

## SECTION 01 73 00 - 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. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. General installation of products.
  - 4. Coordination of Owner-installed products.
  - 5. Progress cleaning.
  - 6. Starting and adjusting.
  - 7. Protection of installed construction.
  - 8. Correction of the Work.
- B. Related Sections include the following:
  - 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
  - 2. Division 01 Section "Submittal Procedures" for submitting surveys.
  - 3. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
  - 4. Division 01 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.

### PART 2 - PRODUCTS (Not Used)

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Acceptance of Conditions: Examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - a. Description of the Work.
  - b. List of detrimental conditions, including substrates.
  - c. List of unacceptable installation tolerances.
  - d. Recommended corrections.
2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
5. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. 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.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

### 3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
  1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points

- promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

### 3.5 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 8 feet (2.4 m) in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.

2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 OWNER-INSTALLED PRODUCTS

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

### 3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F (27 deg C).
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
  4. Dispose of waste in accordance with Division 01 Section "Construction Waste Management".
- 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: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### 3.8 STARTING AND ADJUSTING

- A. Permanent equipment used for temporary services:
1. Any permanent equipment used for temporary service must undergo (before being used) manufacturer's supervision and startup services as specified in the technical sections of the specifications.
  2. Upon completion of such use of permanent equipment, equipment must again undergo manufacturer's supervision and startup services no earlier than one month prior to Substantial Completion.
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- 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: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."

### 3.9 PROTECTION OF INSTALLED CONSTRUCTION

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

### 3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

## SECTION 01 73 29 - CUTTING AND PATCHING

### 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. This Section includes procedural requirements for cutting and patching.
- B. Contractor shall have overall responsibility for all cutting, fitting and patching, including attendant excavation and backfill, required to complete the Work or to:
  - 1. Make its several parts fit together properly.
  - 2. Uncover portions of the Work to provide for installation of ill-timed work.
  - 3. Remove and replace defective work.
  - 4. Remove and replace work not conforming to requirements of Contract Documents.
  - 5. Remove samples of installed work as specified for testing.
  - 6. Provide routine penetrations of nonstructural surfaces for installation of piping and electrical conduit.
- C. Specific Requirements
  - 1. Each Subcontractor shall be responsible for all cutting in new and existing construction as required for his particular trade, including that required for installation of Mechanical, Plumbing, Electrical and Elevator work, etc., except for cutting in exterior walls and roofs which shall be performed by Contractor at locations established by the particular trades involved.
  - 2. Contractor shall be responsible for all patching and refinishing of walls, partitions, floors, roofs and finished surfaces, utilizing the appropriate Subcontractors.
  - 3. Each Subcontractor shall furnish information and/or Drawings to all trades involved to locate openings and chases required in walls, partitions, floors and roof. He shall also properly set sleeves required for his work. Where sleeves, openings and chases are not installed or are incorrectly sized or located as a result of any Subcontractor's failure to furnish information or do work in sufficient time so as not to delay construction, cutting required shall be performed by Contractor and charged to the Subcontractor involved.
  - 4. Provide required lintels and other structural members, flashings, and other work in a manner satisfactory to Architect. Do cutting only with the permission of Architect. Promptly repair any damage to the building piping, wiring or equipment as a result of such cutting and drilling by skilled mechanics of the trade involved and finish the repair to match adjacent surfaces, utilizing the appropriate finishing Subcontractor.
  - 5. When underground services are to be installed in areas where existing paving, curbing, grass, etc., has to be damaged and/or removed to permit installation of new underground

services, Contractor shall repair existing surface areas back to their original condition to match adjacent surfaces to the satisfaction of Architect. The cost for such repair shall be charged to the Subcontractor responsible for installing such underground services.

D. Specific Requirements

1. Each specification section includes cutting and patching for that trade section as required unless specifically noted otherwise. All cutting in new and existing construction required for the installation of the Heating, Ventilating and Air Conditioning, Plumbing, Drainage, Fire Protection, Electrical and Elevator Work shall be included in the work of the respective contracts, except for cutting in exterior walls and roofs at locations established by the particular trades involved which shall be the responsibility of Contractor for General Construction and included in the work of Contractor for General Construction.
2. Each Contractor shall furnish information and/or Drawings to all trades involved to locate all openings and chases required in walls, partitions, floors and roof. He shall also properly set all sleeves required for his work. Where sleeves and openings are not installed, or are incorrectly sized or located as a result of the particular Contractor's failure to furnish information or do work in sufficient time so as not to delay construction, the corrective work required shall be performed by Contractor for General Construction and charged to the respective Contractor involved.
3. Each respective Contractor doing the cutting shall provide all required lintels and other structural members, flashings and other work in a manner satisfactory to Architect. Do cutting only with the permission of Architect. Promptly repair any damage to the building piping, wiring or equipment as a result of such cutting and drilling by skilled mechanics of the trade involved and finish the repair to match adjacent surfaces at the expense of the Contractor doing the cutting and drilling.
4. Patching and refinishing shall be included under the work of the Contractor for General Construction, but the cost for patching and refinishing (except painting) shall be included under the respective Heating, Ventilating and Air Conditioning, Plumbing, Drainage, Fire Protection, Electrical and Elevator Contractor's work.
5. When underground services are to be installed in areas where existing paving, curbing, grass, etc., has to be damaged and/or removed to permit installation of new underground services, Contractor for General Construction shall repair existing surface areas back to their original condition to match existing surfaces to the satisfaction of Architect. The cost for such repair shall be charged to the Contractor responsible for installing such underground services.

E. All architectural components shall be in accordance with the seismic requirements of the governing codes; refer to Division 01 Section "Summary."

F. Related Sections include the following:

1. Division 01 Section "Selective Structure Demolition" for demolition of selected portions of the building.
2. Divisions 2 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
3. Division 07 Section "Penetration Firestopping" for patching 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 surfaces to original conditions after installation of other Work.

### 1.4 SUBMITTALS

- A. Cutting and Patching Proposal: Submit a proposal describing procedures at least 10 days before the time cutting and patching will be performed, requesting approval to proceed. Include the following information:
  - 1. Work of the Owner or any separate contractor.
  - 2. Structural value or integrity of any element of the Project.
  - 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
  - 4. Efficiency, operational life, maintenance or safety of operational elements.
  - 5. Visual qualities of sight-exposed elements.
  - 6. Extent: Describe cutting and patching, show how they will be performed, and indicate why they cannot be avoided.
  - 7. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
  - 8. Products: List products to be used and firms or entities that will perform the Work.
  - 9. Dates: Indicate when cutting and patching will be performed.
  - 10. Architect's Approval: Obtain approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.
- B. Request shall include:
  - 1. Identification of the Project.
  - 2. Description of affected work.
  - 3. The necessity for cutting, alteration or excavation.
  - 4. Effect on work of Owner or any separate contractor, or on structural or weatherproof integrity of Project.
  - 5. Description of proposed work:
    - a. Scope of cutting, patching, alteration, or excavation.
    - b. Trades who will execute the work.
    - c. Products proposed to be used.
    - d. Extent of refinishing to be done.
  - 6. Alternatives to cutting and patching.
  - 7. Cost proposal, when applicable.
  - 8. Written permission of any separate contractor whose work will be affected.

- C. Should conditions of Work or the schedule indicate a change of products from original installation, Contractor shall submit request for substitution as specified in Section 01 60 00 - "Product Requirements".

## 1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.
- B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that result in increased maintenance or decreased operational life or safety.
1. Primary operational systems and equipment.
  2. Air or smoke barriers.
  3. Fire-suppression systems.
  4. Mechanical systems piping and ducts.
  5. Control systems.
  6. Communication systems.
  7. Conveying systems.
  8. Electrical wiring systems.
  9. Operating systems of special construction in Division 13 Sections.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
1. Water, moisture, or vapor barriers.
  2. Membranes and flashings.
  3. Exterior curtain-wall construction.
  4. Equipment supports.
  5. Piping, ductwork, vessels, and equipment.
  6. Noise- and vibration-control elements and systems.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

## 1.6 WARRANTY

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of in-place materials.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

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

### 3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
  4. 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.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
  2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight aesthetically appropriate condition.
- D. Where sleeves have not been provided, holes in masonry walls and concrete slabs and walls shall be core drilled.
1. Masonry Walls and Structural Concrete Slabs and Walls: No coring of concrete slabs and walls allowed without approval from Architect. Submit proposed core size and location for Architect's review.
  2. Concrete Slab on Metal Deck
    - a. Cores 8 inches or Smaller: Locate to clear all other structural members. Space between cores shall be a minimum of the largest adjacent core size.
    - b. Cores Greater Than 8 Inches and Less Than 12 Inches: Submit size and location to Architect for review before coring.
    - c. Cores 12 Inches and Greater: Frame out by structural frames as defined in Division 5 Section "Steel Decking" and typical structural details. Coordinate size and location with Contractor for Division 5 Section "Steel Decking".
    - d. Closely Spaced Groups of Cores Creating an Opening Area 12 Inches and Larger: Frame out by structural frames as defined in Division 5 Section "Steel Decking" and typical structural details. Coordinate size and locations with Contractor for Division 5 Section "Steel Decking".
- E. The cutting and patching of all floors and rated partitions, ceilings, etc., shall be accomplished to provide a rating equivalent to the existing. Division 7 Section "Firestopping".
- F. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- G. Employ original Installer or Fabricator to perform cutting and patching for:
1. Weather-exposed or moisture-resistant elements.
  2. Sight-exposed finished surfaces.
- H. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- I. Restore work which has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.
- J. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- K. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
1. For continuous surfaces, refinish to nearest intersection.
  2. For an assembly, refinish entire unit.
- L. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

## 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. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
- B. Closeout Procedures
  - 1. Substantial Completion.
  - 2. Final Completion.
  - 3. Reinspection Fees.
  - 4. Closeout Submittals.
  - 5. Adjustment of Accounts.
  - 6. Application for Final Payment.
- C. Cleaning
  - 1. Execute cleaning, during progress of the Work, and at completion of the Work, as required by General Conditions.
  - 2. Contractor and each Subcontractor shall clean all fixtures and equipment installed under his contract.
  - 3. Replace any surface or material damaged due to cleaning methods.
- D. Warranties and Bonds
  - 1. Compile specified warranties and bonds.
  - 2. Compile specified service and maintenance contracts.
  - 3. Coexecute submittals when so specified.
  - 4. Review submittals to verify compliance with Contract Documents.
  - 5. Compile specified product and Contractor's certifications and certificates.
  - 6. Submit to Architect for review and transmittal to Owner.
- E. Closeout Submittals
  - 1. Evidence of Compliance with Requirements of Governing Authorities:
    - a. Certificate of Occupancy.

b. Certificates of Inspection

- 1) Elevators
  - 2) Mechanical
  - 3) Electrical
  - 4) Fire Protection
2. Project Record Documents: In accordance with Paragraph herein.
  3. Operation and Maintenance Data, Instructions to Owner's Personnel: In accordance with Paragraph herein.
  4. Warranties and Bonds: In accordance with Paragraph herein.
  5. Keys and Keying Schedule: In accordance with Section 08700.
  6. Evidence of Payment and Release of Liens: In accordance with General and Supplementary Conditions.
  7. Consent of Surety to Final Payment.
  8. Certificates of Insurance for Products and Completed Operations: In accordance with Supplementary Conditions.
  9. Certifications for proper installation/operation.

