

SECTION 04 2731

REINFORCED UNIT MASONRY

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction, and General Provisions of the Contract, including General and Supplementary Conditions and Division - 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Concrete Block.
 - 1. Includes acoustical, burnished, scored, and glazed block as they occur in reinforced unit masonry walls.
- B. Mortar and Grout.
- C. Reinforcement and Anchorage.
- D. Accessories.

1.03 RELATED REQUIREMENTS

- A. Section 01 4533 - Structural Testing and Special Inspection
- B. Section 03 1510 - Post-Installed Anchors.
- C. Section 03 3000 - Cast-in-Place Concrete.
- D. Section 05 1200 - Structural Steel Framing: Bearing plates embedded in masonry.
- E. Section 05 4000 - Cold Formed Metal Framing:.

1.04 REFERENCE STANDARDS

- A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 2005.
- B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2005.
- C. ASTM A 82/A 82M - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2007.
- D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2005.
- E. ASTM C 90 - Standard Specification for Loadbearing Concrete Masonry Units; 2006b.
- F. ASTM C 94/C 94M - Standard Specification for Ready-Mixed Concrete; 2007.
- G. ASTM C 140 - Standard Test Methods of Sampling and Testing Concrete Masonry Units and Related Units; 2007a.
- H. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar; 2004.
- I. ASTM C 150 - Standard Specification for Portland Cement; 2007.
- J. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006.
- K. ASTM C 270 - Standard Specification for Mortar for Unit Masonry; 2007a.
- L. ASTM C 387 - Standard Specification for Packaged, Dry, Combined Materials for Mortar and Concrete; 2006.
- M. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout; 2007.
- N. ASTM C 476 - Standard Specification for Grout for Masonry; 2008.
- O. ASTM C 1019 - Standard Test Method for Sampling and Testing Grout; 2008.

- P. ASTM C 1314 - Standard Test Method for Compressive Strength of Masonry Prisms; 2007.
- Q. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 2006.
- R. IBC - International Building Code; International Code Council Edition as enforced by local jurisdiction.

1.05 SUBMITTALS

- A. See Section 01 3300 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units and fabricated wire reinforcement.
- C. Product Data: Include mortar and grout design mix and indicate whether the Proportion or Property specification of ASTM C 270 is to be used. Also include required environmental conditions and admixture limitations. Provide mix designs not less than 14 days prior to beginning masonry work.
- D. Reports: Submit reports of masonry unit strength tests prior to starting work.
- E. Reports: Submit reports on mortar indicating conformance of component mortar materials to requirements of ASTM C 270.
- F. Reports: Submit reports on grout indicating conformance of component grout materials to requirements of ASTM C 476 and test and evaluation reports to requirements of ASTM C 1019.
- G. Shop Drawings: Indicate bar sizes, spacings, reinforcement quantities, bending and cutting schedules, reinforcement supporting and spacing devices, and accessories.
- H. Shop Drawings: Provide drawing showing location of all proposed block control joints.
- I. Manufacturer's Instructions: Submit packaged dry mortar manufacturer's installation instructions.
- J. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Comply with provisions of IBC and ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

1.07 MOCK-UP

- A. If plain block shapes are used for reinforced walls, construct a masonry wall mock-up as a grout demonstration panel sized 4 feet long by 4 feet high, which includes mortar and accessories, reinforcement, and grout, to demonstrate proper grouting can be achieved. Destructive testing of this panel may be necessary to demonstrate compliance.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.
- B. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

1.09 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of ACI 530.1/ASCE 6/TMS 602 this section or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 CONCRETE MASONRY UNITS

- A. Concrete Block: Comply with referenced standards and as follows:
1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
 2. Strength: Minimum unit strength as required by ACI 530.1 to achieve prism strengths shown on drawings.
 3. Shapes: Provide double end or open core shapes for reinforced masonry walls excluding lintel, cap, and sill block units.
 - a. Plain shapes may be used in non-reinforced areas.
 - b. Plain shapes may be substituted for the above subject to grout demonstration panel and additional grouting requirements of this section.
 4. Special Shapes: Provide non-standard blocks configured for corners, lintels, headers, control joint edges, and other locations as specified in Section 04 20 00.
 5. Load-Bearing Units: ASTM C 90, normal weight.
 - a. Hollow block.
 - b. Exposed faces: Manufacturer's standard color and texture where indicated.
 - 1) See Section 04 2000 for acoustical, burnished, scored, and glazed block.

