be painted and the surrounding air temperatures are between 50 degrees F. and 90 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.
- B. Apply solvent-thinned paints when the temperature of surfaces to be painted and the surrounding air temperatures are between 45 degrees F. and 95 degrees F., unless otherwise permitted by the paint manufacturer's printed instructions.
- C. Do not apply paint in snow, rain, fog or mist; or when the relative humidity exceeds 85% or to damp or wet surfaces; unless otherwise permitted by the paint manufacturer's printed instructions.
 1. Continue painting during inclement weather, if the areas and surfaces to be painted are enclosed and heated within the temperature limits specified by the paint manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 COLORS AND FINISHES:

- A. Painting, surface treatments and finishes are indicated in the "schedules" of the contract documents.
- B. See Drawings for color schedule for surfaces to be painted.
 - 1. Provide the necessary compatible base color for the selected finish colors. Should color coverage appear to be a problem, notify the Architect prior to base coat application. Sample areas may be required (approximately four areas of four-square feet each).
 - 2. Use representative colors when preparing samples for review.
- C. Upon completion of the first coat, notify the Architect for his review and approval. This review and approval procedure may be done on a room-by-room basis so as not to impede the progress of the work.
- D. Color Pigments: Pure, non-fading, applicable types to suit the substrates and service indicated.
 - 1. Lead content in the pigment, if any, is limited to contain no more than 0.06% lead, as lead metal based on the total non-volatile (dry-film) of the paint by weight.
- E. Paint Coordination: Provide finish coats, compatible with prime paints used. Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of total coatings system for various substrates. Upon request, furnish information on characteristics of finish materials proposed for use, to ensure compatible prime coats are used. Provide barrier coats over incompatible primers or remove and reprime, as required. Notify the Architect, in writing, of any anticipated problems using specified coating systems with substrates primed by others.

2.2 MATERIAL QUALITY:

- A. Provide the best quality grade of the various types of coatings as regularly manufactured by acceptable paint materials manufacturers. Materials not displaying the manufacturer's identification as a standard, best-grade product will not be acceptable.
- B. Exterior Paint Manufacturers:
 - 1. Sherwin Williams, as specified.
 - 2. Benjamin Moore, as specified.
 - 3. Or equivalent products by the following: PPG Industries or Devoe
- C. Interior Paint Manufacturers:
 - 1. Sherwin-Williams Co. "Harmony" Coating System as specified.
 - 2. Benjamin Moore Company "Eco-Spec", as specified.
 - 3. Or equivalent products by the following:
 - a. PPG Industries "Pure Performance" Low VOC line
 - b. Devoe "Wonder-Pure" Low VOC line
- D. Proprietary names, used to designate colors or materials, are not intended to imply that products of the named manufacturers are required to the exclusion of equivalent products of other manufacturers.

- E. Provide undercoat paint produced by the same manufacturer as the finish coats. Use only thinners approved by the paint manufacturer, and use only within recommended limits.

2.3 EXTERIOR PAINT SYSTEMS:

- A. Provide the following paint systems for the various substrates, as indicated.
- B. Ferrous Metal: (including steel doors and frames, overhead doors, coiling doors, handrails, etc.)

Gloss Finish: (4 mils wet, 1.3 mils dry per coat)

1st Coat - S-W Pro Industrial Pro Cryl Primer, B66 Series

2nd Coat - S-W Water Based Acrolon 100, B65 Series

3rd Coat - S-W Water Based Acrolon 100, B65 Series

Semi-Gloss Finish : (3-5 mils dry per coat)

1st Coat - S-W Pro Industrial Pro Cryl Primer, B66 Series

2nd Coat - S-W Pro Industrial Pre-Catalyzed Waterbase Urethane, B65 Series

3rd Coat - S-W Pro Industrial Pre-Catalyzed Waterbased Urethae, B65 Series

First coat not required on items delivered shop primed.

or;

1st coat - Benjamin Moore M07 Universal Metal Primer- M07

2nd coat - Benjamin Moore D.T.M. Acrylic (Semi-Gloss M29) (Gloss M28)

3rd coat - Benjamin Moore D.T.M. Acrylic (Semi-Gloss M29) (Gloss M28)

- C. Galvanized/Zinc Coated Metal: (architecturally exposed structural steel, including fascia; if not aluminum)

1. Epoxy System:

- a. Prime Coat: Primer, epoxy, anti-corrosive, for metal. Sherwin Williams MPI 18 Corothane I Galvapac 1K Zinc Primer
- b. Intermediate Coat: Sherwin Williams Water Based Acrolon 100
- c. Topcoat: Epoxy, Sherwin Williams Water Based Acrolon 100

or;

1st coat - Benjamin Moore M04 Acrylic Metal Primer - M04

2nd coat - Benjamin Moore D.T.M. Acrylic (Semi-Gloss M29) (Gloss M28)

3rd coat- Benjamin Moore D.T.M. Acrylic (Semi-Gloss M29) (Gloss M28)

2.4 LOW ODOR - LOW VOC COMPLIANT INTERIOR PAINTS

- A. Coordinate with Finish Schedule for material, colors, and sheen required.
- B. Concrete Masonry Units:

1st coat - Sherwin-Williams Pro Industrial Block Filler

2nd coat - Sherwin-Williams Sherwin-Williams ProMar 200 Zero VOC Interior Latex

3rd coat - Sherwin-Williams Sherwin-Williams ProMar 200 Zero VOC Interior Latex

or;

1st coat- Benjamin Moore Super Craft Latex Block Filler
2nd coat - Benjamin Moore Eco Spec Interior Latex
3rd coat- Benjamin Moore Eco Spec Interior Latex

C. Gypsum Drywall System (except ceilings):

1st coat - Sherwin-Williams ProMar 200 Zero VOC Interior Latex Primer
2nd coat - Sherwin-Williams ProMar 200 Zero VOC Interior Latex
3rd coat - Sherwin-Williams ProMar 200 HP Zero VOC Interior Latex

or;

1st coat- Benjamin Moore Eco Spec Interior Latex Primer Sealer
2nd coat - Benjamin Moore Eco Spec Interior Latex
3rd coat- Benjamin Moore Eco Spec Interior Latex

D. Drywall Ceilings:

Flat Finish: (4 mils wet, 1.6 mils dry per coat)

1st Coat - Sherwin-Williams ProMar 200 Zero VIC Interior Latex Primer, B28 Series
2nd Coat - Sherwin Williams ProMar Ceiling Paint, Flat A27 Series
3rd Coat - Sherwin Williams ProMar Ceiling Paint, Flat A27 Series

or;

1st coat Benjamin Moore Super Spec Latex Enamel Undercoater & Primer Sealer- 253
2nd coat Benjamin Moore Moorecraft Super Spec Latex Flat- 275
3rd coat Benjamin Moore Moorecraft Super Spec Latex Flat- 275

E. Galvanized/Zinc Coated Metal: (for all exposed to view metal, in finished rooms, including ducts, conduit, grilles, diffusers, miscellaneous metals):

1st Coat - S-W ProCryl Universal Primer, B66-310 Series (110 g/L)
2nd Coat - S-W ProMar 200 HP Zero VOC Interior Latex Semi-Gloss, B31 Series (0 VOC)
3rd Coat - S-W ProMar 200 HP Zero VOC Latex Semi-Gloss, B31 Series (0 VOC)

F. Aluminum: (for all exposed to view items, including grilles, diffusers, louvers, ducts, conduit and miscellaneous items not prefinished)

Semi-Gloss Finish (4 mils wet, 1.6 mils dry per coat)

1st Coat - S-W ProCryl Universal Primer, B66-310 Series (110 g/L)
2nd Coat - S-W ProMar 200 HP Zero VOC Latex Semi-Gloss, B31 Series (0 VOC)
3rd Coat - S-W ProMar 200 HP Zero VOC Latex Semi-Gloss, B31 Series (0 VOC)

G. Tectum Ceiling:

1st coat - Sherwin-Williams Pro Industrial Block Filler
2nd coat - Sherwin-Williams Sherwin-Williams Waterborne Acrylic Dry Fall (B42W1)
3rd coat - Sherwin-Williams Sherwin-Williams Waterborne Acrylic Dry Fall (B42W1)

or;

1st coat- Benjamin Moore Super Craft Latex Block Filler

2nd coat – Alkali-based, flat latex paints with similar properties per manufacturer's requirements

3rd coat – Alkali-based, flat latex paints with similar properties per manufacturer's requirements

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine the areas and conditions under which painting work is to be applied and do not proceed with the work until unsatisfactory conditions have been corrected.
- B. Starting of painting work will be construed as acceptance of the surfaces and conditions within any particular area.
- C. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to the formation of a durable paint film.