F. Adjustment of Accounts

1. Submit a final statement of accounting, reflecting adjustments to Contract Sum:
  - a. Original Contract Sum.
  - b. Additions and deductions resulting from:
    - 1) Previous Change Orders.
    - 2) Allowances.
    - 3) Unit Prices.
    - 4) Deductions for uncorrected Work.
    - 5) Deductions for reinspection payments.
    - 6) Other adjustments.
  - c. Total Contract Sum, as adjusted.
  - d. Previous payments.
  - e. Sum remaining due.
2. Architect will issue a final Change Order, reflecting approved adjustments to the Contract Sum not previously made by Change Orders.

G. Application for Final Payment: Submit Application for Final Payment in accordance with procedures and requirements in Conditions of the Contract.

H. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 01 Section "Photographic Documentation" for submitting Final Completion construction photographs and negatives.

3. Division 01 Section "Execution" for progress cleaning of Project site.
4. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
5. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
6. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
7. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

### 1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
  1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  2. Advise Owner of pending insurance changeover requirements.
  3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  5. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, and similar final record information.
  6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
  7. Complete startup testing of systems.
  8. Submit test/adjust/balance records.
  9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  10. Advise Owner of changeover in heat and other utilities.
  11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
  12. Complete final cleaning requirements, including touchup painting.
  13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
  1. Should Architect determine that Work is not substantially complete, he will promptly notify Contractor in writing, giving the reasons therefor.
  2. Contractor shall remedy deficiencies, and send a second written notice of substantial completion, and Architect will reinspect the Work.



3. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
4. Results of completed inspection will form the basis of requirements for Final Completion.
5. Reinspection Fees: Should Architect perform reinspections due to failure of Work to comply with claims made by the Contractor, Owner will compensate Architect for such additional services, and deduct the amount of such compensation from final payment of the Contractor.

#### 1.4 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
5. When Contractor considers Work is complete, he shall submit written certification that:
  - a. Contract Documents have been reviewed.
  - b. Work has been inspected for compliance with Contract Documents.
  - c. Work has been completed in accordance with Contract Documents, and deficiencies listed with Certificate of Substantial Completion have been corrected.
  - d. Equipment and systems have been tested in presence of Owner's representative and are operational.
  - e. Work is complete and ready for final inspection.
6. Architect will inspect to verify status of completion with reasonable promptness.

B. Inspection

1. Should Architect consider that Work is incomplete or defective, he will promptly notify Contractor in writing, listing incomplete or defective work.
2. Contractor shall take immediate steps to remedy deficiencies and send a second written certification that Work is complete, and Architect will reinspect the Work.
3. When Architect finds Work is acceptable, he will consider closeout submittals.
4. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
5. Reinspection Fees: Should Architect perform reinspections due to failure of Work to comply with claims made by the Contractor, Owner will compensate Architect for such

additional services, and deduct the amount of such compensation from final payment of the Contractor.

#### 1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, 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.
    - d. Name of Contractor.
    - e. Page number.

#### 1.6 WARRANTIES

- A. Submittal Time: Submit written warranties for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Submittal Requirements
1. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
  2. Number of Original Signed Copies Required: Two each.
  3. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
    - a. Product or work item.
    - b. Firm, with name of principal, address and telephone number.
    - c. Scope.
    - d. Date of beginning of warranty, bond or service and maintenance contract.
    - e. Duration of warranty, bond or service maintenance contract.
    - f. Provide Information for Owner's Personnel:
      - 1) Proper procedure in case of failure.
      - 2) Instances which might affect the validity of warranty or bond.
    - g. Contractor, name of responsible principal, address and telephone number.

- C. 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.
- D. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (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.
- E. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Materials
  - 1. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
  - 2. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
  - 3. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

- C. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

- a. Remove tools, construction equipment, machinery, and surplus material from Project site.
- b. Remove snow and ice to provide safe access to building.
- c. 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.
- d. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- e. Sweep concrete floors broom clean in unoccupied spaces.
- f. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- g. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- h. Remove labels that are not permanent.
- i. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
  - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
- j. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- k. Replace parts subject to unusual operating conditions.
- l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- n. Clean ducts, blowers, and coils if units were operated without filters during construction.
- o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
- p. Leave Project clean and ready for occupancy.

- D. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.

- E. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully in accordance with Division 01 Section Construction Waste Management.

END OF SECTION 01 77 00

## SECTION 01 78 23 - 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. This 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. Maintenance manuals for the care and maintenance of products, materials, and finishes systems and equipment.
- B. Related Sections include the following:
  - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
  - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
  - 4. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

#### 1.3 DEFINITIONS

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

#### 1.4 SUBMITTALS

- A. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

- B. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
  - 1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

## 1.5 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: 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 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
  - 1. Title page.
  - 2. Table of contents.

3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name, address, and telephone number of Contractor, including responsible principal and their telephone number.
  6. Name and address of Architect.
  7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Quality Assurance
1. Preparation of data shall be done by personnel:
    - a. Trained and experienced in maintenance and operation of described products.
    - b. Familiar with requirements of this Section.
    - c. Skilled as technical writer to the extent required to communicate essential data.
    - d. Skilled as draftsman competent to prepare required Drawings.
- D. 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.
  2. List, with each product, name, address and telephone number of:
    - a. Subcontractor or installer.
    - b. Maintenance contractor, as appropriate.
    - c. Identify area of responsibility of each.
    - d. Local source of supply for parts and replacement.
  3. Identify each product by product name and other identifying symbols as set forth in Contract Documents.
- E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. Coordinate Drawings with information in Project Record Documents to assure correct illustration of completed installation. Do not use Project Record Documents as Maintenance Drawings.
  2. Written text, as required to supplement product data for the particular installation:
    - a. Organize in consistent format under separate headings for different procedures.
    - b. Provide logical sequence of instructions for each procedure.



3. Copy of each warranty, bond and service contract issued.
  - a. Provide information sheet for Owner's personnel, give:
    - 1) Proper procedures in event of failure.
    - 2) Instances which might affect validity of warranties or bonds.
4. Copy of operating permits from the appropriate authority having jurisdiction. Original permits shall be delivered directly to the Owner with a copy of the transmittal submitted to Architect for record.
5. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
  - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
  - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets. Indicate six-digit section number on bottom of spine for identification.
6. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
7. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
8. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
9. 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.
  2. Performance and design criteria if Contractor is 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.
  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 MANUAL

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

- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
  - 1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- 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.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard printed 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 videotape, 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 23

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## SECTION 01 78 39 - 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. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Signature of Contractor or his authorized representative, certifying the correctness and completeness of the Record Documents.
- B. Related Sections include the following:
  - 1. Division 01 Section "Closeout Procedures" for general closeout procedures.
  - 2. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 3. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

#### 1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit one set of Record CAD Drawing files, one set of Record CAD Drawing plots, and one copy printed from record plots. Plot and print each Drawing, whether or not changes and additional information were recorded.
    - a. Electronic Media: CD-R.
- B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit one copy of each Product Data submittal.
  - 1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.



## PART 2 - PRODUCTS

### 2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.
  - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
  - b. Accurately record information in an understandable drawing technique.
  - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
2. Content: Types of items requiring marking include, but are not limited to, the following:
  - a. Dimensional changes to Drawings.
  - b. Revisions to details shown on Drawings.
  - c. Depths of foundations below first floor.
  - d. Locations and depths of underground utilities.
  - e. Revisions to routing of piping and conduits.
  - f. Revisions to electrical circuitry.
  - g. Actual equipment locations.
  - h. Duct size and routing.
  - i. Locations of concealed internal utilities.
  - j. Field changes of dimension or data.
  - k. Changes made by Change Order or Construction Change Directive.
  - l. Changes made following Architect's written orders.
  - m. Details not on the original Contract Drawings.
  - n. Field records for variable and concealed conditions.
  - o. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record CAD Drawings: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record Prints with Architect. When authorized, prepare a full set of corrected CAD Drawings of the Contract Drawings, as follows:

1. Format: Same CAD program, version, and operating system as the original Contract Drawings.
  2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
  3. Refer instances of uncertainty to Architect for resolution.
  4. Contractor will be furnished one electronic copy of CAD Drawings of the Contract Drawings for use in recording information.
    - a. Architect makes no representations as to the accuracy or completeness of CAD Drawings as they relate to the Contract Drawings.
- 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. Record CAD Drawings: Organize CAD 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 CAD file.
  3. 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, Record Product Data, and Record Drawings where applicable.

## 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.

## 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.

# PART 3 - EXECUTION

## 3.1 RECORDING AND MAINTENANCE

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

END OF SECTION 01 78 39

## SECTION 01 79 00 - DEMONSTRATION AND TRAINING

### 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. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
- B. Related Sections include the following:
  - 1. Division 01 Section "Project Management and Coordination" for requirements for preinstruction conferences.
  - 2. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

#### 1.3 SUBMITTALS

- A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. At completion of training, submit one complete training manual(s) for Owner's use.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.

#### 1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
  - 1. Inspect and discuss locations and other facilities required for instruction.
  - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
  - 3. Review required content of instruction.
  - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

## 1.5 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
  - 1. Motorized doors.
  - 2. Equipment.
  - 3. Fire-protection systems.
  - 4. Intrusion detection systems.
  - 5. Conveying systems.
  - 6. Medical equipment, including medical gas equipment and piping.
  - 7. Heat generation.
  - 8. Refrigeration systems.
  - 9. HVAC systems.
  - 10. HVAC instrumentation and controls.
  - 11. Electrical service and distribution.
  - 12. Packaged engine generators, including transfer switches.