2.02 MORTAR AND GROUT MATERIALS

- A. Materials Not Permitted: Masonry cement, anti-freeze, salts.
- B. Packaged Dry Mortar: ASTM C 387, Type as given below for location in structure, using gray color cement.
- C. Portland Cement: ASTM C 150, Type I.
- D. Hydrated Lime: ASTM C 207, Type S.
- E. Mortar Aggregate: ASTM C 144.
- F. Grout Aggregate: ASTM C 404.
- G. Water: Clean and potable.
- H. Accelerating Admixture: Nonchloride type for use in cold weather. Obtain Architect's approval prior to use.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Reinforcing Steel: ASTM A615, Grade 60; size as indicated on drawings; uncoated finish.
- B. Single Wythe Joint Reinforcement: Ladder type; ASTM A 82/A 82M steel wire, hot dip galvanized after fabrication to ASTM A 153/A 153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.
- C. Adjustable Multiple Wythe Joint Reinforcement: Ladder type with adjustable ties or tabs spaced at 16 in on center ASTM A 82/A 82M steel wire, hot dip galvanized after fabrication to ASTM A 153/A 153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
 1. Vertical adjustment: Not less than 2 inches.
- D. Rigid Anchors for Intersecting Bearing Walls: 1-1/2" wide by 24" long by 1/4" thick with ends turned up 2". Hot-dip galvanized, ASTM A153, Class B.

2.04 ACCESSORIES

- A. Reinforcing Bar Positioners: Adequate to hold reinforcing bars in specified locations without displacement during grouting operations.
- B. Post-installed anchors and reinforcing: See Section 03 1510
- C. Preformed Control Joints: Polyvinyl chloride material. Provide with corner and tee accessories, fused joints. Minimum Shore Durometer hardness of 80, 5/8" thick shear section with 5/16" thick flanges, total width not less than 2-3/8".
- D. Building Paper: ASTM D 226, Type I ("No. 15") asphalt felt.
- E. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

2.05 MORTAR MIXES

- A. Mortar for Unit Masonry: ASTM C 270, using the Property Specification.
 - 1. Engineered masonry: Type S.
 - 2. Masonry below grade and in contact with earth: Type M.
 - 3. Exterior, loadbearing masonry: Type S.
 - 4. Interior, loadbearing masonry: Type S.

2.06 MORTAR MIXING

- A. Control and accurately maintain specified proportions of the mortar materials during the entire progress of the work.
- B. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C270 and in quantities needed for immediate use.
 - 1. Mix prepackaged dry mortar in accordance with manufacturer's written instructions.
- C. Maintain sand uniformly damp immediately before the mixing process.
- D. Do not use anti-freeze compounds to lower the freezing point of mortar.
- E. If water is lost by evaporation, re-temper only within two hours of mixing.

2.07 GROUT MIXES

- A. Bond Beams, Lintels, and Grouted Cores: 3,000 psi strength at 28 days; 8-10 inches slump; provide premixed type according to ASTM C94/C94M, or mix according to ATM C476.
 - 1. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
 - 2. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

2.08 GROUT MIXING

- A. Mix premixed grout in accordance with ASTM C 94/C 94M.
- B. Thoroughly mix site mixed grout ingredients in quantities needed for immediate use in accordance with ASTM C 476 for fine and coarse grout.
- C. Add admixtures in accordance with manufacturer's instructions; mix uniformly.
- D. Do not use anti-freeze compounds to lower the freezing point of grout.

2.09 PRECONSTRUCTION TESTING

- A. Testing will be conducted by an independent test agency, in accordance with provisions of Section 01 4533.