3.2 PREPARATION:

A. New Substrates:

- 1. General: Perform preparation and cleaning procedures in strict accordance with the paint manufacturer's instructions and as specified, for each particular substrate condition.
 - a. Remove all hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items in place and not to be finish-painted or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for the complete painting of the items and adjacent surfaces. Following completion of painting of each space or area, reinstall the removed items by workmen skilled in the trades involved.
 - b. Clean surfaces to be painted before applying paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Program the cleaning and painting so that contaminants from the cleaning process will not fall onto wet, newly-painted surfaces.
 - c. Equipment, factory primed, including but not limited to fire extinguisher cabinets; electric panels, in finished areas; grilles; diffusers; and similar equipment not indicated to be painted "electro-statically" shall be dulled by sanding with #00 sandpaper or other approved material prior to receiving finish coats. Remove all sanding residue with water-moistened rags or other approved method.
- 2. Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, and cement plaster to be painted by removing all efflorescence, chalk, dust, dirt, grease, oils, and by roughening as required to remove glaze.
 - a. Determine the alkalinity and moisture content of the surfaces by performing appropriate tests. If the surfaces are found to be sufficiently alkaline to cause blistering and burning of the finish paint, correct this condition before application of paint. Do not paint over surfaces where the moisture content exceeds that permitted in the manufacturer's printed directions.
 - b. Coordinate with Division 4. If liquid cleaning solutions are used, determine the condition of the surfaces for paint application.

- c. Shot blast concrete floors scheduled to be painted to provide a surface texture to receive paint.
 - d. If approved, prepare concrete floor surfaces with a commercial solution of muriatic acid, or other etching cleaner, flush floor with clean water to neutralize acid, and allow to dry before painting. Test slabs for dryness prior to commencing painting.
3. Ferrous Metals: Clean ferrous surfaces, which are not galvanized or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
- a. Coordinate with Division 4. Determine if liquid cleaning solutions have been removed from surfaces abutting masonry.
 - b. Wire brush or mechanically sand rust spots to bright metal and spot prime.
 - c. Touch-up shop-applied prime coats wherever damaged or bare, where required by other sections of these specifications. Clean and touch-up with the same type shop primer.
4. Galvanized Surfaces: Clean free of oil and surface contaminate with an acceptable non-petroleum based solvent.

3.3 MATERIALS PREPARATION:

- A. Mix and prepare painting materials in accordance with manufacturer's directions.
- B. Store materials not in actual use in tightly covered containers. Maintain containers used in storage, mixing and application of paint in a clean condition, free of foreign materials and residue.
- C. Stir materials before application to produce a mixture of uniform density, and stir as required during the application of the materials. Do not stir surface film into the material. Remove the film and if necessary, strain the material before using.

3.4 APPLICATION:

- A. General:
 1. Apply paint in accordance with the manufacturer's directions. Use applicators and techniques best suited for the substrate and type of material being applied.
- B. Apply primer, intermediate and finish coats to not less than the manufacturer's recommended wet film and dry film thicknesses and spreading rates for each of the various types of materials specified.
 1. Verify mil thickness, wet or dry, by use of recommended gauges.
- C. Apply additional coats when undercoats, stains or other conditions show through the final coat of paint, until the paint film is of uniform finish, color and appearance. Give special attention to insure that all surfaces, including edges, corners, crevices, welds and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
- D. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently-fixed equipment or furniture with prime coat only before final installation of equipment.

- E. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
- F. Paint the back sides of access panels, and removable or hinged covers to match the exposed surfaces.
- G. Finish doors on tops, bottoms and side edges the same as the faces, unless otherwise indicated.
- H. Sand lightly between each succeeding enamel or varnish coat.
- I. Omit the first coat (primer) on metal surfaces which have been shop-primed and touch-up painted, unless otherwise indicated.
- J. Scheduling Painting:
 - 1. Apply the first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
 - 2. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and the application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- K. Minimum Coating Thickness: Apply each material at not less than the manufacturer's recommended spreading rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended by coating manufacturer.
- L. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed to view on the building exterior, in mechanical equipment rooms and in finished spaces.
 - 1. Mechanical items to be painted include, but are not limited to, the following:
 - a. Roof appurtenances including fan housings, exhaust hoods, fan covers, vent stacks, vent covers and grilles.
 - b. Convectors, radiation units, cabinet heaters, unit ventilators.
 - c. Piping, pipe hangers and supports.
 - d. Heat exchangers.
 - e. Tanks.
 - f. Ductwork, insulation.
 - g. Motors and mechanical equipment and supports.
 - h. Accessory items, including grilles, diffusers and louvers.
 - 2. Electrical items to be painted include, but are not limited to, the following:
 - a. Conduit and fittings.
 - b. Panels.
 - c. Panel backboards.
- M. Prime Coats: Apply a prime coat of material which is required to be painted or finished, and which has not been prime coated by others.
 - 1. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

2. Apply prime coat to all surfaces including surfaces indicated to receive other finishes.
- N. Pigmented (Opaque) Finishes: Completely cover to provide an opaque, smooth surface of uniform finish, color, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.
- O. Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes or other surface imperfections.
1. Provide satin finish for final coats, unless otherwise indicated.
- P. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or repaint work not in compliance with specified requirements.

3.5 CLEAN-UP AND PROTECTION:

- A. Clean-up: During the progress of the work, remove from the site all discarded paint materials, rubbish, cans and rags at the end of each work day.
1. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.
- B. Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct any damage by cleaning, repairing or replacing, and repainting, as acceptable to the Architect.
1. Provide "Wet Paint" signs as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
 2. At the completion of work of other trades, touch-up and restore all damaged or defaced painted surfaces.

END OF SECTION 09 91 00

SECTION 10 14 00 - SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Plaques.
2. Dimensional illuminated and non-illuminated characters.
3. Panel signs.
4. Illuminated panel signs.

- B. Related Sections include the following:

1. Division 10 Section "Post and Panel/Pylon Signage" for freestanding signs.
2. Division 22 Section "Identification for Plumbing Piping and Equipment for labels, tags, and nameplates for plumbing systems and equipment.
3. Division 23 Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
4. Division 26 Section "Interior Lighting" for illuminated Exit signs.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines."

1.4 ACTION SUBMITTALS

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

- B. Shop Drawings: Show fabrication and installation details for signs.

1. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
2. Provide message list, typestyles, graphic elements, including tactile characters and Braille, and layout for each sign.
3. Wiring Diagrams: Power, signal, and control wiring.

- C. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:

1. Plaque Casting: 6 inches (150 mm) square including border.
2. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).
3. Aluminum: For each form, finish, and color, on 6-inch- (150-mm-) long sections of extrusions and squares of sheet at least 4 by 4 inches (100 by 100 mm).
4. Acrylic Sheet: 8 by 10 inches (200 by 250 mm) for each color required.
5. Polycarbonate Sheet: 8 by 10 inches (200 by 250 mm) for each color required.
6. Fiberglass Sheet: 8 by 10 inches (200 by 250 mm) for each color required.
7. Panel Signs: Not less than 12 inches (305 mm) square including border.
8. Photoluminescent Signs: Full-size sign.
9. Trim and Frame: 6-inch- (152-mm-) long sections of each profile.
10. Accessories: Manufacturer's full-size unit.

D. Sign Schedule: Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Warranty: Special warranty specified in this Section.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- C. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.
- D. Regulatory Requirements: Comply with applicable provisions in ADA-ABA Accessibility Guidelines, ICC/ANSI A117.1 and State Building Code Requirements.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.

- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.9 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of metal and polymer finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image colors and sign lamination.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.
- B. Aluminum Sheet and Plate: **ASTM B 209 (ASTM B 209M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- C. Aluminum Extrusions: **ASTM B 221 (ASTM B 221M)**, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 6063-T5.
- D. Brass Castings: ASTM B 584, Alloy UNS No. C85200 (high-copper yellow brass).
- E. Brass, Yellow, Sheet: ASTM B 36/B 36M, Alloy UNS No. C26000.
- F. Bronze Castings: ASTM B 584, Alloy UNS No. C86500 (No. 1 manganese bronze).
- G. Bronze Plate: ASTM B 36/B 36M.
- H. Copper Sheet: ASTM B 152/B 152M.
- I. Steel:
 - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, **G90 (Z275)** coating, either commercial or forming steel.

2. Steel Sheet: Uncoated, cold-rolled, ASTM A 1008/A 1008M, commercial steel, Type B, exposed or electrolytic zinc-coated, ASTM A 591/A 591M, with steel sheet substrate complying with ASTM A 1008/A 1008M, commercial steel, exposed.
 3. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 316, stretcher-leveled standard of flatness.
 4. Steel Members Fabricated from Plate or Bar Stock: ASTM A 529/A 529M or ASTM A 572/A 572M, 42,000-psi (290-MPa) minimum yield strength.
 5. For steel exposed to view on completion, provide materials having flat, smooth surfaces without blemishes. Do not use materials whose surfaces exhibit pitting, seam marks, roller marks, rolled trade names, or roughness.
- J. Fiberglass Sheet: Molded, seamless, thermosetting, glass-fiber-reinforced polyester panels with a minimum tensile strength of 15,000 psi (103 MPa) when tested according to ASTM D 638 and with a minimum flexural strength of 30,000 psi (207 MPa) when tested according to ASTM D 790.
- K. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).
- L. Polycarbonate Sheet: Of thickness indicated, manufactured by extrusion process, coated on both surfaces with abrasion-resistant coating:
1. Impact Resistance: 16 ft-lbf/in. (854 J/m) per ASTM D 256, Method A.
 2. Tensile Strength: 9000 lbf/sq. in. (62 MPa) per ASTM D 638.
 3. Flexural Modulus of Elasticity: 340,000 lbf/sq. in. (2345 MPa) per ASTM D 790.
 4. Heat Deflection: 265 deg F (129 deg C) at 264 lbf/sq. in. (1.82 MPa) per ASTM D 648.
 5. Abrasion Resistance: 1.5 percent maximum haze increase for 100 revolutions of a Taber abraser with a load of 500 g per ASTM D 1044.
- M. Applied Vinyl: Die-cut characters from vinyl film of nominal thickness of 3 mils (0.076 mm) with pressure-sensitive adhesive backing, suitable for exterior applications.