13. Lighting equipment and controls.
14. Communication systems equipment.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
  - a. System, subsystem, and equipment descriptions.
  - b. Performance and design criteria if Contractor is delegated design responsibility.
  - c. Operating standards.
  - d. Regulatory requirements.
  - e. Equipment function.
  - f. Operating characteristics.
  - g. Limiting conditions.
  - h. Performance curves.
2. Documentation: Review the following items in detail:
  - a. Emergency manuals.
  - b. Operations manuals.
  - c. Maintenance manuals.
  - d. Project Record Documents.
  - e. Identification systems.
  - f. Warranties and bonds.
  - g. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
  - a. Instructions on meaning of warnings, trouble indications, and error messages.
  - b. Instructions on stopping.
  - c. Shutdown instructions for each type of emergency.
  - d. Operating instructions for conditions outside of normal operating limits.
  - e. Sequences for electric or electronic systems.
  - f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
  - a. Startup procedures.
  - b. Equipment or system break-in procedures.
  - c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.

- l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
  - a. Alignments.
  - b. Checking adjustments.
  - c. Noise and vibration adjustments.
  - d. Economy and efficiency adjustments.
- 6. Troubleshooting: Include the following:
  - a. Diagnostic instructions.
  - b. Test and inspection procedures.
- 7. Maintenance: Include the following:
  - a. Inspection procedures.
  - b. Types of cleaning agents to be used and methods of cleaning.
  - c. List of cleaning agents and methods of cleaning detrimental to product.
  - d. Procedures for routine cleaning
  - e. Procedures for preventive maintenance.
  - f. Procedures for routine maintenance.
  - g. Instruction on use of special tools.
- 8. Repairs: Include the following:
  - a. Diagnosis instructions.
  - b. Repair instructions.
  - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - d. Instructions for identifying parts and components.
  - e. Review of spare parts needed for operation and maintenance.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

### 3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner, through Architect, with at least seven days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written and a demonstration performance-based test.
- E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION 01 79 00



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## SECTION 02 41 19 - SELECTIVE DEMOLITION

### 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. This Section includes the following:

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.
4. Remove designated building equipment and fixtures.
5. Remove designated partitions and components.
6. Remove designated flooring material.
7. Remove designated ceiling tile and grid.
8. Cap and identify exposed utilities.
9. Provide temporary partitions to allow continued building occupancy by Owner.

- B. Related Sections include the following:

1. Division 01 Section "Summary" for use of premises, and phasing, and Owner-occupancy requirements.
2. Division 01 Section "Photographic Documentation" for preconstruction photographs taken before selective demolition operations.
3. Division 01 Section "Temporary Facilities and Controls" for temporary construction and environmental-protection measures for selective demolition operations.
4. Division 01 Section "Cutting and Patching" for cutting and patching procedures.
5. Division 01 Section "Construction Waste Management and Disposal" for disposal of demolished materials.
6. Division 02 Section "Structure Demolition" for demolition of entire buildings, structures, and site improvements.
7. Division 02 Section "Alteration Project Procedures".
8. Division 31 Section "Site Clearing" for site clearing and removal of above- and below-grade improvements.

#### 1.3 DEFINITIONS

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

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

#### 1.4 MATERIALS OWNERSHIP

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

#### 1.5 SUBMITTALS

- A. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of elevator and stairs.
  - 5. Locations of proposed dust- and noise-control temporary partitions and means of egress.
  - 6. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
  - 7. Means of protection for items to remain and items in path of waste removal from building.
- B. Certificates
  - 1. Permits and notices authorizing demolition.
  - 2. Certificates of severance of utility services.
  - 3. Permit for transport and disposal of debris.
- C. Inventory: After selective demolition is complete, submit a list of items that have been removed and salvaged.
- D. Pre-demolition Photographs: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by selective demolition operations. Comply with Division 01 Section "Photographic Documentation." Submit before Work begins.
- E. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

## 1.6 QUALITY ASSURANCE

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.
- B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- C. Standards: Comply with ANSI A10.6 and NFPA 241.
- D. Pre-demolition Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to selective demolition including, but not limited to, the following:
  - 1. Inspect and discuss condition of construction to be selectively demolished.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
  - 5. Review areas where existing construction is to remain and requires protection.

## 1.7 PROJECT CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
  - 1. Comply with requirements specified in Division 01 Section "Summary."
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
  - 1. Before selective demolition, Owner will remove the following items:
    - a. Furniture, Medical Equipment and Office Equipment.
    - b. Computers, Printers and Monitors.
- 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. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Owner will remove hazardous materials under a separate contract.

- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.
- G. Protection
  - 1. Do not interfere with use of building or adjacent buildings. Maintain free and safe passage to and from.
  - 2. Prevent movement or settlement of structure(s). Provide and place lintels, bracing or shoring and be responsible for safety and support of structure. Assume liability for such movement, settlement, damage or injury.
  - 3. Cease operations and notify the Architect immediately, if safety of structure appears to be endangered. Take precautions to properly support structure. Do not resume operations until safety is restored.
  - 4. Provide, erect and maintain barricades, lighting and guardrails as required by applicable regulatory advisory to protect occupants of building and workers.
  - 5. In the event the contractor encounters material reasonably believed to be asbestos or polychlorinated biphenyl (PCB) which has not been rendered harmless, the Contractor shall immediately stop work in the area affected and report the condition to the Owner and Architect in writing.
- H. Existing Services
  - 1. Arrange and pay for disconnecting, removing and/or rerouting and capping utility services within areas of demolition without effecting non-demolition area. Disconnect and stub off.
  - 2. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

## 1.8 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.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Except where noted otherwise, maintain possession of materials being demolished. Immediately remove from site.
- B. Relics and antiques (i.e., cornerstones and their contents, commemorative plaques and tablets) and similar objects shall remain the property of the Owner. Store as directed by Owner.

- C. Discoveries of construction, furnishings and articles having a historic or private value shall remain in possession of Owner.
  - 1. Promptly notify Architect.
  - 2. Protect discovery from damage from elements or work.
  - 3. Architect will promptly transmit Owner's decision for disposition of discovery.
  - 4. Store items to be retained by Owner in a safe, dry place on site, or dispose of items which Owner releases.
- D. Carefully remove, store and protect for reinstallation materials and equipment as required.
- E. Carefully remove materials and equipment, to be retained by the Owner. Deliver and store where directed by the Architect.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped.
- B. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- C. Inventory and record the condition of items to be removed and reinstalled and items to be removed and salvaged.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Engage a professional engineer to survey condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs and templates.
  - 1. Comply with requirements specified in Division 01 Section "Photographic Documentation."
  - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.
- G. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems: Maintain services/systems indicated to remain and protect them against damage during selective demolition operations.
  - 1. Comply with requirements for existing services/systems interruptions specified in Division 01 Section "Summary."
- B. Service/System Requirements: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
  - 1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
  - 2. Arrange to shut off indicated utilities with utility companies.
  - 3. If services/systems are required to be removed, relocated, or abandoned, before proceeding with selective demolition provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 4. Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing.
    - a. Where entire wall is to be removed, existing services/systems may be removed with removal of the wall.

### 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.
- D. Erect weatherproof closures for exterior openings. Maintain exit requirements.
- E. Erect and maintain dustproof and fireproof partitions as required to prevent spread of dust, fumes and smoke to other parts of the building. On completion, remove partitions and repair damaged surfaces to match adjacent surfaces.
- F. Locate guardrails in stairwells and around open shafts to protect workers. Post clearly visible warning signs.

### 3.4 DEMOLITION

- A. Demolish in an orderly and carefully manner as required to accommodate new work, including that required for connection to the existing building. Protect existing supporting structural members.
- B. Carry out demolition work to cause as little inconvenience to adjacent occupied building areas as possible.
- C. Perform demolition in accordance with applicable authorities having jurisdiction.
- D. Repair all demolition performed in excess of that required, at no cost to the Owner.
- E. Burning of materials on site is not permitted.
- F. Remove from site, contaminated, vermin infested or dangerous materials encountered and dispose of by safe means so as not to endanger health of workers and public.
- G. Remove demolished materials, tools and equipment from site upon completion of work. Leave site in a condition acceptable to the Architect.

### 3.5 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
  2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and



chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.

3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
5. Maintain adequate ventilation when using cutting torches.
6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
9. Dispose of demolished items and materials promptly.

B. Removed and Salvaged Items:

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

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse. Paint equipment to match new equipment.
2. Pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

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

### 3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. 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.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI-WP and its Addendum.
  - 1. Remove residual adhesive and prepare substrate for new floor coverings by one of the methods recommended by RFCI.
- E. Roofing: Remove no more existing roofing than can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Refer to Division 07 for new roofing requirements.
- F. Air-Conditioning Equipment: Remove equipment without releasing refrigerants.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

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

### 3.8 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.

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## SECTION 02 44 00 - ALTERATION PROJECT PROCEDURES

### 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 REQUIREMENTS INCLUDE

- A. Coordinate work of trades and schedule elements of alterations and renovation work by procedures and methods to expedite completion of the Work.
- B. In addition to demolition specified in Division 01 sections "Selective Demolition" and "removal and Salvage of Construction Materials" and that specifically shown; cut, move or remove items as necessary to provide access or to allow alterations and new work to proceed. Include such items as:
  - 1. Repair or removal of unsafe or unsanitary conditions.
  - 2. Removal of abandoned items and items serving no useful purpose, such as abandoned piping, conduit and wiring.
  - 3. Removal of unsuitable or extraneous materials not marked for salvage, such as abandoned furnishings and equipment, and debris such as rotted wood, rusted metals and deteriorated concrete.
  - 4. Cleaning of surfaces and removal of surface finishes as needed to install new work and finishes.
- C. Patch, repair and refinish existing items to remain, to the specified condition for each material, with a workmanlike transition to adjacent new items of construction.
- D. All architectural components shall be in accordance with the seismic requirements of the governing codes; refer to specification Section 10 10 00.
- E. Related sections include the following:
  - 1. Division 02 Section "Alteration Project Procedures"
  - 2. DIVISIONS 21 through 28 - Mechanical, Electrical and Controls and Instrumentation: Alterations to utilities and services; alterations and connections to existing facilities; continuity of existing services.

### 1.3 SEQUENCE AND SCHEDULES

- A. Schedule alteration Work as required and in the sequences and within times specified in Section 01 10 00 and submit a detailed schedule showing:
  - 1. Each stage of work, and dates of occupancy of areas.
  - 2. Date of Substantial Completion for each area of alterations work, as appropriate.
  - 3. Trades and subcontractors employed in each stage.