- B. Concrete Masonry: Test each type, class, and grade of concrete masonry unit in accordance with ASTM C 140 for conformance to requirements of this specification.
 - 1. Provide test for each different masonry unit width, face shell thickness, and concrete unit weight.
 - 2. Supplier production test results may be used if tests are not more than 90 days old and supplier furnishes a certification that the units meet the requirements of this section.
- C. Mortar Mixes: Test mortars for consistency, compressive strength, and water retentivity in accordance with ASTM C 780 recommendations for preconstruction testing.
 - 1. Preconstruction tests will be used to establish optimum mortar proportions and establish quality control values for construction testing. Preconstruction tests are not required to meet the compressive strength requirements of ASTM C270.
- D. Grout Mixes: Test grout batches in accordance with ASTM C 1019 procedures.
 - 1. Test results will be used to establish optimum grout proportions and establish quality control values for construction testing.
- E. Compressive Strength: Test masonry prisms in accordance with ASTM C 1314.
 - 1. Prepare two sets of three prisms; test one set at 7 days and the other at 28 days.
 - 2. Prepare sets for each different unit size, face shell thickness, and concrete unit weight.
 - 3. Complete 28 day test of prisms prior to the start of masonry construction.
 - 4. Concrete masonry prisms: Height-to-thickness ratio of not less than 1.33 and not more than 5.0; apply correction factor per ACI 530.1/ASCE 6/TMS 602 for ratio other than 2.0.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that preconstruction testing has been completed.
- B. Verify that field conditions are acceptable and are ready to receive masonry. Resolve out-of-tolerance conditions prior to starting work.
- C. Verify that reinforcing dowels are positioned in accordance with the drawings.
- D. Verify that related items provided under other sections are properly sized and located.
- E. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.
- B. Clean reinforcement of loose rust.
- C. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.
- D. For areas where high-lift grouting will be employed and grout pour height exceeds 5 feet, provide cleanout openings as follows:
 - 1. Hollow Masonry: Not less than 8 inches high at the bottom of each cell to be grouted, formed by cutting out face shell of masonry unit.

3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:

1. Bond: Running.
2. Coursing: One unit and one mortar joint to equal 8 inches.
3. Mortar Joints: Concave.

3.04 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints. Provide full mortar bed at footings, grouted cores, foundations, and slabs.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar as work progresses.
- E. Interlock intersections and external corners.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- H. Cut mortar joints flush where wall tile is scheduled.
- I. Build all chases and recesses as shown on the Drawings or required by all trades. Cut all masonry units to fit neatly around conduit or piping, outlet boxes, etc. Set grilles and other equipment furnished by others as required in masonry.
- J. Provide cleanouts in the bottom course of each grout pour at each grouted core when the grout pour height exceeds 5 feet..
- K. Do not enclose mechanical, electrical or work specified in other sections until such work has been inspected and approved by the proper local code authority and by the Engineer if required.
- L. Install loose lintels, anchors, bolts, dowels, grounds, angles, plates, grilles, or similar items required for anchorage of other work. Refer to Drawings for specific bearing conditions.
- M. Discard all mortar that has begun to stiffen or is not used within 2-1/2 hours of initial mixing. Maintain workability of mortar within the 2-1/2 hour period by retempering or remixing.

3.05 REINFORCEMENT AND ANCHORAGE

- A. Reinforcement Bars: Secure at locations indicated and to avoid displacement during grouting. Minimum spacing between bars or to masonry surfaces shall be one bar diameter.
 1. Place reinforcing bar positioners at top course and bottom course of grout lift and not more than 200 bar diameters on center.
- B. Joint Reinforcement: Install horizontal joint reinforcement 16 inches on center.
 1. Place masonry joint reinforcing in first joint above bottom of wall.
 2. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.
 3. Place continuous joint reinforcement in first and second joint below top of walls.
 4. Lap joint reinforcement ends minimum 6 inches.
 5. Provide prefabricated corner or tee sections at intersecting walls.
- C. Anchors: Reinforce intersections between interior and exterior walls with rigid wall anchors 16 inches on center.

- D. Anchors: Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 16 inches horizontally and 16 inches vertically.
- E. Wall Ties: Install wall ties at locations indicated, spaced at not more than 16 inches on center horizontally and 16 inches on center vertically, unless otherwise indicated on drawings.
- F. Reinforced Hollow Unit Masonry: Keep vertical cores to be grouted clear of mortar, including bed area of first course.
 - 1. Grouted Cores: Construct masonry walls to provide continuous vertical cores with a clear area not less than 3"x4" and sufficient to provide a minimum 8" long solid section.
 - 2. Plain Block at Grouted Core Locations: Place block to provide a continuous vertical section of grouted wall, minimum 8" and maximum 12" long.