2.2 INTERIOR PLAQUES

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: TakeForm Fusion 01 Series. Colors and materials to be selected from the manufacturers' full range of offerings. Lumicor Backer.

Or a comparable product by one of the following:

1. Advance Corporation; Braille-Tac Division.
2. A. R. K. Ramos.
3. Matthews International Corporation; Bronze Division.
4. Metal Arts; Div. of L&H Mfg. Co.
5. Mills Manufacturing Company.
6. Nelson-Harkins Industries.
7. Southwell Company (The).

2.3 DIMENSIONAL CHARACTERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: TakeForm Fusion 01 Series. Colors and materials to be selected from the manufacturers' full range of offerings. Lumicor Backer.

Or a comparable product by one of the following:

- 1. Advance Corporation; Braille-Tac Division.
- 2. A. R. K. Ramos.
- 3. Matthews International Corporation; Bronze Division.
- 4. Metal Arts; Div. of L&H Mfg. Co.
- 5. Mills Manufacturing Company.
- 6. Nelson-Harkins Industries.
- 7. Southwell Company (The).

2.4 PANEL SIGNS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- C. Basis-of-Design Product: TakeForm Fusion 01 Series. Colors and materials to be selected from the manufacturers' full range of offerings. Lumicor Backer.

Or a comparable product by one of the following:

- 1. Advance Corporation; Braille-Tac Division.
- 2. A. R. K. Ramos.
- 3. Matthews International Corporation; Bronze Division.
- 4. Metal Arts; Div. of L&H Mfg. Co.
- 5. Mills Manufacturing Company.
- 6. Nelson-Harkins Industries.
- 7. Southwell Company (The).

- D. Exterior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus **1/16 inch (1.5 mm)** measured diagonally from corner to corner, complying with the following requirements:

- 1. Aluminum Sheet: **0.050 inch (1.27 mm)** thick.
- 2. Laminated, Aluminum-Faced Sheet: **0.020-inch- (0.51-mm-)** thick aluminum sheet laminated to each side of **0.197-inch- (5.0-mm-)**
- 3. Acrylic Sheet: **0.060 inch (1.52 mm)** thick.
- 4. Fiberglass Sheet: **0.090-inch- (2.29-mm-)** thick sheet.
- 5. Edge Condition: **Square cut.**
- 6. Corner Condition: **Square.**

- E. Laminated **Interior and Exterior** Signs: Solid phenolic panel core with graphic image covered with thermosetting resin face layer.
1. Surface Finish: **Gloss** or **UV resistant, outdoor**.
 2. Edge Condition: **Square cut**.
 3. Corner Condition: **Square**.
 4. Thickness: **1/8 inch (3 mm)**.
- F. Brackets: Fabricate brackets and fittings for bracket-mounted signs from extruded aluminum to suit panel sign construction and mounting conditions indicated. Factory paint brackets in color **matching background color of panel sign**.
- G. Panel Sign Frames:
1. Extruded-Aluminum Frames: Mitered **with concealed anchors**.
- H. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
1. Raised-Copy Thickness: Not less than **1/32 inch (0.8 mm)**.
- I. Engraved Copy: Machine engrave letters, numbers, symbols, and other graphic devices into panel sign on face indicated to produce precisely formed copy, incised to uniform depth.
1. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.
 2. Engraved Metal: Fill engraved copy with enamel.
 3. Engraved Opaque Acrylic Sheet: Fill engraved copy with enamel.
 4. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with enamel. Apply opaque background color coating to back face of acrylic sheet.
- J. Subsurface Copy: Apply minimum **4-mil- (0.10-mm-)** thick vinyl copy to back face of clear acrylic sheet forming panel face to produce precisely formed opaque image. Image shall be free of rough edges.

2.5 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

2.6 FABRICATION

- A. General: Provide manufacturer's standard signs of configurations indicated.
1. Welded Connections: Comply with AWS standards for recommended practices in shop welding. Provide welds behind finished surfaces without distortion or discoloration of exposed side. Clean exposed welded surfaces of welding flux and dress exposed and contact surfaces.

2. Mill joints to tight, hairline fit. Form joints exposed to weather to exclude water penetration.
3. Preassemble signs in the shop to greatest extent possible. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in location not exposed to view after final assembly.
4. Conceal fasteners if possible; otherwise, locate fasteners where they will be inconspicuous.

2.7 FINISHES, GENERAL

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

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: Manufacturer's standard Class 1 clear anodic coating, 0.018 mm or thicker, over a satin (directionally textured) or polished (buffed) mechanical finish unless indicated otherwise, complying with AAMA 611.
- B. Color Anodic Finish: Manufacturer's standard Class 1 integrally colored or electrolytically deposited color anodic coating, 0.018 mm or thicker, color as indicated, applied over a satin (directionally textured) mechanical finish, complying with AAMA 611.
- C. Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Apply baked enamel complying with paint manufacturer's written instructions for cleaning, conversion coating, and painting.
 1. Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system complying with AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss.

2.9 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
- B. Factory Priming for Painted Finish: Apply shop primer specified below immediately after surface preparation and pretreatment.
 1. Shop Primer: Manufacturer's or fabricator's standard, fast-curing, lead- and chromate-free, universal primer, selected for resistance to normal atmospheric corrosion, for

compatibility with substrate and field-applied finish paint system indicated, and for capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

- C. Baked-Enamel Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-enamel finish consisting of prime coat and thermosetting topcoat. Comply with paint manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of **2 mils (0.05 mm)**.

2.10 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- B. Directional Satin Finish: No. 4 finish.
- C. Mirrorlike Reflective, Nondirectional Polish: No. 8 finish.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.11 ACRYLIC SHEET FINISHES

- A. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for five years for application intended.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, and electrical power are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate signs and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
 - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Interior Wall Signs: Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within **3 inches (75 mm)** of sign without encountering protruding objects or standing within swing of door.
- B. Wall-Mounted Signs: Comply with sign manufacturer's written instructions except where more stringent requirements apply.
1. Two-Face Tape: Mount signs to smooth, nonporous surfaces. Do not use this method for vinyl-covered or rough surfaces.
 2. Hook-and-Loop Tapes: Mount signs to smooth, nonporous surfaces.
 3. Magnetic Tape: Mount signs to smooth, nonporous surfaces.
 4. Silicone-Adhesive Mounting: Attach signs to irregular, porous, or vinyl-covered surfaces.
 5. Shim Plate Mounting: Provide **1/8-inch- (3-mm-)** thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other mounting methods are not practicable. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach panel signs to plate using method specified above.
 6. Mechanical Fasteners: Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer.
 7. Signs Mounted on Glass: Provide matching opaque plate on opposite side of glass to conceal mounting materials.
- C. Bracket-Mounted Signs: Provide manufacturer's standard brackets, fittings, and hardware for mounting signs that project at right angles from walls and ceilings. Attach brackets and fittings securely to walls and ceilings with concealed fasteners and anchoring devices to comply with manufacturer's written instructions.
- D. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
1. Flush Mounting: Mount characters with backs in contact with wall surface.
 2. Projected Mounting: Mount characters at projection distance from wall surface indicated.
- E. Cast-Metal Plaques: Mount plaques using standard fastening methods to comply with manufacturer's written instructions for type of wall surface indicated.
1. Concealed Mounting: Mount plaques by inserting threaded studs into tapped lugs on back of plaque. Set in predrilled holes filled with quick-setting cement.
 2. Face Mounting: Mount plaques using exposed fasteners with rosettes attached through face of plaque into wall surface.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

3.4 SCHEDULE OF SIGNAGE

- A. At the minimum the following signs shall be required:

- B. Room (Suites) names and numbers with ID slide-ins, Braille. (Approx. 8" x 8")
- C. Area Signage, with room name and number, Braille (Approx. 8" x 8")
- D. Office Signage, individual name and room number, Braille (Approx. 8" x 4")
- E. Dedicatory Plaque (Nominal 24" x 36").
- F. Evacuation Plans (At elevators each floor, each office, lab, suite).
- G. Exterior Signage (Site Drawings)
- H. Egress ID (In stairs per RISBC-1)
- I. Evacuation Plans (At elevators each floor, office, stairs, rest rooms, lobby/lounge, breakroom,).
- J. Directional Signage

END OF SECTION 10 14 00

PART 1 TOILET PARTITIONS

1.1 SUMMARY

- A. Section Includes:
 - 1. Solid plastic toilet compartments and urinal screens.
- B. Related Sections:
 - 1. Division 01: Administrative, procedural, and temporary work requirements.