### 1.4 ALTERATIONS, CUTTING AND PROTECTION

- A. Assign the work of moving, removal, cutting and patching, to trades qualified to perform the work in a manner to cause least damage to each type of work, and provide means of returning surfaces to appearance of new work.
- B. Perform cutting and removal work to remove minimum necessary, and in a manner to avoid damage to adjacent work. Cut finish surfaces such as masonry, tile, plaster or metals, by methods to terminate surfaces in a straight line at a natural point of division.
- C. Perform cutting and patching as specified in Section 01 73 29. Do not cut horizontal chases in existing walls or partitions without approval of Architect.
- D. Protect existing finishes, equipment and adjacent work which is scheduled to remain, from damage.
  - 1. Maintain existing interior work above 60° F.
  - 2. Provide weather protection, waterproofing, heat and humidity control as needed to prevent damage to remaining existing work and to new work.
- E. Provide temporary enclosures as specified in Section 01 73 29, to separate work areas from existing building and from areas occupied by Owner, and to provide weather protection.
- F. Discoveries of construction, furnishings and articles having a historic or private value shall remain in possession of Owner.
  - 1. Promptly notify Architect.
  - 2. Protect discovery from damage from elements or work.
  - 3. Architect will promptly transmit Owner's decision for disposition of discovery.
  - 4. Store items to be retained by Owner in a safe, dry place on site, or dispose of items which Owner releases.

## PART 2 - PRODUCTS

### 2.1 SALVAGED MATERIALS

- A. Salvage sufficient quantities of cut or removed material to replace damaged work of existing construction, when in the opinion of the Architect suitable material is not readily obtainable on current market.
  - 1. Store salvaged items in a dry, secure place on site.
  - 2. Items not required for use in repair of existing work shall remain the property of Owner where specifically noted.
  - 3. Do not incorporate salvaged or used material in new construction except where specifically noted.
  - 4. Should "salvaged and stored" materials be misplaced, damaged, destroyed, or otherwise be made unavailable for reuse, provide new materials and installation for entire existing areas involved; materials as selected by Architect and provided by Contractor.

### 2.2 PRODUCTS FOR PATCHING, EXTENDING AND MATCHING

- A. General Requirements that Work be complete:
  - 1. Provide same products or types of construction as that in existing structure, as needed to patch, extend or match existing work. Generally, Contract Documents will not define products or standards of workmanship present in existing construction; Contractor shall determine products by inspection and any necessary testing, and workmanship by use of the existing as a sample of comparison.
  - 2. Presence of a product, finish, or type of construction, requires that patching, extending or matching shall be performed as necessary to make Work complete and consistent to identical standards of quality.

## PART 3 - EXECUTION

### 3.1 PERFORMANCE

- A. Patch and extend existing work using skilled mechanics who are capable of matching existing quality of workmanship. Quality and rating of patched or extended work shall be not less than that specified for new work.
- B. Refinish interior of existing building to extent specified and indicated.
  - 1. Prepare existing surfaces to receive new finishes and materials specified.
  - 2. Sand and clean existing painted surfaces before application of new paint; Contractor shall certify that substrate will retain new paint without peeling or cracking. If this cannot be done, all old paint shall be removed.
  - 3. Score and clean walls to receive new ceramic tile work before application of new tile.

4. Remove and patch loose plaster or other finishes before repainting or applying new finishes.
- C. Patching of Concrete: Patch existing concrete at spalled and cracked surfaces where exposed, including exposed concrete columns, beams and walls. Patch concrete as required at locations of framing connections and at surfaces broken as a result of field investigations.
1. Chip away defective areas to a depth of not less than one inch with edges perpendicular to the surface.
  2. Remove rust from exposed reinforcing by wire brushing.
  3. Wet area to be patched and a space at least six (6) inches wide entirely surrounding it to prevent absorption of water from patching mortar.
  4. Apply a bonding compound, Sikadur 32 HiMod (vapor barrier) or Armatex 110 (nonvapor barrier), both as manufactured by Sika Chemical Corporation, or equal, to the prepared surfaces.
    - a. Patching mortar shall consist of cement and sand and an admixture of one part water to two parts of "Acryl 60" as manufactured by Standard Dry Wall Products Company or equal.
    - b. Admixture shall be compatible with bonding compound.
    - c. Finish patch in a manner as to match adjoining surface.
- D. Painting: Repaint and/or refinish rooms or areas of existing buildings, damaged or altered during construction work.
1. Sand woodwork, including doors and frames and windows prior to priming and finish painting.
- E. Gypsum Wallboard Work
1. Patch holes, cutouts, chases, abrasions as required to restore, existing damaged areas, areas damaged by demolition and alteration work, holes left in existing walls and ceilings, and where new suspension ceilings are fastened to existing construction.
  2. Finishes and fire ratings shall match present construction and be of quality specified in other sections of specifications.
  3. Furr and finish around new and existing electrical items, ductwork, exposed piping, etc., in finished areas of existing building.
- F. Ceiling and Floors: Alter and/or replace ceiling and flooring damaged in areas of demolition and alteration work including ceilings disturbed by mechanical and/or electrical work.
1. Where partitions presently penetrate existing ceilings and are to be removed, adjust, patch and repair ceiling and suspension systems to match adjacent ceilings.
  2. In no case shall new suspension system be hung or supported from existing ceilings or suspension systems.
  3. Maintain rating of existing ceilings.
- G. Windows: Refinish interior surfaces of existing frames, sash, trim, sills, stools by sanding and repainting.

- H. Roof: Patch existing roofs where disturbed by new construction, maintaining any existing roof bond or warranty.
  - 1. Provide cants, flashing and counterflashing.
  - 2. Provide curbs and supports for mechanical items.
  - 3. Cut reglets in existing masonry walls and/or concrete where new counterflashing is required.
- I. Fireproofing: Patch existing fireproofing as required to obtain proper fire ratings. Fireproofing must be compatible with existing material.
- J. Miscellaneous: Restore to a finished condition all work, materials and/or equipment disturbed by demolition or alterations. Work shall also include materials not specifically mentioned herein.
  - 1. Remove existing partitions, provide new partitions, close off openings in existing partitions, cut new openings in existing partitions, and block in exterior wall openings with masonry to match existing construction. Provide required precast and/or steel lintels.
  - 2. Fill voids and depressions left in walls, ceilings or floors of existing buildings where existing ceilings, floor finishes, partitions, and equipment have been removed. Floor fill over 1 inch thick shall be lightweight concrete; floor fill under 1 inch thick shall be "Level-Right" latex.

### 3.2 ADJUSTMENTS

- A. Where removals are made, patch adjacent construction and finishes with materials to match existing.
  - 1. Where removal of partitions results in adjacent spaces becoming one, rework floors and ceilings to provide smooth planes without breaks, steps, or bulkheads.
  - 2. Where extreme change of plane of 2 inches or more occurs, request instructions from Architect as to method of making transition.
- B. Trim and refinish existing doors as necessary to clear new floors.

### 3.3 DAMAGED SURFACES

- A. Patch and replace any portion of an existing finished surface which is found to be damaged, lifted, discolored, or shows other imperfections, with matching material.
  - 1. Provide adequate support of substrate prior to patching the finish.
  - 2. Refinish patched portions of painted or coated surfaces in a manner to produce uniform color and texture over entire surface.
  - 3. Unless otherwise noted on documents, all painting shall be from a break in plane to a break in plane regardless of area actually repaired or disturbed.



### 3.4 TRANSITION FROM EXISTING TO NEW WORK

- A. When new work abuts or finishes flush with existing work, make a smooth and workmanlike transition. Patched work shall match existing adjacent work in texture and appearance so that the patch or transition is invisible at a distance of five feet. When finished surfaces are cut in such a way that a smooth transition with new work is not possible, terminate existing surface in a neat manner along a straight line at a natural line of division, and provide trim appropriate to finished surface.

### 3.5 CLEANING

- A. Perform periodic and final cleaning as specified.
  - 1. Clean Owner-occupied areas daily.
  - 2. Clean spillage, overspray, and heavy collection of dust in Owner-occupied areas immediately.
- B. At completion of work of each trade, clean area and make surfaces ready for work of successive trades.
- C. At completion of alterations work in each area, provide final cleaning and return space to a condition suitable for use by Owner.

END OF SECTION 02 44 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.

#### 1.2 SUMMARY

- A. This Section includes the following:

1. Steel framing and supports for overhead doors.
2. Steel framing and supports for mechanical and electrical equipment.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Shelf angles.
5. Loose steel lintels.
6. Loose bearing and leveling plates.
7. Structural-steel door frames.
8. Miscellaneous steel trim including steel angle corner guards, and steel edgings.
9. Metal ladders.
10. Ladder safety cages.
11. Metal ships' ladders.
12. Metal bollards.
13. Pipe guards.
14. Metal floor plates and supports.

#### 1.3 REFERENCES

- A. AISC - American Institute of Steel Construction.
- B. ANSI A202.1 - ANSI/NAAMM MBG 531 - Metal Bar Grating Manual for Steel and Aluminum Gratings and Stair Treads.
- C. ANSI A202.1 - ANSI/NAAMM 510 - Metal Stair Manual.
- D. ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads."
- E. ASTM A 36 - Structural Steel.
- F. ASTM A 47 - Malleable Iron Castings.

- G. ASTM A 47 - Gray Iron Class 30.
- H. ASTM A 123A—153A – Galvanizing Steel and Iron Products.
- I. ASTM A 185 Welded Wire Fabric.
- J. ASTM A 307 - Carbon Steel Externally and Internally Threaded Fasteners.
- K. ASTM A 500 - Cold-formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- L. ASTM A 510 - WireRods.
- M. ASTM A 653 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- N. ASTM A 786 – Roller Steel Plate.
- O. ASTM A 1008/A 1008M, Cold Rolled Sheet.
- P. ASTM A 1011/A 1011M, Hot Rolled Sheet.
- Q. ASTM F 1267, Type I (expanded) Class 1 (uncoated).
- R. ASTM B 26/B 26M, Aluminum Castings.
- S. ASTM B 221 (ASTM B 221M), Aluminum Extrusions Alloy 6063-T6
- T. ASME B18.Screws, bolts, washers
- U. ASTM D 1187 Bituminous Paint
- V. AWS D1.1 - Structural Welding Code—Steel.
- W. AWS D1.3 - Structural Welding Code—Sheet Steel.
- X. ADA - Accessibility Guidelines for Buildings and Facilities (latest edition).