3.06 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.

3.07 GROUTING

- A. Definitions
 - 1. Grout Pour: The total height of masonry to be grouted prior to the construction of additional masonry. A grout pour consists of one or more grout lifts. If the grout is to be placed only to a partial height of the constructed masonry, the grout pour is the full height of the constructed masonry.
 - 2. Grout Lift: An increment of grout height within a total grout pour.
- B. Use either high-lift or low-lift grouting techniques, at Contractor's option, subject to other limitations of contract documents.
- C. If plain block are used at grouted wall locations, fill cores with grout to provide a vertically continuous section of solid masonry wall a minimum of 8" and a maximum of 12" long.
- D. Consolidate grout by mechanical vibration.
- E. Low-Lift Grouting:
 - 1. Limit height of lifts to 16 inches.
 - 2. Limit height of masonry to 16 inches above each pour.
 - 3. Limit grout pours to maximum 5 feet.
 - 4. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
 - 5. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.
- F. High-Lift Grouting:
 - 1. Verify that horizontal and vertical reinforcement is in proper position and adequately secured before beginning pours.
 - 2. Clean out masonry cells and other cavities to be grouted by high pressure water spray or compressed air. Remove debris, allow to dry, and inspect before sealing cleanout openings.
 - 3. Hollow Masonry: Limit lifts to maximum 5 feet and pours to maximum height of 24 feet.
 - 4. If plain masonry unit shapes are used at grouted locations, limit pour heights to 4 feet.
 - 5. Place grout for spanning elements in single, continuous pour.

G. Concrete Block Lintels and Bond Beams: Fill block lintels and bond beams with grout and consolidate.

1. Fill lintels and bond beams more than one course high in a single continuous pour.

3.08 COLD WEATHER CONSTRUCTION

A. These procedures apply when the ambient temperature falls below 40° F, or the temperature of masonry units is below 40° F.

B. Construction

1. Minimum masonry unit temperature of 20° F when laid in the wall. Remove visible ice on masonry units before the unit is laid in the masonry.
2. Heat mortar sand or mixing water to produce mortar temperatures between 40° F and 120° F at the time of mixing. Maintain mortar above freezing until installed.
3. When ambient temperatures are between 25° F and 20° F, use heat sources on both sides of the masonry under construction and install windbreaks when wind velocity exceeds 15 mph.
4. When ambient temperatures are below 20° F, provide an enclosure for the masonry under construction and use heat sources to maintain temperatures above 32° F within the enclosure.

C. Protection

1. When mean daily temperatures are between 40° F and 32° F protect completed masonry from rain or snow by covering with a weather resistive membrane for 24 hours after construction.
2. When mean daily temperatures are between 32° F, and 25° F completely cover completed masonry with a weather resistive membrane for 24 hours after construction.
3. When mean daily temperatures are between 25° F and 20° F, completely cover completed masonry with insulating blankets or equal protection for 48 hours after construction. Protection time may be reduced to 24 hours for ungrouted masonry.
4. When mean daily temperatures are below 20° F, maintain masonry temperature above 32° F for 48 hours after construction by enclosure with supplementary heat, by electric heating blankets, by infrared heat lamps, or by other acceptable methods. Protection time may be reduced to 24 hours for ungrouted masonry.

3.09 HOT WEATHER CONSTRUCTION

A. Employ the requirements of this section when the ambient temperature exceeds 100°F or exceeds 90°F with a wind velocity greater than 8 mph.

B. Construction

1. Maintain the temperature of mortar and grout below 120°F.
2. Flush mixers, mortar transport containers and mortar boards with cool water before they come into contact with mortar ingredients or mortar.
3. Maintain mortar consistency by retempering with cool water.
4. Use mortar within 2 hours of initial mixing.

C. Protection: Fog spray newly constructed masonry until damp at least three times a day until the masonry is three days old.

3.10 CONTROL JOINTS

A. Provide control joints as indicated on drawings, but not to exceed 24 feet on center.

B. Do not continue horizontal joint reinforcement through control joints.

C. Top of wall bond beam reinforcement extends through control joints.

- D. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- E. Keep expansion joint voids clear of mortar.

3.11 BUILT-IN WORK

- A. As work progresses, install built-in anchor bolts and plates and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
- D. Do not build into masonry construction organic materials that are subject to deterioration.