1.2 REFERENCES

- A. ASTM International (ASTM):
 - 1. A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
 - 2. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- B. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.3 SYSTEM DESCRIPTION

- A. Compartment Configurations:
 - 1. Toilet partitions: Floor mounted, wall braced.
 - 2. Urinal screens: Wall mounted.

1.4 SUBMITTALS

- A. Submittals for Review:
 - 1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.
 - 2. Product Data: Manufacturer's descriptive data for panels, hardware, and accessories.
 - 3. Samples: 2 x 3 showing available colors.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Minimum 5 years' experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.
- B. Installer Qualifications: Minimum 5 years' experience in work of this Section.

1.6 WARRANTIES

- A. Provide manufacturer's 25 year warranty against breakage, corrosion, and delamination under normal conditions.

TOILET

PARTITIONS

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers and products: Provide products from one manufacturer, unless otherwise specified or approved. The following manufacturers offer products herein specified:
1. Phenolic Toilet Partition from Bradley. Color Smoke Quarstone 6220
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Doors, Panels and Pilasters:
1. High density polyethylene (HDPE), fabricated from polymer resins compounded under high pressure, forming single thickness panel.
 2. Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.
 3. 1 inch thick with edges rounded to 1/4 inch radius.
 4. Fire hazard classification: Not required.
 5. Color: To be selected from manufacturer's full color range.
- B. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.
- C. Stainless Steel: ASTM A167, Type 304.

2.3 HARDWARE

- A. Hinges:
1. 8 inches long, fabricated from heavy-duty extruded aluminum with bright dip anodized finish, wrap-around flanges, adjustable on 30-degree increments, through bolted to doors and pilasters with stainless steel, Torx head sex bolts.
 2. Hinges operate on field-adjustable nylon cams, field adjustable in 30 degree increments.
- B. Door Strike and Keeper:
1. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap-around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.
 2. Bumper: Extruded black vinyl.
- C. Latch and Housing:
1. Heavy-duty extruded aluminum.
 2. Latch housing: Bright dip anodized finish.
 3. Slide bolt and button: Black anodized finish.

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- D. Coat Hook/Bumper:
 - 1. Combination type, chrome plated Zamak.
 - 2. Equip outswing handicapped doors with second door pull and door stop.
- E. Door Pulls: Chrome plated Zamak.

2.4 COMPONENTS

- A. Doors and Dividing Panels: 55 inches high, mounted 14 inches above finished floor, [with aluminum heat-sinc fastened to bottom edges.]
- B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.
- C. Pilaster Sleeves: 3 inches high, [one-piece molded HDPE,] [20 gage stainless steel,] secured to pilaster with stainless steel tamper resistant Torx head sex bolt.
- D. Wall Brackets: 54 inches long, [Extruded PVC,] [heavy-duty aluminum, bright dip anodized finish,] fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.
- E. Headrail: Heavy-duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.
- F. Headrail Brackets: 20 gage stainless steel, satin finish, secured to wall with stainless steel tamper resistant Torx head screws.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install compartments in accordance with manufacturer's instructions and approved Shop Drawings.
- B. Install rigid, straight, plumb, and level.
- C. Locate bottom edge of doors and panels 14 inches above finished floor.
- D. Provide uniform, maximum 3/8 inch vertical clearance at doors.
- E. Not Acceptable: Evidence of cutting, drilling, or patching.

3.2 ADJUSTING

- A. Adjust doors and latches to operate correctly.

END OF SECTION

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SECTION 102240 - OPERABLE PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manually operated, acoustical panel partitions.
2. Electrically operated, acoustical panel partitions.
3. Manually operated, fire-rated panel partitions.
4. Manually operated, glass panel partitions.

B. Related Sections:

1. Division 05 Section "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.
2. Division 06 Section "Interior Architectural Woodwork" for special finishes for panels and for fire-retardant-treated wood veneers.
3. Division 08 Sections for operable exterior wall systems.
4. Division 08 Section "Door Hardware" for hardware to the extent not specified in this Section.
5. Division 09 Section "Gypsum Board" for fire-rated assemblies and sound barrier construction above the ceiling at track.
6. Division 09 Section "Staining and Transparent Finishing" for wood finish.
7. Divisions 26 and 27 Sections for electrical service and connections for motor operators, controls, and limit switches; and for system disconnect switches.

1.3 DEFINITIONS

- A. ADA-ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."
- B. Glass and Glazing Definitions: See Division 08 Section "Glazing."
- C. NIC: Noise Isolation Class.
- D. NRC: Noise Reduction Coefficient.
- E. STC: Sound Transmission Class.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design operable panel partitions, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to [SEI/ASCE 7] <Insert requirement>.
 - 1. The term "withstand" means "the panels will remain in place without separation of any parts from the system when subjected to the seismic forces specified."
- C. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
 - 1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
 - 2. Noise-Reduction Requirements: Operable panel partition assembly, identical to partition tested for STC, tested for sound-absorption performance according to ASTM C 423, and rated for not less than the NRC indicated.
 - 3. Acoustical Performance Requirements: Installed operable panel partition assembly, identical to partition tested for STC, tested for NIC according to ASTM E 336, determined by ASTM E 413, and rated for [10 dB less than STC value indicated] <Insert value>.
- D. Fire Resistance: Provide fire-rated operable panel partition assemblies[including pass doors] with fire-resistance ratings indicated.
 - 1. Pass Doors: Provide doors in fire-rated operable panel partition assemblies with fire-resistance ratings indicated. Pass doors shall meet positive-pressure requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
 - 1. Certificates for [Credit MR 6] [Credit MR 7]: Chain-of-custody certificates certifying that operable panel partitions comply with forest certification requirements. Include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
 - 2. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that products contain no urea formaldehyde.
 - 3. Laboratory Test Reports for Credit IEQ 4: For [adhesives] [and] [composite wood products], documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Shop Drawings: Include plans, elevations, sections, details,[numbered panel installation sequence,] and attachments to other work.

1. For installed products indicated to comply with design loads, include structural analysis data for attachments, signed and sealed by the qualified professional engineer responsible for their preparation.
 2. Indicate storage and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
 3. Wiring Diagrams: For power, signal, and control wiring.
- D. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing indicated.
1. Include similar Samples of accessories involving color selection.
- E. Samples for Verification: For each type of exposed material, finish, covering, or facing indicated, prepared on Samples of size indicated below:
1. Textile: Full width by not less than **36-inch- (914-mm-)** long section of **[fabric] [carpet]** from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat.
 2. Panel Facing Material: Manufacturer's standard-size unit, not less than **3 inches (75 mm)** square.
 3. Panel Edge Material: Not less than **3 inches (75 mm)** long.
 4. Chair Rail: Manufacturer's standard-size unit, **6 inches (150 mm)** long.
 5. Glass: Units **12 inches (300 mm)** square.
 6. Hardware: Manufacturer's standard exposed door-operating device.
- F. Delegated-Design Submittal: For operable panel partitions indicated to comply with performance requirements, including analysis data and calculations signed and sealed by the qualified professional engineer responsible for their preparation.
1. Design Calculations: Calculate requirements for seismic restraints.

1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
1. Suspended ceiling components.
 2. Structural members to which suspension systems will be attached.
 3. Size and location of initial access modules for acoustical tile.
 4. Items penetrating finished ceiling, including the following:
 - a. Lighting fixtures.
 - b. HVAC ductwork, outlets, and inlets.
 - c. Speakers.
 - d. Sprinklers.
 - e. Smoke detectors.
 - f. Access panels.
 - g. **<Insert item>**.
 5. Plenum **[fire] [smoke] [and] [acoustical]** barriers.
- B. Setting Drawings: For embedded items and cutouts required in other work, **including support-beam, mounting-hole template**].

- C. Qualification Data: For qualified [**Installer**] [**and**] [**testing agency**].
- D. Seismic Qualification Certificates: For operable panel partitions, accessories, and components, from manufacturer.
 - 1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- E. Product Certificates: For each type of operable panel partition, from manufacturer.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each operable panel partition.
- G. Field quality-control reports.
- H. Warranty: Sample of special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:
 - 1. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
 - 2. Seals, hardware, track, carriers, and other operating components.
 - 3. Electric operator.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from the same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.9 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- C. Testing Agency Qualifications: Qualified according to Division 01 Section "Quality Requirements" for testing indicated.

- D. Fire-Test-Response Characteristics: Provide panels with finishes meeting one of the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. Surface-Burning Characteristics: As determined by testing per ASTM E 84.
 - a. Flame-Spread Index: **[25 or less] [26 to 75] [76 to 200]**.
 - b. Smoke-Developed Index: 450 or less.
 2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to **[NFPA 265] [NFPA 286]**.
- E. Fire-Rated Door Assemblies: Comply with NFPA 80, based on testing according to UL 10B.
1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- F. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- G. Preinstallation Conference: Conduct conference at **[Project site] <Insert location>**.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.11 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of operable panel partition openings by field measurements before fabrication.