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance of Ladders: Provide ladders capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- B. Thermal Movements: Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 1.5 SUBMITTALS

- A. Product Data: For the following:
  1. Paint products.
- B. Shop Drawings: Show fabrication and installation details for metal fabrications.
  1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
  2. For installed products indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Mill Certificates: Signed by manufacturers of stainless-steel sheet certifying that products furnished comply with requirements.
- D. Welding certificates.

## 1.6 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
  1. AWS D1.1, "Structural Welding Code--Steel."
  2. AWS D1.2, "Structural Welding Code--Aluminum."
  3. AWS D1.3, "Structural Welding Code--Sheet Steel."
  4. AWS D1.6, "Structural Welding Code--Stainless Steel."

## 1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on Shop Drawings.
  1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.

## 1.8 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. 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.

- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to Project site in time for installation.

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

### 2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. 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.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- F. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface.
- G. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- H. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
- I. Slotted Channel Framing ("Unistrut"): Cold-formed metal channels with continuous slot complying with MFMA-3.
  - 1. Size of Channels: As indicated or required.
  - 2. Material: Galvanized steel complying with ASTM A 653/A 653M, Grade 33 (Grade 230), with G90 (Z275) coating; 12G 0.108-inch (2.8-mm) nominal thickness.
  - 3. Material: Steel complying with ASTM A 1008/A 1008M, Grade 33 (Grade 230); 12G 0.0966-inch (2.5-mm) minimum thickness; hot-dip galvanized after fabrication.
- J. Cast Iron: ASTM A 48/A 48M, Class 30, unless another class is indicated.

### 2.3 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209 (ASTM B 209M), Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- C. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- D. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

### 2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless-steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 (ASTM F 738M) for bolts and ASTM F 594 (ASTM F 836M) for nuts, Alloy Group 2 (A4).
- D. Anchor Bolts: ASTM F 1554, Grade 36.
  - 1. Provide hot-dip, zinc-coated anchor bolts where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3 (ASME B18.6.7M).
- G. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1 (ASME B18.22M).
- J. Lock Washers: Helical, spring type, ASME B18.21.1 (ASME B18.21.2M).
- K. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Material for Anchors in Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

2. Material for Anchors in Exterior Locations and in pressure treated lumber: Alloy Group 2 (A4) stainless-steel bolts complying with ASTM F 593 (ASTM F 738M) and nuts complying with ASTM F 594 (ASTM F 836M).

## 2.5 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- 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.
  1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  2. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- D. Zinc-Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
  1. Use primer with a VOC content of 420 g/L (3.5 lb/gal.) or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- E. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- 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 Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa), unless otherwise indicated.

## 2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm), unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  - 1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

## 2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. 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 retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
- B. Fabricate supports from continuous structural steel members of sizes indicated with attached bearing plates, anchors, and braces as indicated, with holes where indicated on Shop Drawings of individual products.
- C. Galvanize miscellaneous framing and supports where indicated.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.



## 2.8 LOOSE LINTELS

- A. Fabricate loose lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches (200 mm), unless otherwise indicated.
- C. Galvanize loose steel lintels located in exterior walls.

## 2.9 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.
  - 1. Provide mitered and welded units at corners.
  - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.
- B. Galvanize shelf angles located in exterior walls.

## 2.10 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.
- B. Galvanize plates after fabrication.

## 2.11 STRUCTURAL-STEEL DOOR FRAMES

- A. Fabricate structural-steel door frames from steel shapes, plates, and bars of size and to dimensions indicated, fully welded together, with 5/8-by-1-1/2-inch (16-by-38-mm) steel channel stops, unless otherwise indicated. Plug-weld built-up members and continuously weld exposed joints. Secure removable stops to frame with countersunk machine screws, uniformly spaced at not more than 10 inches (250 mm) o.c. Reinforce frames and drill and tap as necessary to accept finish hardware.
  - 1. Provide with integrally welded steel strap anchors for securing door frames into adjoining concrete or masonry.
- B. Provide steel angle clips welded to frames for anchoring frame to floor with expansion shields and bolts.
- C. Galvanize exterior steel frames.

- D. Prime interior steel frames with zinc-rich primer.

## 2.12 METAL LADDERS

### A. Steel Ladders:

1. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm) steel flat bars, with eased edges.
2. Support each ladder at top and bottom and not more than 48 inches (1220 mm) o.c.] with welded brackets, made from same metal as ladder.
3. Rungs: 1-inch- (25-mm-) diameter steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.
6. Galvanize exterior ladders and interior ladders, where indicated, including brackets and fasteners.
7. Prime interior ladders including brackets and fasteners, with zinc-rich primer, unless otherwise noted.

### B. Aluminum Ladders:

1. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches (64 mm) deep, 3/4 inch (19 mm) wide, and 1/8 inch (3.2 mm) thick.
2. Support each ladder at top and bottom and not more than 48 inches (1220 mm) o.c.] with welded brackets, made from same metal as ladder.
3. Rungs: Extruded-aluminum tubes, not less than 3/4 inch (19 mm) deep and not less than 1/8 inch (3.2 mm) thick, with ribbed tread surfaces.
4. Fit rungs in centerline of siderails; fasten by welding or with stainless-steel fasteners or brackets and aluminum rivets.

## 2.13 LADDER SAFETY CAGES

### A. Steel Ladder Safety Cages:

1. Primary Hoops: 1/4-by-3-inch (6.4-by-76-mm) flat bar hoops.
2. Secondary Intermediate Hoops: 1/4-by-2-1/2-inch (6.4-by-64-mm) flat bar hoops.
3. Vertical Bars: 1/4-by-1-1/2-inch (6.4-by-38-mm) flat bars secured to each hoop.
4. Galvanize exterior ladder cages and interior ladder cages, where indicated, including fasteners.
5. Prime interior ladder cages including fasteners, with zinc-rich primer.

### B. Aluminum Ladder Safety Cages:

1. Primary Hoops: 1/4-by-3-inch (6.4-by-76-mm) flat bar hoops.
2. Secondary Intermediate Hoops: 1/4-by-2-1/2-inch (6.4-by-50-mm) flat bar hoops.
3. Vertical Bars: 1/4-by-1-1/2-inch (6.4-by-38-mm) flat bars secured to each hoop.

## 2.14 METAL SHIPS' LADDERS

- A. Provide metal ships' ladders where indicated. Fabricate of open-type construction with channel stringers, pipe railings, and bar grating treads, unless otherwise indicated. Provide brackets and fittings for installation. Steel ships ladder of C6 channel stringers spaced with 1 foot 6 inches between; 4 inch channel treads with abrasive surface spaced 12 inches on center vertically; with 1-1/2 inch nominal diameter steel pipe rail and post; with steel mounting brackets and attachments; [prime paint (interior)] [galvanized (exterior)] finish.
  - 1. Fabricate ships' ladders, including treads and railings from steel.
  - 2. Comply with applicable requirements in Division 05 Section "Metal Stairs" for railings.
- B. Galvanize [exterior steel ships' ladders and interior steel ships' ladders, where indicated, including treads, railings, brackets, and fasteners.
- C. Prime interior steel ships' ladders, where indicated, including treads, railings, brackets, and fasteners, with zinc-rich primer.

## 2.15 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe 1/4-inch (6.4-mm) wall-thickness rectangular steel tubing, as indicated.
  - 1. Cap bollards with 1/4-inch- (6.4-mm-) thick steel plate.
  - 2. Where bollards are indicated to receive push-button controls for door operators, provide necessary cutouts for push-button controls and hole for wire.
- B. Fabricate bollards with 3/8-inch- (9.5-mm-) thick steel baseplates for bolting to concrete slab. Drill baseplates at all 4 corners for 3/4-inch (19-mm) anchor bolts.
- C. Fabricate internal sleeves for removable bollards from Schedule 80 steel pipe with an OD approximately 1/8 inch (3 mm) less than ID of bollards. Match drill sleeve and bollard for 3/4 inch (19 mm) steel machine bolt.

## 2.16 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
  - 1. ASTM A 123/A 123M, for galvanizing steel and iron products.
  - 2. ASTM A 153/A 153M, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:

1. Exteriors (SSPC Zone 1B) and Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

## 2.17 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Dull Satin Finish: No. 6.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

## 2.18 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. As-Fabricated Finish: AA-M10 (Mechanical Finish: as fabricated, unspecified).
- C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

# PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.

Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.

### 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports securely to and rigidly brace from building structure.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

### 3.3 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.

1. Use nonshrink grout, either metallic or nonmetallic, in concealed locations where not exposed to moisture; use nonshrink, nonmetallic grout in exposed locations, unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.4 INSTALLING METAL BOLLARDS

- A. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- B. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch (19-mm) bolts at each bollard, unless otherwise indicated. Paragraph below can be used for bollards located in landscaping, in unit pavers, etc.
  - 1. Embed anchor bolts at least 4 inches (100 mm) in concrete.
- C. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches (75 mm) above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.
- D. Place removable bollards over internal sleeves and secure with 3/4-inch (19-mm) machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner will furnish padlocks.
- E. Fill bollards solidly with concrete, mounding top surface to shed water.
  - 1. Do not fill removable bollards with concrete.

### 3.5 INSTALLING NOSINGS, AND TREADS

- A. Center nosings on tread widths.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.

### 3.6 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. 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

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## 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. This Section includes the following:
  - 1. Miscellaneous framing with lumber and sheathing.
  - 2. Framing with engineered wood products.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Wood blocking and nailers for roofing system, related flashing and roof mounted items.
  - 5. Wood furring.
  - 6. Wood sleepers.
  - 7. Plywood backing panels.
  - 8. Carpentry work not specified in other sections and not exposed, unless otherwise indicated.
  - 9. All architectural components shall be in accordance with the seismic requirements of the governing codes; refer to Division 01 Section "Summary".

#### 1.3 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- C. Timber: Lumber of 5 inches nominal (114 mm actual) or greater in least dimension.
- D. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NLGA: National Lumber Grades Authority.
  - 3. RIS: Redwood Inspection Service.
  - 4. SPIB: The Southern Pine Inspection Bureau.
  - 5. WCLIB: West Coast Lumber Inspection Bureau.
  - 6. WWPA: Western Wood Products Association.
- E. Agrifiber is a composite panel product derived from recovered agricultural waste fiber from sources including but not limited to: cereal straw, sugarcane bagasse, sunflower husk, walnut



shells, coconut husks and agricultural pruning. The raw fibers are processed and mixed with resins to produce panel products with characteristics similar to those derived from wood fiber.

#### 1.4 REFERENCES

- A. Underwriters' Laboratories, Inc. (UL)
- B. NFoPA - National Design Specification for Wood Construction.
- C. U. S. Product Standards (Office of Product Standards, National Bureau of Standards):
- D. ASME B International
  - 1. ASME B18.2.1-96: Square and Hex Bolts and Screws (Inch Series)
  - 2. ASME B18.2.3.8M-81 (Reaffirmed 1999): Metric Hex Lag Screws
  - 3. ASME B18.6.1-81 (Reaffirmed 1997): Wood Screws (Inch Series)
- E. ASTM A 153 – Specification for Zinc-Coating (Hot-Dip) of Iron and Steel hardware
- F. ASTM A 307 - Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
- G. ASTM A 563 – Specification for Carbon and Alloy Steel Nuts.
- H. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
- I. ASTM A 666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
- J. ASTM B 633 – Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- K. ASTM C 954 – Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
- L. ASTM C 2559 – Specification for Adhesives for Structural Laminated Wood Products for use under Exterior (Wet Use) Exposure Conditions.
- M. ASTM D 3498 – Specification for Adhesives for Field-Gluing Plywood to Lumber Framing for Floor Systems.
- N. ASTM D 5055 – Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists.
- O. ASTM D 5456 – Specification for Evaluation of Structural Composite Lumber Products.
- P. ASTM D 5516 - Standard Test Method for Evaluating the Flexural Properties of Fire-Retardant Treated Softwood Plywood Exposed to Elevated Temperatures.

- Q. ASTM D 5664 - Standard Test Method for Evaluating the Effects of Fire-Retardant Treatments and Elevated Temperatures on Strength Properties of Fire-Retardant Treated Lumber.
- R. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
- S. ASTM E 488 - Test Methods for Strength of Anchors in Concrete and Masonry Elements.
- T. ASTM F 568 - Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners.
- U. ASTM F 593 - Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.
- V. ASTM F 594 - Specification for Stainless Steel Nuts.
- W. ASTM F 738 - Specification for Stainless Steel Metric Bolts, Screws and Studs
- X. ASTM F 836 - Specification for Stainless Steel Metric Nuts.
- Y. ASTM F 1667 - Standard Specification for Driven Fasteners: Nails, Spikes and Staples.
- Z. CABO NER 272
- AA. APA EWA The Engineered Wood Association (formerly The American Plywood Association):
  - 1. PS1-95 – Construction and Industrial Plywood.
  - 2. PS 20 – American Softwood Lumber Standard.
  - 3. PRP – 108
- BB. AWWA (American Wood Preservers Association) Standards:
  - 1. C20 – Fire-Retardant Treatment for Lumber.
  - 2. C27 – Fire-Retardant Treatment for Plywood.
  - 3. C9 – Preservative Treatment for Plywood.
  - 4. C2 – Preservative Treatment
  - 5. C31 – Preservative Treatment
- CC. NPA - National Particleboard Association
- DD. ANSI A208.1
- EE. Forest Stewardship Counsel
  - 1. FSC 1.2-00: Principles and Criteria (Available in PDF at [www.fscoax.org](http://www.fscoax.org))
- FF. SCAQMD - South Coast Air Quality Management District.
- GG. For products applied on site - Paints, coatings and primers applied to interior walls and ceilings shall not exceed the VOC content limits established in Green Seal Standard GS-11, Paints, First Edition, May 20, 1993. Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates shall not exceed the VOC content limit of 250 g/L established in Green Seal Standard GC003, Anti-Corrosive Paints, Second Addition, January 7, 1997. Clear wood finishes, floor

coatings, stains, sealers and shellacs applied to interior elements shall not exceed the VOC content limits established in South Coast Air Quality Management District (SCAQMD) Rule 1113, Architectural Coatings, rules in effect on January 1, 2004.

- HH. Composite wood and agrifiber products used on the interior of the building (defined as inside of the weatherproofing system) shall contain no added urea-formaldehyde resins. Laminating adhesives used to fabricate on-site and shop applied composite wood and agrifiber assemblies shall contain no added urea-formaldehyde resins. Composite wood and agrifiber products are defined as: particleboard, MDF, plywood, wheatboard, strawboard, panel substrate, and door cores.
- II. K. For products applied on site - The VOC content of adhesives, sealants and sealant primers shall be less than the current VOC content limits of South Coast Air Quality Management District (SCAQMD) Rule #1168 and all sealants used as fillers must meet or exceed the requirements of the Bay Area Quality Management District Regulation 8, rule 51.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.
- B. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.
- C. Fire retardant treatment to conform to:
  - 1. Requirements of Underwriters' Laboratories (UL);
  - 2. Applicable codes and regulations for fire retardant treatment of wood surfaces for flame/fuel/smoke ratings.
- D. Lumber: Identify with grade stamp of an agency certified by NFOPA.
- E. Forest Certification: For the wood products specified in this section, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials under cover and protected from weather and contact with damp or wet surfaces.
- B. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

## PART 2 - PRODUCTS

### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece if authorities having jurisdiction require grade stamps on all materials, or if not, 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.

### 2.2 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: Either DOC PS 1 or DOC PS 2, unless otherwise indicated.
- B. Oriented Strand Board: DOC PS2.
- C. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- D. Factory mark panels to indicate compliance with applicable standard.

### 2.3 FIRE-RETARDANT-TREATED PLYWOOD

- A. General: Comply with performance requirements in AWPA C27.
  - 1. Use treatment that does not promote corrosion of metal fasteners.
  - 2. Use Exterior type for exterior locations and where indicated.
  - 3. Use Interior Type A, High Temperature (HT) for roof sheathing and where indicated.
  - 4. Use Interior Type A, unless otherwise indicated.
- B. Kiln-dry material after treatment to maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Identify fire-retardant-treated plywood with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

## 2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
  2. Nailers.
  3. Rooftop equipment bases and support curbs.
  4. Cants.
  5. Furring.
  6. Grounds.
  7. Utility shelving.
- B. For items of dimension lumber size, provide Construction or No. 2 or Standard, Stud, or No. 3 grade lumber with 19 percent maximum moisture content and any of the following species:
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 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine, No. 2 or 3 grade; SPIB.
  2. Hem-fir or hem-fir (north), Construction or 2 Common or Standard or 3 Common grade; NLGA, WCLIB, or WWPA.
  3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common or Standard or 3 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
  4. Western woods, Construction or No. 2 Common or Standard or No. 3 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

## 2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

## 2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for fastening to Cold-Formed Metal Framing: ASTM C 954, except with water heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. 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).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 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, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

## SECTION 06 41 00 - ARCHITECTURAL CABINETS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:

- 1. Plastic laminate and fire rated high impact laminate faced cabinets
  - 2. Solid surface material countertops
  - 3. Cabinet hardware and accessories
  - 4. Wood shims and hanging strips for installing architectural cabinets.
  - 5. Shop finishing of architectural cabinets.

- B. Related Requirements:

- 1. Division 01 Section "Product Requirements."
  - 2. Division 06 Section "Rough Carpentry" for wood blocking concealed within other construction required for installing cabinets.
  - 3. Division 06 Section "Miscellaneous Rough Carpentry" for wood blocking concealed within other construction required for installing cabinets.

#### 1.3 DEFINITIONS

- A. MDF: Medium-density fiberboard.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including high pressure decorative laminates, high impact laminate and countertop materials.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
  - 1. Show details full size.
  - 2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  - 3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural cabinets.



4. Apply WI Certified Compliance Program or Apply AWI Quality Certification Program label to Shop Drawings.
- C. Samples for Initial Selection:
1. Each type of high pressure laminate.
  2. Each type of high impact laminate (Wilsonart Fire Rated Compact Laminate)
  3. Each type of solid surface material.
- D. Samples for Verification:
1. Plastic laminates, 5 by 7 inches, for each type, color, pattern, and surface finish, with one sample applied to core material and specified edge material applied to one edge.
  2. Fire rated high impact laminate, 5x7 for each type, color, pattern and surface finish. (Wilsonart Fire Rated Compact Laminate)
  3. Wood-grain plastic laminates, 5 by 7 inches, for each type, pattern and surface finish, with one sample applied to core material and specified edge material applied to one edge.
  4. Solid surface material, 4 by 4 inches, for each type, color, pattern, and surface finish, with specified edge treatment applied to one edge.
  5. Exposed cabinet hardware and accessories, one unit for each type and finish.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator and installer.
- B. Product Certificates: For the following:
1. Composite wood products.
  2. Adhesives.
  3. High pressure decorative laminate.
  4. Wilsonart Fire Rated Compact Laminate
  5. Each type of solid surface material.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: AWI or WI Certified 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.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

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

## 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.9 COORDINATION

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

## 1.10 WARRANTY

- A. Architectural Woodwork, including cabinets and countertops, provided under the scope of this section, shall be of specified materials, quality workmanship and be free from defects that would render them unserviceable for the use intended, including flaws in appearance. The fabricator and installer agree, within a period of two years after substantial completion, to repair or replace without charge to the Owner, any woodwork item that is defective within the meaning of this warranty.

## PART 2 - PRODUCTS

### 2.1 ARCHITECTURAL CABINETS, GENERAL

- A. Quality Standard (Current Edition): Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.

## 2.2 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

- A. Grade: Premium.
- B. Type of Construction: Frameless.
- C. Cabinet, Door, and Drawer Front Interface Style: Flush overlay.
- D. Cabinet Door and Drawer Front:
  - 1. Core Thickness: 11/16 inch.
  - 2. Maximum Door Height: 80 inches.
- E. Panel Product for Exposed Surfaces and Shelves: 3/4 inch thick medium density fiberboard (MDF).
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by woodwork quality standard.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Formica Corporation.
    - b. Lamin-Art, Inc.
    - c. Panolam Industries International, Inc.
    - d. Wilsonart, Inc.
    - e. Pionite Decorative Surfaces
    - f. Arborite.
- G. Laminate Cladding for Exposed Surfaces:
  - 1. Vertical Surfaces: Grade VGP.
  - 2. Edges: Self-Edged with edges applied first, prior to faces.
  - 3. Pattern Direction: As indicated.
- H. Materials for Semiexposed Surfaces:
  - 1. Surfaces Other Than Drawer Bodies and Shelves: Thermoset decorative panels.
    - a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
      - 1) Thermoset Decorative Panel Shelves are not permitted.
    - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.
  - 2. Drawer Sides and Backs: Solid-hardwood lumber.
  - 3. Drawer Bottoms: Thermoset decorative panels.