1.12 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Faulty operation of operable panel partitions.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal wear.
 2. Warranty Period: **[Two] <Insert number>** years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Forest Certification: Fabricate products with wood, wood veneers, and wood-based panel products 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. Steel Frame: Steel sheet, [**manufacturer's standard**] [**0.0508-inch (1.3-mm)**] [**0.0641-inch (1.6-mm)**] [**0.0747-inch (1.9-mm)**] <Insert dimension> nominal minimum thickness for uncoated steel.
- C. Steel Face/Liner Sheets: Tension-leveled steel sheet, [**manufacturer's standard**] [**minimum 0.0299-inch (0.75-mm)**] [**0.0359-inch (0.9-mm)**] [**0.0478-inch (1.2-mm)**] [**0.0598-inch (1.5-mm)**] [**0.0747-inch (1.9-mm)**] <Insert thickness> nominal minimum thickness for uncoated steel.
- D. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; **ASTM B 221 (ASTM B 221M)** for extrusions; manufacturer's standard strengths and thicknesses for type of use.
1. Frame Reinforcement: Manufacturer's standard steel or aluminum.
- E. Wood Frame: Clear, vertical-grain, straight, kiln-dried[, **fire-retardant-treated**] wood; of [**manufacturer's standard species.**] [**one of the following species:**] [**the following species:**]
1. Cherry.
 2. Hemlock.
 3. Maple.
 4. Meranti.
 5. Poplar.
 6. Red oak.
 7. <Insert species>.
- F. Gypsum Board: ASTM C 36/C 36M.
- G. Cement Board: ASTM C 1288.
- H. Plywood: DOC PS 1.
- I. Particleboard: ANSI A208.1[, **made with binder containing no urea formaldehyde**].
- J. Medium-Density Fiberboard: ANSI A208.2[, **made with binder containing no urea formaldehyde**].
- K. Composite Wood Products: Products shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- L. Adhesives: Manufacturer's standard products that comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 OPERABLE ACOUSTICAL PANELS

- A. Operable Acoustical Panels: Operable acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
1. Manufacturers: Subject to compliance with requirements, **[provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:**
 2. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings]** <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 - a. Advanced Equipment Corporation.
 - b. Curtition, Inc.
 - c. FolDoor; Holcomb & Hoke Mfg. Co., Inc.
 - d. Hufcor.
 - e. KWIK-WALL Company.
 - f. Moderco Inc.
 - g. Modernfold, Inc.; a DORMA Group Company.
 - h. Panelfold Inc.
 - i. <Insert manufacturer's name>.
- B. Panel Operation: **[Manually operated, individual] [Manually operated, paired] [Manually operated, continuously hinged] [Electrically operated, continuously hinged]** panels.
- C. Panel Construction: Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
- D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
1. Panel Width: **[Standard widths] [Equal widths] [As indicated]**.
- E. STC: Not less than **[38] [41] [45] [47] [50] [52] [54]** <Insert STC rating>.
- F. NRC: Not less than **[0.50] [0.60] [0.65] [0.90]** <Insert NRC rating>.
- G. Panel Weight: **[8 lb/sq. ft. (40 kg/sq. m)] [10 lb/sq. ft. (50 kg/sq. m)] [12 lb/sq. ft. (59 kg/sq. m)]** <Insert weight> maximum.
- H. Panel Thickness: Not less than **[3 inches (75 mm)] [3-1/2 inches (89 mm)] [4 inches (102 mm)]** <Insert dimension>.
- I. Panel Closure: **[Manufacturer's standard.]**
1. Initial Closure: **[Flexible, resilient PVC, bulb-shaped acoustical seal] [Fixed jamb] [As indicated]** <Insert description>.
 2. Final Closure: **[Constant-force, lever-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal] [Hinged jamb closure] [Hinged communicating panel] [Fixed jamb] [Angle jamb] [Flexible, resilient PVC, bulb-shaped acoustical seal]** <Insert description>.

- J. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
1. Hinges: **[Manufacturer's standard] [Concealed (invisible)] <Insert type>**.
 2. Exit Device: **[Manufacturer's standard] <Insert type>**.
 3. **<Insert hardware requirement>**.

2.3 OPERABLE FIRE-RATED PANELS

- A. Operable Fire-Rated Panels: Operable fire-rated acoustical panel partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
1. Manufacturers: Subject to compliance with requirements, **[provide products by one of the following] [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following]:**
 2. Basis-of-Design Product: Subject to compliance with requirements, provide **[product indicated on Drawings] <Insert manufacturer's name; product name or designation>** or comparable product by one of the following:
 - a. Advanced Equipment Corporation.
 - b. Hufcor.
 - c. Modernfold, Inc.; a DORMA Group Company.
 - d. Panelfold Inc.
 - e. **<Insert manufacturer's name>**.
- B. Panel Operation: **[Manually operated, individual] [Manually operated, paired]** panels.
- C. Panel Construction: Provide top reinforcement as required to support panel from suspension components and provide reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
- D. Dimensions: Fabricate operable fire-rated panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
1. Panel Width: **[Standard widths] [Equal widths] [As indicated]**.
- E. Fire Rating: **[1 hour] [2 hours]**.
- F. STC: Not less than **[38] [41] [45] [47] [50] [52] [54] <Insert STC rating>**.
- G. NRC: Not less than **[0.50] [0.60] [0.65] [0.90] <Insert NRC rating>**.
- H. Panel Weight: **[8 lb/sq. ft. (40 kg/sq. m)] [10 lb/sq. ft. (50 kg/sq. m)] [12 lb/sq. ft. (59 kg/sq. m)] <Insert weight>** maximum.
- I. Panel Thickness: Not less than **[3 inches (75 mm)] [3-1/2 inches (89 mm)] [4 inches (102 mm)] <Insert dimension>**.
- J. Panel Closure: **[Manufacturer's standard fire-rated closure.]**

1. Initial Closure: [**Flexible, resilient PVC, bulb-shaped acoustical seal**] [**Fixed jamb**] [**As indicated**] <Insert description>.
2. Final Closure: Fire-rated, [**constant-force, lever-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal**] [**hinged jamb closure**] [**hinged communicating panel**] [**fixed jamb**] [**angle jamb**] [**flexible, resilient PVC, bulb-shaped acoustical seal**] <Insert description>.

K. Hardware: Manufacturer's standard as required to operate fire-rated operable panel partition and accessories; with decorative, protective finish.

1. Hinges: [**Manufacturer's standard**] [**Concealed (invisible)**] <Insert type>.
2. Exit Device: [**Manufacturer's standard**] <Insert type>.
3. <Insert hardware requirement>.

2.4 OPERABLE GLASS PANELS

A. Operable Glass Panels: Operable [**frameless aluminum**] [**aluminum-framed**] [**wood-framed**] glass panel partition system [**with acoustical properties**], including panels, [**seals**], suspension system, operators, and accessories.

1. Manufacturers: Subject to compliance with requirements, [**provide products by one of the following**] [**available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following**]:
2. Basis-of-Design Product: Subject to compliance with requirements, provide [**product indicated on Drawings**] <Insert manufacturer's name; product name or designation> or comparable product by one of the following:
 - a. Hufcor.
 - b. KWIK-WALL Company.
 - c. Modernfold, Inc.; a DORMA Group Company.
 - d. Nana Wall Systems, Inc.
 - e. <Insert manufacturer's name>.

B. Panel Operation: [**Manually operated, individual**] [**Manually operated, paired**] [**Manually operated, continuously hinged**] panels.

C. Panel Construction: Manufacturer's standard glazed panels, reinforced as required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.

1. Factory-Glazed Fabrication: Glaze operable glass panels in the factory where practical and possible for applications indicated. Comply with manufacturer's written requirements and with requirements in Division 08 Section "Glazing."

D. Glass and Glazing: [**See Division 08 Section "Glazing."**]

1. Safety Glass: Provide glass products complying with testing requirements in 16 CFR 1201, for Category II materials, unless those of Category I are expressly indicated and permitted.