- I. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.
  - 1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.
- J. Shelf Construction: Provide 3/4 inch thick substrate<sup>2</sup> with top and bottom surfaces of high-pressure decorative laminate, NEMA LD 3, Grade HGS.
  - 1. Four edges: Self Edged.
- K. Case side, base and bottom panels: 3/4 inch.
- L. Face frames: 3/4 inch hardwood stock.
- M. Case Back Panels: 1/2 inch thick medium density fiberboard (MDF).
- N. 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 on Finish Schedule.

## 2.3 SOLID-SURFACE-MATERIAL COUNTERTOPS

- A. Solid surface material: Mineral-filled polymer composition that is solid and nonporous, with color and pattern extending through its entire thickness.
- B. Grade: Premium.
- C. Configuration: Provide countertops with the front and backsplash styles indicated on Drawings.
- D. Countertops: 1/2-inch thick, solid surface material laminated to 3/4-inch thick marine plywood with exposed edges built up with solid surface material.
  - 1. Plywood sheet substrate to be prepared per manufacturer's written instructions prior to bonding solid surface material.
- E. Unless otherwise indicated build up countertop thickness to 1-1/4 inches at front, back, and ends with additional layers of substrate material laminated to top.
- F. Provide additional support cleats along the sides of each individual base cabinet.
- G. Backsplashes: 1/2-inch thick, solid surface material fabricated and installed as indicated.
- H. Fabrication: Fabricate tops in one piece with shop-applied edges unless otherwise indicated. Comply with solid-surface-material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
  - 1. Fabricate with loose backsplashes for field assembly.
  - 2. Coordinate required openings with Division 22.

I. Solid Surface Material:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - a. Avonite Surfaces.
  - b. E. I. du Pont de Nemours and Company.
  - c. Formica Corporation.
  - d. LG Chemical, Ltd.
  - e. Meganite Inc.
  - f. Samsung Chemical USA, Inc.
  - g. Swan Corporation (The)
  - h. Wilsonart
  - i. Basix International
2. Colors and Patterns: Per Finish Schedule.

2.4 WOOD SUBSTRATE MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
  1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
  2. Wood Moisture Content: 8 to 13 percent.
- B. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
  1. Medium density fiberboard (MDF): ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
  2. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
  3. Fire Rated Compact Laminate Substrate

2.5 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.
- B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, and B 01612, self-closing.
  1. Basis of Design: Blum, Inc.: 71T Series hinges
    - a. 170°: All doors, except as noted.
    - b. 110°: For installation on cabinet doors abutting inside corner surfaces.

<u>Door Height</u>	<u>Hinges per Door</u>
0 - 36 inches	2
37 - 62 inches	3
63 - 80 inches	4

- C. Continuous Hinges: BHMA A156.9, B01491, Bright nickel plated, 14 gauge steel.
  - 1. Basis of Design: The Stanley Works, 314 Series.
- A. Flip Up Counterbalance:
  - 1. Assembly shall provide neutral balance through 90 degrees of countertop travel, such that the counter will stay in place if released anywhere within this range.
  - 2. Modular torsion spring device.
  - 3. Finish: Black anodized.
  - 4. Basis of Design: CounterBalance; Counter-A-Syst CAS Series.
  - 5. Install per manufacturer's written instructions.
- B. Door and Drawer Pulls: BHMA A156.9, B02011, back mounted, solid stainless steel, 5-3/8 inches long, 1-3/8 inches deep, and 5/16 inch in diameter.
  - 1. Basis of Design: Sugatsune SWF 650 satin stainless steel (ADA compliant).
- C. Catches: Magnetic catches, BHMA A156.9, B03141. Minimum 5 pound pull (ADA compliant).
  - 1. Basis of Design: Stanley CD 46.
- D. Adjustable Shelf Supports: BHMA A156.9, B04013.
  - 1. Steel, nickel-plated.
  - 2. Basis of Design: Hettich International, #052096.
- E. Shelf Securing Studs
  - 1. Flexible, translucent plastic.
  - 2. Basis of Design: Hettich International, #1005082.
- F. Shelf Standards and Brackets: BHMA A156.9, B04102 and B04112.
  - 1. Twelve gauge steel, stainless steel finish.
  - 2. Provide matching shelf rests for anchoring the shelf to the bracket.
  - 3. Basis of Design: Knappe and Vogt Mfg. Co., #87 and #187.
- G. Drawer Slides: BHMA A156.9, B05111.
  - 1. Telescoping with full extension, one hundred fifty (150) lbs. load capacity, steel ball bearings and zinc-plated finish.
    - a. Basis of Design: Accuride, Model 4032

H. Locks: Locks are required on specified cabinet drawers and doors.

1. Cabinet Locks: ANSI A156.11, Grade 1.

- a. Pin tumbler, grooved key type, master keyed as directed by the Owner.
- b. Manufacturer's standard finish as selected by the Architect.
- c. Provide strike box keeper on inactive leaf at pair of doors.
- d. Basis of Design: Olympus Lock, Inc., #500 DR, with Keeper #2SPD-KEPR.

2. Drawer Locks: ANSI A156.11, Grade 1.

- a. Dead bolt, pin tumbler, grooved key type, master keyed as directed by the Owner.
- b. Manufacturer's standard finish as selected by the Architect.
- c. Basis of Design: Olympus Lock Inc., #600 DW.

I. Door and Drawer Silencers: BHMA A156.16, L03011.

- 1. Clear polyurethane, 8 mm diameter, self-adhesive.
- 2. Provide on all cabinet doors and drawers.
- 3. Basis of design: Häfele America Co., #356.21.428.

J. Access Panel Fasteners:

- 1. Black plastic concealed fasteners.
- 2. Basis of Design: Häfele America Co. # 206.15.300.

K. Counter Support Brackets:

- 1. Materials: 6063-T6 extruded aluminum, welded and ground smooth.
- 2. Size: 75% of counter depth, minimum.
- 3. Finish: Powder coat, Off-White.
- 4. Basis of Design: Rangine Corporation, Rakks Bracket EH Series, Flush Mount.

L. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

- 1. Satin Stainless Steel: BHMA 630.

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

## 2.6 MISCELLANEOUS MATERIALS

A. Shims and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

- C. Adhesives: Do not use adhesives that contain urea formaldehyde.
- D. Adhesives: Use adhesives that meet 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."

## 2.7 FABRICATION

- A. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
  - 1. Corners of Cabinets: 1/16 inch unless otherwise indicated.
  - 2. Exposed edges of all materials, including metal angles and pulls, used in the fabrication of Interior Finished Carpentry woodwork, shall be eased to 1/16 inch radius.
  - 3. Exposed cut metal edges shall be ground or sanded smooth.
- B. Unless otherwise indicated, use substrate panel thicknesses that comply with referenced quality standard.
- C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- D. Shelf Support Holes: Provide 5 mm holes spaced 32 mm on center. Holes no less than 1 inch or greater than 3 inches from the front and back of the cabinet. Unless noted otherwise, holes extend to within 6 inches of the cabinet top and bottom.
- E. Attach hinges per manufacturer's written instructions.
- F. Countertops: Layout surface to minimize joints and avoid L-shaped pieces.
- G. Shop-cut openings to maximum extent possible to receive hardware, appliances, 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 wood substrates of countertops by saturating with varnish.
- H. For glass in wood frames, secure glass with removable stops.



## 2.8 SHOP FINISHING

- A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.
  - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 CABINET INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing screws for exposed fastening, countersunk and filled flush with woodwork.
  - 1. For shop finished items use filler matching finish of items being installed.
- F. Install cabinets 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 sag, bow, or other variation from a straight line.

2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
- G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.
  2. Seal junctures of tops, splashes, and walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.

### 3.3 SOLID SURFACE COUNTERTOP INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet.
- B. Tools: Cut and polish with water cooled powered tools or as recommended by the manufacturer.
- C. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items.
- D. Fasten countertops with silicon adhesive applied per top manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
1. Install backsplashes and endsplashes to comply with manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
  2. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- E. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- F. Cutouts:
1. Cutouts shall have a minimum of 3/8 inch radius.
  2. Where edges of cutouts will be exposed in finished work; ease corners and polish edges
- G. Laminate layers of surfacing material as required to create built up edges following procedures recommended by the manufacturer.

### 3.4 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, 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 cabinets on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 41 00

## SECTION 07 21 00 - FIBROUS BATT INSULATION

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Batt insulation in exterior wall and roof construction.
- B. Batt insulation for stuffing perimeter window shim spaces crevices in exterior wall/roof assembly.
- C. Batt insulation for acoustical purposes in walls and above ceilings.

#### 1.02 RELATED SECTIONS

- A. Section 09 29 00 - Gypsum Wallboard System.
- B. Section 09 51 13 - Acoustical Ceilings.

#### 1.03 REFERENCES

- A. ASTM C 518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
- B. ASTM C 665 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- C. ASTM E 84 - Test Method for Surface Burning Characteristics of Building Materials.
- D. ASTM E 96 - Test Method for Water Vapor Transmission of Materials.

#### 1.04 SUBMITTALS

- A. Submit manufacturer's product literature indicating location use of each product and installation instructions.
- B. Provide certification from manufacturer stating that insulation is in compliance with this specification.

#### 1.05 (NOT USED)

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Insulation
  - 1. Basis of Design: Johns Manville
  - 2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the

Conditions of the Contract and Division 01 Section "Substitutions".

- a. CertainTeed Corp.
- b. Owens-Corning Fiberglas Corp.

2.02 MATERIALS

- A. Type I Batt Insulation: Preformed fiberglass with formaldehyde free thermosetting resin; complying with ASTM C 665; without membrane.
- |                               |                 |
|-------------------------------|-----------------|
| Flame Spread per ASTM E 84    | Less than 25    |
| Smoke Developed per ASTM E 84 | Less than 50    |
| Max. perms per ASTM E 96      | N.A.            |
| Water Absorption              | Less than 0.05% |
- B. Type II Class A Category 1 (above ceiling): Polyethylene-wrapped sound control batt insulation, preformed fiberglass with formaldehyde free thermosetting resin complying with ASTM C 665, and with glass fiber portion classified as noncombustible when tested in accordance with ASTM C 136; wrapped with polyethylene.
- |                               |                 |
|-------------------------------|-----------------|
| Flame Spread per ASTM E 84    | Less than 25    |
| Smoke Developed per ASTM E 84 | Less than 50    |
| Max. perms per ASTM E 96      | 0.50            |
| Water Absorption              | Less than 0.05% |
- C. Type II Class C Batt Insulation: Preformed fiberglass with formaldehyde free thermosetting resin; complying with ASTM C 665, with nonreflective membrane one side.
- |                               |                 |
|-------------------------------|-----------------|
| Flame Spread per ASTM E 84    | N.A.            |
| Smoke Developed per ASTM E 84 | N.A.            |
| Max. perms per ASTM E 96      | 1.00            |
| Water Absorption              | Less than 0.05% |
- D. Type III Class A Batt Insulation: (FSK faced) Preformed fiberglass with formaldehyde free thermosetting resin; complying with ASTM C 665, with reflective FSK membrane one side.
- |                               |                 |
|-------------------------------|-----------------|
| Flame Spread per ASTM E 84    | 25              |
| Smoke Developed per ASTM E 84 | 50 or less      |
| Max. perms per ASTM E 96      | 0.05            |
| Water Absorption              | Less than 0.05% |
- E. Type III Class B Batt Insulation: Preformed fiberglass with formaldehyde free thermosetting resin; complying with ASTM C 665, with reflective membrane one side with a flame propagation resistance; critical radiant flux of .11 BTU/sq. ft. (0.12 W/cm<sup>2</sup>) or greater.
- |                               |                 |
|-------------------------------|-----------------|
| Flame Spread per ASTM E 84    | 75              |
| Smoke Developed per ASTM E 84 | 150             |
| Max. perms per ASTM E 96      | 0.50            |
| Water Absorption              | Less than 0.05% |
- F. Width of batt shall be to suit stud spacing, but typically is 16 inches (400 mm) for metal studs at 16 inches (400 mm) o.c. 24 inches (610 mm) for metal studs at 24 inches (610 mm) o.c.. Insulation shall friction fit stud spacing. It shall NOT be either larger nor smaller.
- G. R Value in accordance with ASTM C 518: 3-1/2 inch thickness - R value of 13 for walls,

13 inch thickness - R value of 38 for roof.

- H. Insulation for acoustical purposes above ceilings shall be formaldehyde free 13 inches (330 mm) thick (2 layers of 6-1/2 inches (165 mm)).
- I. Blown-in or Poured-in Insulation: R rating, fire rating and environmental criteria equivalent to adjacent batt insulation.
- J. Mineral Wool: 4 lb. (64 kg/m<sup>3</sup>) Density.
- K. Wire mesh, light gauge wire or metal straps of type and size as recommended for application.
- L. Nails or Staples: Of steel wire; type and size as recommended for application.
- M. Tape: 4 inch (100 mm) wide self-adhering type; bright aluminum for Type III Class A polyethylene for Type II Class C.

### PART 3 EXECUTION

#### 3.01 WORKMANSHIP

- A. Install batt insulation in exterior walls and roof without visible gaps or separations.
- B. Cut and trim insulation neatly, to fit spaces. Use batts free of ripped backs or edges.

#### 3.02 INSTALLATION

- A. Install batt insulation in accordance with manufacturer's recommendations. Install after mechanical and electrical services within walls and ceiling have been installed.
- B. Friction fit insulation within spaces and to and behind mechanical and electrical services within the plane of insulation. Leave no gaps or voids.
- C. For metal studs, install insulation, friction fit (with one end tucked into stud web). Do not tear or cut membrane insulation.
- D. Where stud space is deeper than thickness of batt, hold insulation in place with metal straps or wire.
- E. Entire building envelope including space formed by boxed members shall be insulated. Where the use of batt insulation is impossible, provide blown-in or poured-in insulation installed in accordance with manufacturer's recommendations.

#### 3.03 (NOT USED)

END OF SECTION 07 21 00

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## SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

### PART 1 GENERAL

#### 1.01 SECTION INCLUDES

- A. Metal flashing.
- B. Accessory materials.
- C. Counterflashings over base flashings.

#### 1.02 RELATED SECTIONS

- A. Section 06 10 00 - Rough Carpentry: Installation of wood blocking, nailers, grounds.
- B. Division 15 and 16 - Mechanical and Electrical: Flashing sleeves, collars for mechanical and/or electrical items projecting through membrane roofing, equipment curbs.
- C. Division 15 and 16 - Mechanical and Electrical: Counterflashings for roof mounted mechanical and electrical equipment/services.

#### 1.03 REFERENCES

- A. ASTM A 167 - Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
- B. ASTM A 653 - Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy coated (Galvannealed) by the Hot Dip Process, Commercial Quality.
- C. ASTM B 209 - Aluminum Alloy Sheet and Plate.
- D. ASTM B 221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes and Tubes.
- E. ASTM B 370 - Copper Sheet and Strip for Building Construction.
- F. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- G. ASTM D 4214 - Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
- H. AAMA 2605 - Specification for Superior High Performance Organic Coatings on Architectural Extrusions and Panels.
- I. AAMA 607.1 - Voluntary Guide Specifications and Inspection Methods for Clear Anodic Finishes for Architectural Aluminum.
- J. AAMA 608.1 - Voluntary Guide Specification and Inspection Methods for



Electrolytically Deposited Color Anodic Finishes for Architectural Aluminum.

K. AAMA 611 - Voluntary Standards for Anodized Architectural Aluminum.

L. Copper and Common Sense/Revere Copper Products, Inc.

M. SMACNA - Architectural Sheet Metal Manual.

1.04 (NOT USED)

1.05 (NOT USED)

1.06 WARRANTY

A. Provide Owner with a written warranty from Subcontractor stating that metal flashings will properly shed water and protect base flashings from physical damage for a minimum period of 2 years, and that all work will be repaired to satisfaction of Owner.

B. Provide Owner with a 15 year written warranty from manufacturer stating if their metal gravel stop or coping blows off, leaks, or causes membrane failure up to wind conditions of 110 mph (180 km/hr), the gravel stop or coping will be repaired or replaced.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Factory Fabricated Flashings

1. Basis of Design: Fry Reglet

2. Other Acceptable Manufacturers subject to compliance with requirements of Contract Documents as judged by the Architect, provide product by one of the manufacturers listed. If not listed, submit as substitution according to the Conditions of the Contract and Division 01 Section "Substitutions".

a. Revere Copper and Brass, Inc.

b. Keystone Flashing Co.

c. Cheney Flashing Co.

### 2.02 METAL FLASHING

A. Use SMACNA and Copper and Common Sense as standards of details and installation unless specifically shown otherwise. The Contractor has the option of using either stainless steel or copper, but the same material must be used throughout.

B. Stainless Steel: ASTM A 167; minimum 26 gauge; of Type 302/304 alloy, soft temper, 2D finish except as otherwise indicated.

C. Galvanized Steel: ASTM A 653; minimum 26 gauge with minimum 1.25 oz./sq.ft. (380 b/m<sup>2</sup>) galvanized coating.

### 2.03 ACCESSORIES

A. Fasteners: Concealed hook strip or clip type; of same material as flashings; sized to suit application.

- B. Reglets: Surface mounted and recessed galvanized steel.
- C. Solder and Flux: Type recommended for materials being used.
- D. Plastic Cement: Cutback asphaltic type.
- E. Rubber-Asphalt Sealing Compound.
- F. Bituminous Paint: Acid and alkali resistant type; black color.
- G. Sealant: One part silicone; nonstaining; nonbleeding; nonsagging; of color selected by Architect; manufactured by:
  - 1. Pecora: 864 or 890
  - 2. Dow 790
  - 3. Mobay Baysilone 900

## 2.09 FABRICATION

- A. Form sections square, true and accurate to size, free from distortion and other defects detrimental to appearance or performance.
- B. Form sections in 10 foot lengths or longer. Make allowances for expansion at joints.
- C. Seams are to be standing lock type except corners. Fabricate corners minimum 18 inches (450 mm) x 18 inches (450 mm) mitered, soldered or welded, and sealed as one piece.
- D. Wipe and wash clean, soldered joints, to remove traces of flux immediately after soldering.
- E. Hem exposed edges of flashings on underside 1/2 inch (13 mm).
- F. All interior flashing shall incorporate minimum 1-1/2 inch (38 mm) end dams to prevent water penetration to the interior.
- G. Backpaint flashings and all aluminum with bituminous paint where expected to be in contact with cementitious materials, preservative treated wood or dissimilar metals.
- H. Dowels penetrating flashing shall be capped with same material as flashing, soldered watertight to flashing. Aluminum cannot be soldered.

## PART 3 EXECUTION

### 3.01 PROTECTION

- A. Exercise care when working on or about roof surfaces.
- B. Provide protection panels to avoid damaging or puncturing membrane or flexible flashings.

### 3.02 INSTALLATION

- A. Form flashing into a continuous, unbroken, waterproof line, which will shed water to the

exterior of the building.

- B. All exposed flashing unless otherwise noted or specified shall be 26 gauge stainless steel or 16 oz. copper. Use 3-way mechanical bond flashing where required for masonry bond.
- C. Where metal cap flashing is indicated, use 3-way mechanical bond through-wall flashing with 2-piece factory formed cap flashing. Receiver portion shall have 3/16 inch (5 mm) high undercut saw tooth ribs at 3 inch (75 mm) intervals, and extend through wall and terminate with 1/4 inch (6 mm) hook dam as detailed; end joints shall overlap at least 1-1/2 inches (38 mm) and interlock to form watertight joints; edge to which counterflashing insert member connects shall have locking slot to secure insert member. Lap and interlock end joints of insert member. Insert member shall be not less than 4 inches (100 mm) wide, formed to snap into receiver locking slot.
- D. Install surface mounted reglets true to lines and levels. Seal top and ends of reglets with sealant.
- E. Secure flashings in place using specified type fasteners. Use exposed fasteners in locations approved by Architect. Exposed fasteners shall be of same finish as flashings. Make provision for expansion and contraction in all metal work.
- F. Insert spring lock metal flashings into reglets to form tight fit. Seal flashings into reglets with sealant.
- G. Apply sealing compound at junction of metal flashings and roofing membrane flashings.
- H. Lock seams and end joints; solder seams except where loose lock is indicated or where expansion provision is required. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- I. Direct contact between dissimilar metals and between metal flashings and preservative treated lumber is prohibited.

END OF SECTION 07 62 00