2. Glass: **[Manufacturer's standard]** **[Custom]** glass and glass assemblies as indicated and complying with **[the following]** **[requirements in Division 08 Section "Glazing," and as follows]**:
- a. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Type I (transparent flat glass), **[Class 1 (clear)]** **[Class 2 (tinted)]**, Quality-Q3.
 - b. Tempered Patterned Glass: ASTM C 1048, Kind FT (fully tempered), Type II (patterned flat glass), Class 1 (clear), Form 3 (patterned); and of quality, finish, and pattern specified.
 - c. Laminated Glass: ASTM C 1172, with **[clear]** **[colored]** **[patterned]** **[graphic]** **<Insert requirement>** interlayer.
 - 1) Annealed Float Glass: ASTM C 1036, Type I (transparent flat glass), **[Class 1 (clear)]** **[Class 2 (tinted)]**, Quality-Q3.
 - 2) Patterned Glass: ASTM C 1036, Type II (patterned and wired flat glass), Class 1 (clear), Form 3 (patterned); and of quality, finish, and pattern specified.
 - d. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass as indicated, separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units.
 - 1) Spacer Specifications: Manufacturer's standard spacer material and construction.
 - 2) Spacer Specifications: Manufacturer's standard spacer construction and material as follows: **[Aluminum with mill or clear anodic finish]** **[Aluminum with black, color anodic finish]** **[Aluminum with bronze, color anodic finish]** **[Aluminum with powdered-metal paint finish in color selected by Architect]** **[Galvanized steel]** **[Stainless steel]** **<Insert material>**.
 - e. Glass Thickness: **[Manufacturer's standard thickness for indicated requirements]** **[As indicated]** **[1/4 inch (6 mm)]** **[3/8 inch (10 mm)]** **[1 inch (25 mm)]** **[2-1/4 inches (57 mm)]** **<Insert thickness>**.
 - f. Glass Vertical Edge: **[Polished]** **[Manufacturer's standard, permanently adhered edge trim]** **<Insert description>**.
3. Glazing System: **[Manufacturer's standard factory-glazing system]** **[Manufacturer's standard factory-glazing system that produces acoustical seal]** **[Manufacturer's standard factory-glazing system as indicated]** **<Insert glazing requirements>**.
- E. Dimensions: Fabricate operable glass panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
1. Panel Width: **[Standard widths]** **[Equal widths]** **[As indicated]**.
- F. STC: Not less than **[36]** **[41]** **[46]** **[48]** **<Insert STC rating>**.
- G. Panel Weight: **[8 lb/sq. ft. (40 kg/sq. m)]** **[20 lb/sq. ft. (98 kg/sq. m)]** **<Insert weight>** maximum.
- H. Panel Frame Thickness: Maximum **[1-7/8 inches (48 mm)]** **[2-1/4 inches (57 mm)]** **[3-3/4 inches (96 mm)]** **<Insert dimension>**.

- I. Panel Closure: **[Manufacturer's standard]** <Insert description>.
- J. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.
- K. Finishes:
 - 1. Exposed Metal: **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]** as follows:
 - a. Aluminum: **[Clear anodized]** **[Light bronze anodized]** **[Medium bronze anodized]** **[Dark bronze anodized]** **[Black anodized]** **[Baked powder coating]** <Insert finish>.
 - b. Metal-Clad Aluminum: **[Satin stainless steel]** **[Polished stainless steel]** **[Satin brass]** **[Polished brass]** **[Satin bronze]** **[Polished bronze]** <Insert finish>.
 - 2. Wood Finish: **[Match Architect's sample]** **[As selected by Architect from manufacturer's full range]**, as follows:
 - a. Type: **[Transparent finish]** **[Transparent finish over stain]** <Insert finish> over wood variety indicated.
 - 3. Wood Finish: **[As specified in Division 09 Section "Staining and Transparent Finishing."]** <Insert description.>

2.5 SEALS

- A. General: Provide types of seals indicated that produce operable panel partitions complying with **[acoustical]** **[and fire-resistive]** performance requirements and the following:
 - 1. Manufacturer's standard seals.
 - 2. Seals made from materials and in profiles that minimize sound leakage.
 - 3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.
- B. Vertical Seals: Deep-nesting, interlocking **[steel]** astragals mounted on each edge of panel, with continuous PVC acoustical seal.
- C. Horizontal Top Seals:
 - 1. Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track.
 - 2. PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on track when extended.
 - 3. Continuous-contact, extruded-PVC seal exerting uniform constant pressure on track or PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on track when extended.
- D. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

1. Mechanically Operated for Acoustical Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than [**1-1/2 inches (38 mm)**] [**2 inches (50 mm)**] [**4 inches (102 mm)**] [**6 inches (152 mm)**] between retracted seal and floor finish.
2. Mechanically Operated for Fire-Rated Panels: Extension and retraction of bottom seal by operating handle or built-in operating mechanism, with operating range not less than [**1-1/2 inches (38 mm)**] [**2 inches (50 mm)**] [**4 inches (102 mm)**] between retracted seal and floor finish.
3. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, with operating range not less than [**1 inch (25 mm)**] [**1-1/2 inches (38 mm)**] [**2 inches (50 mm)**] between retracted seal and floor finish.

2.6 FINISH FACING

- A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.
 1. Apply [**one-piece, seamless**] facings free of air bubbles, wrinkles, blisters, and other defects, [**with edges tightly butted, and**] [**with invisible seams complying with Shop Drawings for location, and**] with no gaps or overlaps. Horizontal [**butted edges**] [**seams**] are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
 2. Where facings with [**directional or repeating patterns or directional weave**] [**directional, repeating, or matching grain**] are indicated, mark facing top and attach facing in same direction.
 3. Match facing pattern **72 inches (1830 mm)** above finished floor.
 4. Color/Pattern: [**Match Architect's samples**] [**As selected by Architect from manufacturer's full range**] <Insert manufacturer's name and designation for color and pattern>.
- B. Vinyl-Coated Fabric Wall Covering: Manufacturer's standard, mildew-resistant, washable, vinyl-coated fabric wall covering; complying with CFFA-W-101-D for type indicated; Class A.
 1. Total Weight: <Insert weight>.
 2. Antimicrobial Treatment: Additives capable of inhibiting growth of bacteria, fungi, and yeasts.
- C. Carpet Wall Covering: Manufacturer's standard [**nonwoven, needle-punched carpet with fibers fused to backing**], from same dye lot, treated to resist stains.
- D. Fabric Wall Covering: [**Manufacturer's standard fabric**] [**100 percent polyolefin woven fabric**] <Insert fabric description>, from same dye lot, treated to resist stains.
- E. High-Pressure Decorative Laminate: NEMA LD 3, Horizontal grade.
- F. Wood Veneer: Laminated to [**noncombustible**] [**fire-retardant-treated wood**] core with moisture-resistant adhesive, of wood species indicated.
 1. Wood Finish: [**Match Architect's sample**] [**As selected by Architect from manufacturer's full range**], as follows:

- a. Type: **[Transparent finish] [Transparent finish over stain] <Insert finish>** over wood variety indicated.
 2. Wood Finish: **[As specified in Division 09 Section "Staining and Transparent Finishing."]** <Insert description.>
- G. Paint: Manufacturer's standard factory-painted finish.
1. Color: **[As indicated] [As selected by Architect] <Insert requirement>**.
- H. Facing Materials: Owner furnished[.][**as follows:**]
- I. Cap-Trimmed Edges: Protective perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing, finished as follows:
1. Steel, Painted: Finished with manufacturer's standard **[neutral color] [Matching Architect's sample] [As selected by Architect from manufacturer's full range]**.
 2. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper required to comply with performance requirements; and with manufacturer's standard **[mill] [clear anodic] [color anodic]** finish.
- J. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.7 SUSPENSION SYSTEMS

- A. Suspension Tracks: Steel or aluminum **[mounted directly to overhead structural support,] [with adjustable steel hanger rods for overhead support,]** designed for type of operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than **0.10 inch (2.54 mm)** between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.
1. Panel Guide: Aluminum; finished with factory-applied, decorative, protective finish.
 2. Head Closure Trim: As required for acoustical performance; **[with factory-applied, decorative, protective finish] [primed for field finish]**.
- B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.
1. Multidirectional Carriers: Capable of negotiating 90-degree L, T, and X intersections without track switches.
- C. Track Intersections, Switches, and Accessories: As required for type of operation, storage, track configuration, and layout indicated for operable panel partitions, and compatible with partition assembly specified. Fabricate track intersections and switches from steel or aluminum.
1. Curve-and-Diverter Switches: Allowing radius turns to divert panels to an auxiliary track.
 2. L Intersections: Allowing panels to change 90 degrees in direction of travel.

3. T Intersections: Allowing panels to pass through or change 90 degrees to another direction of travel.
 4. X Intersections: Allowing panels to pass through or change travel direction full circle in 90-degree increments, and allowing 1 partition to cross track of another.
 5. Multidirectional Switches: Adjustable switch configuring track into L, T, or X intersections and allowing panels to be moved in all pass-through, 90-degree change, and cross-over travel direction combinations.
 6. Center carrier stop.
- D. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.
- E. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.8 ELECTRIC OPERATORS

- A. General: Provide factory-assembled electric operation system of size and capacity recommended and provided by operable panel partition manufacturer for partition specified; with electric motor and factory-prewired motor controls, speed reducer, chain drive, remote-control stations, control devices, and accessories required for proper operation. Include wiring from motor control to motor. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
- B. Comply with NFPA 70.
- C. Control Equipment: Complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6.
- D. Motor Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, within installed environment, with indicated operating sequence, and without exceeding nameplate rating or considering service factor. Comply with NEMA MG 1[**and the following:**][.]
1. Voltage: [120 V] [208-220 V] [NEMA standard voltage selected to operate on nominal circuit voltage to which motor is connected] <Insert voltage>.
 2. Horsepower: [1/4] [1/3] [3/4] [Manufacturer's standard] <Insert number>.
 3. Efficiency: [Standard] [Premium].
 4. Enclosure: [Open dripproof] [Totally enclosed] [Manufacturer's standard].
 5. Duty: Continuous duty at ambient temperature of 105 deg F (40 deg C) and at altitude of 3300 feet (1005 m) above sea level.
 6. Service Factor: 1.15 for open dripproof motors; 1.0 for totally enclosed motors.
 7. Phase: [Single] [Polyphase].
- E. Remote-Control Stations: Two single-key-operated, constant-pressure control stations located remotely from each other on opposite sides and opposite ends of partition run. Wire in series to require simultaneous activation of both key stations to operate partition. Each three-position control station labeled "Open," "Close," and "[Off] [Stop]." Provide two keys per station.
- F. Obstruction-Detection Devices: Provide each motorized operable panel partition with automatic safety sensor indicated, that causes operator to immediately [shut off motor] [stop and reverse direction].
1. Sensor Edge: Contact-pressure-sensitive safety edge along partition's leading edge.

2. Sensor Mat: Electrically operated, contact-weight-sensitive safety mat in storage pocket area.
 3. Infrared Sensor System: Designed to detect an obstruction in partition's path and sound an audible alarm, without obstruction contacting partition.
- G. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop operable panel partition at fully extended and fully stacked positions.
- H. Emergency Release Mechanism: Quick disconnect-release of electric-motor drive system, permitting manual operation in event of operating failure.

2.9 ACCESSORIES

- A. Pass Doors: Fabricated to comply with recommendations in **[ICC/ANSI A117.1] [the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines]** <Insert requirements of authorities having jurisdiction>. Swinging door built into and matching panel **[materials,] [construction,] [acoustical qualities,] [fire rating]** finish, and thickness, complete with frames and operating hardware. Hinges finished to match other exposed hardware.
1. Single Pass Door: **[36 by 80 inches (914 by 2032 mm)] [36 by 84 inches (914 by 2134 mm)]**, with the following:
 2. Double Pass Door: **[72 by 80 inches (1829 by 2032 mm)] [72 by 84 inches (1829 by 2134 mm)]**, with the following:
 - a. Door Seals: **[Mechanically operated floor seal on panels containing pass doors] [Sweep floor seals]**.
 - b. **[Panic] [Fire]** exit device.
 - c. Concealed door closer.
 - d. Door Viewer: Installed with view in direction of swing.
 - e. Exit Sign: Recessed, self-illuminated.
 - f. Latchset: Passage set.
 - g. Lock: Key-operated lock cylinder**[, keyed to master key system,]** operable from both sides of door. Include two keys per lock.
 - h. Lock: Deadlock to receive cylinder, operable from both sides of door. Refer to Division 08 door hardware Sections for lock cylinder and keying requirements.
- B. Storage Pocket Door: Full height at end of partition runs to conceal stacked partition; of same materials, finish, construction, thickness, and acoustical qualities as panels; complete with operating hardware**[and acoustical seals at soffit, floor, and jambs]**. Hinges in finish to match other exposed hardware.
1. Manufacturer's standard method to secure storage pocket door in closed position.
 2. Rim Lock: Key-operated lock cylinder**[, keyed to master key system,]** to secure storage pocket door in closed position. Include two keys per lock.
 3. Rim Lock: Deadlock to receive cylinder, to secure storage pocket door in closed position. Refer to Division 08 door hardware Sections for lock cylinder and keying requirements.
- C. Electric Interlock: Provide each motorized operable panel partition with electric interlocks at locations indicated, to prevent operation of operable panel partition under the following conditions:
1. On storage pocket door, to prevent operation if door is not in fully open position.

2. On partitions at location of convergence by another partition, to prevent operation if merging partitions are in place.
- D. Windows: **[Manufacturer's standard] [As indicated]**.
- E. Work Surfaces: Quantities, placement, and size indicated.
1. Surface: **[Porcelain steel marker/projection surface] [Self-healing, tackable, vinyl-coated fabric wall covering, complying with CFFA-W-101-D, Type II, and indicated fire-test-response characteristics; laminated to natural cork tackboard] <Insert description>**.
 2. Surface Color: **[Matching Architect's sample] [As selected by Architect from manufacturer's full range] <Insert manufacturer's designation for color>**.
 3. Size: **[Full width and height of panel] [Full width of panel by 48 inches (1219 mm)] [48 by 48 inches (1219 by 1219 mm)] [As indicated on Drawings] <Insert dimensions>**.
 4. Trim: **[Aluminum slip-on or snap-on trim with no visible screws or exposed joints and with corners mitered to a neat, hairline joint] <Insert description>**.
- F. Chalk Tray[**and Eraser Pocket**]: Manufacturer's standard.
1. Aluminum with **[mill] [clear anodic] [color anodic]** finish.
- G. Chair Rails: **<Insert material, finish, dimensions, and other characteristics not indicated on Drawings.> [Recessed] [Surface mounted]** in locations indicated on Drawings.
- H. Vertical Edge Trim: Manufacturer's standard **[transparent] [thin aluminum astragal]** trim to protect vertical edges of glass in frameless panels.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.
- B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed.
- C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

- E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

3.3 ADJUSTING

- A. Adjust operable panel partitions to operate smoothly, without warping or binding. Lubricate hardware[, **electric operator**,] and other moving parts.
- B. Adjust [**pass doors**] [**and**] [**storage pocket doors**] to operate smoothly and easily, without binding or warping. Check and readjust operating hardware. Confirm that latches and locks engage accurately and securely without forcing or binding.

3.4 FIELD QUALITY CONTROL

- A. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids; adjust partitions for acceptable fit.
- B. NIC Testing: [**Owner will engage**] [**Engage**] a qualified testing agency to perform tests and inspections.
- C. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E 336, determined by ASTM E 413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.
- D. Testing Extent: Testing agency shall randomly select [**one**] <**Insert number**> operable panel partition installation(s) for testing.
- E. Repair or replace operable panel partitions that do not comply with requirements.
- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of repaired, replaced, or additional work with specified requirements.
- G. Prepare test and inspection reports.

3.5 CLEANING

- A. Clean soiled surfaces of operable panel partitions to remove dust, loose fibers, fingerprints, adhesives, and other foreign materials according to manufacturer's written instructions.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 102240

SECTION 10 28 00 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Each type of toilet accessory is shown on the drawings and/ or in the specification.

1.3 QUALITY ASSURANCE:

- A. Inserts and Anchorages:

1. Furnish inserts and anchoring devices which must be set in concrete or built into masonry for the installation of toilet accessories. Coordinate delivery with other work to avoid delay.
2. See concrete and masonry sections of these specifications for installation of inserts and anchorage devices.

- B. Products:

1. The Basis of Design is Bobrick Washroom Equipment, Inc.
2. Provide products of the same manufacturer for each type of accessory unit and for units exposed in the same areas.
3. Stamped names or labels on exposed faces of units will not be permitted.
4. Provide locks for all dispensing units, with the same keying for each type of accessory units in the project wherever possible. Furnish two keys for each lock.

1.4 SUBMITTALS:

- A. Manufacturer's Data: For information only, submit copies of manufacturer's technical data and installation instructions for each toilet accessory.
- B. Samples: When requested, submit full-size samples of units for review of design and operation. Acceptable samples will be returned and may be used in the work. Compliance with all other requirements is the exclusive responsibility of the Contractor.
- C. Setting Drawings: Provide setting drawings, templates, instructions and directions for installation of anchorage devices in other work.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Stainless Steel: AISI, Type 302/304, with polished No. 4 finish, unless otherwise indicated.
- B. Brass: Cast or forged quality alloy, FS WW-P-541.
- C. Sheet Steel: Cold rolled, commercial quality, ASTM A 366. Surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 527, G60.
- E. Chromium Plating: Nickel and chromium electro-deposited on metal, ASTM B 456, Type SC 2.
- F. Baked Enamel Finish: Factory-applied, gloss white, baked acrylic enamel coating.
- G. Mirror Glass: ASTM C1036, Class 1, Quality q1, 1/4" thick, with silver coating, copper protective coating, and non-metallic paint coating.
- H. Galvanized Steel Mounting Devices: ASTM A 386, hot-dip galvanized after fabrication.

2.2 ACCESSORY SCHEDULE:

- A. Include the following accessories:
 - 1. Surface mounted ADA Toilet Tissue Holder B-4388; each toilet stall
 - 2. Surface mounted ADA Soap Dispenser B-4112; each single occupant toilet room, or each lavatory sink as indicated on drawings
 - 3. Surface mounted ADA Paper Towel holder/ trash receptacle B-3979; or Semi-Recessed Paper towel holder/waste receptacle B-3974 each toilet room as indicated on drawings
 - 4. Surface mounted ADA Paper Towel Dispenser B-262; break room
 - 5. Metal Framed Mirrors B-165 or B-294
 - 6. ADA Grab Bars; lengths as indicated on the drawings, B-6806
 - 7. Robe Hooks, B-672; as indicated on the drawings
 - 8. Surface Mounted Sanitary Napkin Dispenser, B-47069C
 - 9. Sanitary Napkin Disposal, B-4354, as indicated on drawings
 - 10. Surface Mount Baby Changing Station – Koala Bear Care

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Examine the areas and conditions under which toilet accessories are to be installed and do not proceed with the work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION:

- A. Use concealed fastenings.
- B. Provide anchors, bolts and other necessary anchorages, and attach accessories securely to walls and partitions in locations as shown.

1. Install grab bars so as to sustain a dead weight of 250 pounds for five minutes.
- C. Install concealed mounting devices and fasteners fabricated of the same material as the accessories, or of galvanized steel, as recommended by manufacturer.
- D. Install exposed mounting devices and fasteners finished to match the accessories.
- E. In public spaces, provide theft-resistant fasteners for all accessory mountings.
- F. Secure toilet room accessories in accordance with the manufacturer's instructions for each item and each type of substrate construction.

END OF SECTION 10 28 00

SECTION 10 44 16 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Requirements:
 - 1. Section 104413 "Fire Extinguisher Cabinets."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10.
 - b. Faulty operation of valves or release levers.
2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS:

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fire End & Croker Corporation.
 - b. Guardian Fire Equipment, Inc.
 - c. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
 - d. Nystrom Building Products.
 - e. Pem All Fire Extinguisher Corp.
 - f. Potter Roemer LLC.
 - g. Pyro-Chem; Tyco Safety Products.
 - h. Or approved equal.
 2. Valves: Manufacturer's standard.
 3. Handles and Levers: Manufacturer's standard.
 4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.
- B. Pressurized, AFFF-Foam Type: UL-rated 3-A:20-B, 2.5-gal. (9.5-L) nominal capacity, with AFFF foam in stainless-steel container; with pressure-indicating gage.
- C. Regular Dry-Chemical Type in Steel Container: UL-rated 10-B:C, 5-lb (2.3-kg) nominal capacity, with sodium bicarbonate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS:

- A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Guardian Fire Equipment, Inc.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Nystrom Building Products.
 - d. Or approved equal.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
 - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
 - a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fire extinguishers for proper charging and tagging.
 - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
 - 1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher, or at height determined by AHJ (Authority Having Jurisdiction)
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

| Section 12 48 13 - Entrance Floor Mats and Frames

Part 1 - General

1.1 Summary

- A. This section includes the following types of entrance flooring systems:
 - 1. Floor Mats & Frame Assemblies
- B. Related Sections: The following sections contain requirements related to this section:
 - 1. Grouting frames into recess; refer to sections 03300 "Cast-In-Place Concrete"

1.2 References

- A. American Society for Testing and Materials (ASTM)
- B. The Aluminum Association
- C. The Carpet and Rug Institute (CRI)
- D. The National Floor Safety Institute (NFSI)
- E. International Organization for Standardization (ISO)

1.3 Submittals

- A. General: Submit the following in accordance with conditions of contract and Division 1 specification section 01300.
- B. Product data for each type of floor mat and frame specified, including manufacturer's specifications and installation instructions.
- C. Shop drawings in sufficient detail showing layout of mat and frame specified including details indicating construction relative to materials, direction of traffic, spline locations, profiles, anchors and accessories.
- D. Samples for verification purposes: Submit a sample of the floor mat and frame members with showing color of exposed floor mat, frame and accessories required.
- E. Maintenance data in the form of manufacturer's printed instructions for cleaning and maintaining floor mats.

1.4 Quality Assurance

- A. Flammability in accordance with ASTM D2859, Un-Charred area greater than 3".
- B. Slip resistance in accordance with ASTM D-2047-96, Coefficient of Friction, minimum 0.60 for accessible routes.
- C. Standard rolling load performance is 400lb/wheel with larger loading requirements as specified. (Load applied on a single wheel.)
- D. Single Source Responsibility: Obtain floor mats and frames from one source of a single manufacturer.
- E. Utilize 100% polypropylene fibers
- F. Utilize a manufacturer that is ISO 9001 & 14001 certified.

1.5 Delivery, Storage and Handling

- A. Deliver materials to the project site ready for use and fabricated in as large sections and assemblies as practical, in unopened original factory packaging clearly labeled to identify manufacturer.

1.6 Project Conditions

- A. Field measurements: Check actual openings for mats by accurate field measurements before fabrication. Record actual measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay of work.
- B. For recess application coordinate frame installation with concrete construction to ensure recess and frame anchorage are accurate and that the base is level and flat. Defer frame installation until building enclosure is complete and related interior finish work is in progress.

Part 2 - Products

2.1 Manufacturers

- A. Drawings and specifications are based on manufacturer's literature from. Provide Dual Track foot grille by Matter Surfaces, 179 Campanelli Parkway, Stoughton, MA, 02072; telephone 800-628-7462 or 781-344-1536; fax 781-344-1537; www.mattersurfaces.com unless otherwise indicated. Other manufacturers must comply with the minimum levels of material and detailing indicated on the drawings and specified herein.

2.2 Materials

- A. Product: Dual Track.
1. **Construction:** Bolt-thru design with individual aluminum spacers. Swedge, welded and key lock fastening of rails is not allowed.
 2. **Material:** Aluminum Alloy type 6061-T6. Soft Aluminum alloy (such as 6063-T52) is not allowed
 3. **Drying Insert:** Drying inserts to be Nylon material with 5% post-consumer recycled content.
 4. **Recycled Content:** Aluminum to be 43.97% pre-consumer and 14.12% postconsumer recycled content
 5. **Blades:** T-Shaped blades, 1-5/16 x 1/8 x 1-1/2 inch size, combined with T shaped blades 11/16 x 1/8" with anti-slip polymer C9065 insert. Spacing between blades not to exceed 3/16 inch.
 6. **Dimension:** Grille depth to be 1-1/2", with frame 1-5/8"
 7. **Panels:** Foot Grille to be supplied in panels not to exceed 48" x 42". One Piece design not allowed. All grille panels to be supplied with individual, prefabricated, factory-assembled frames
 8. **Load Capacity:** 3,831 lbs per 2 foot span
 9. **LEED v3**
 - a. IEQ Credit 5: Dual Track is designed for permanent installation.
 - b. MR Credit 4: 43.97% pre-consumer and 14.12% post-consumer
 - c. MR Credit 5: Material must be manufactured within 500 miles of project location.
 10. **LEED v4**
 - a. MR Sources of Raw Materials Credit: 43.97% pre-consumer and 14.12% post-consumer
 - b. MR Regional Material Credit: Material must be manufactured within 100 miles of project location.
 - c. IEQ Enhanced Indoor Air Quality Strategies Credit: Dual Track is a LEED acceptable permanent entryway system.
- B. Framing Accessories for Recessed Aluminum Foot Grille: Framing will have the following characteristics:
1. **Recessed Frame Integral with Concrete Substrate:** The perimeter frames shall be an inverted "T" shape such as model "VV" by Mats Inc, in order to anchor the structure into the concrete. All aluminum frames shall be pre-assembled at factory incorporating welded construction for all joints. Each grille section shall incorporate an invisible section divider integrated and welded within the frame. Frames and grilles shall be shipped fully assembled in protective wooden crating to each jobsite. For sections larger than 6'-0 by 8'-0 a mechanical joint is to be provided, (if specified).
 2. **Recessed Frame Over Finished Surfaces:** The perimeter frames shall be "Z" shape such as model "TT" by Matter Surfaces For installation over finished floor surfaces. All aluminum frames shall be pre-assembled at factory incorporating welded construction for all joints. Each grille section shall incorporate an invisible section divider integrated and welded within the frame. Frames and grilles shall be shipped fully assembled in protective wooden crating to each jobsite. For sections larger than 6'-0 by 8'-0 a mechanical joint is to be provided (if specified). A silicone joint is to be applied between the frame and the finished floor to prevent any water infiltration (by others).
 3. **Recessed Frame for either concrete substrate or finished surface:** The perimeter frames shall be an angle AD frame, either "Level" or "Embedded" depending on the installation. For installation with either new construction or retrofits. All aluminum frames shall be pre-assembled at factory incorporating welded construction for all joints. Each grille section shall incorporate an invisible section divider integrated and welded within the frame. Frames and grilles shall be shipped fully assembled in protective wooden crating to each jobsite. For sections larger than 6'-0 by 8'-0 a mechanical joint is to be provided, (if specified).

C. Optional Accessories for Recessed Aluminum Foot Grille

1. **Recessed Pan:** 20 gauge Aluminum (optional)
2. **Accessories:** Galvanized Steel key-lock downs (GB-46) attached to each grid section, Galvanized Steel keyless-lock downs attached to each grid section

Part 3 – Execution

3.1 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.

3.2 Preparation

- A. Manufacturer shall offer assistance and guidance to provide a template of irregular shaped mat assemblies to ensure a proper installation.
- B. Floor preparation, temperature and proper glue methods as listed in installation instructions by Construction Specialties.

3.3 Installation

- A. Install the work of this section in strict accordance with the manufacturer's recommendations.
- B. Set mat at height recommended by manufacturer for most effective cleaning action.
- C. Coordinate top of mat surfaces with bottom of doors that swing across to provide ample clearance between door and mat

3.4 Cleaning

- B. It is important to the life cycle of the entrance mat that a maintenance schedule be developed which includes regular vacuuming and extraction that correctly matches the amount of traffic the mat incurs.

3.5 Protection

- A. After completing required frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses, and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and project is near time of substantial completion.
- B. Defer installation of floor mats until time of substantial completion of project.

END OF SECTION 12 48 13

Division	Section Title	Pages
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SPECIFICATIONS GROUP

General Requirements Subgroup

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