3.12 TOLERANCES

- A. Erection tolerances for masonry work shall be as specified in ACI 530.1.

3.13 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.14 FIELD QUALITY CONTROL

A. Structural Testing and Special Inspection

1. Structural Testing and Special Inspection shall be performed by qualified parties as specified herein, and in accordance with the provisions of Section 01 4533.
2. For items indicated below to be performed on a periodic basis, provide inspections at least once per 500 square feet, and for 100% of all shear walls, masonry beams, and masonry columns.
3. Personnel Qualifications
 - a. Testing Technician: Technical I - NCMA Concrete Masonry Testing Technician (or equivalent), employed by a testing laboratory with C.C.R.L. certification at the National Bureau of Standards, under the direct supervision of a licensed civil/structural engineer. The licensed engineer shall review and approve all reports.
 - b. Special Inspector - Structural I: ICBO certified masonry inspector, or a graduate civil/structural engineer or other personnel acceptable to the Structural Engineer of Record (SER) with experience in the design of structural systems of this type. Inspections shall be performed under the direct supervision of a licensed structural engineer, as defined in Section 01 4533. The licensed engineer shall review and approve all inspection reports
4. The Owner will provide the following tests:
 - a. Concrete masonry unit compressive strength according to ASTM C140. One set of tests of each size block for the first 500 square feet installed and for each additional 5,000 square feet or portion thereof.
 - b. Concrete masonry prism test for compressive strength according to ASTM C1314, only if permission has been granted to use prism strength tests to establish prism strength. Conduct two sets of three prisms for each 5,000 square feet of block installed. Test one set at 7 days and one set at 28 days. Test one set of three individual units for compressive strength according to ASTM C140 along with each prism. Individual units shall be representative of masonry in the prism. Qualifications: Technical I.
 - c. Test mortar for consistency, water content, mortar aggregate ratio, air content (for air-entrained mortars), and compressive strength, according to ASTM C780. Conduct one test for each 2,500 square feet of wall area. Qualifications: Technical I.

- d. Test and evaluate grout according to ASTM C 1019 procedures. Test with same frequency as specified for masonry units. Qualifications: Technical I
- e. Observe preparation of masonry wall prisms or selection of masonry units for strength tests and preparation of grout specimens and mortar specimens. Qualifications: Structural I.
- f. At the beginning of masonry construction, observe proportions of site-prepared mortar, construction of mortar joints, and location of reinforcement and connectors. Qualifications: Structural I.
- g. On a periodic basis, verify size and location of structural elements; type, size and location of anchors including anchors to structural members or other construction, grade, size, and type of reinforcing; welding of reinforcing bars; and hot and cold weather protection. Qualifications: Structural I.
- h. On a periodic basis prior to grouting, verify that grout space is clean, placement of reinforcing and connectors, proportions of site-prepared grout, and construction of mortar joints. Qualifications: Structural I.
- i. On a periodic basis, observe grout placement to verify compliance with code and construction documents. Grouting of shear walls, columns, and beams deeper than 24" to be performed on a continuous basis. Qualifications: Structural I.

3.15 MORTAR ACCEPTANCE CRITERIA

- A. Mortar aggregate ratio tests shall show component proportions within 10% of the design mix proportions where mortar mix proportions are determined by ASTM C270 property specification.

3.16 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. At completion clean all exposed masonry surfaces. Remove all excess mortar, mortar stains, efflorescence, etc., to provide a uniform appearance. Materials and methods of cleaning shall be as recommended by masonry material manufacturer. Cut out and repoint defective joints. Protect other work to prevent staining and damage.
- C. Clean soiled surfaces with cleaning solution.
- D. Use non-metallic tools in cleaning operations.

3.17 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.
- B. Adequately brace all work to prevent damage of any kind. Mask, barricade or similarly protect work as required from damage during building operations. Protect installed material as necessary to prevent staining or damage from the elements.
- C. Provide temporary bracing of masonry during erection. Do not remove bracing until building structure provides permanent bracing.
- D. During erection, keep all walls dry by covering the top with a strong, waterproof membrane at each shutdown and the end of each day. Cover partially completed walls at all times when work is not in progress. Extend cover a minimum of 2 feet down both sides, and securely hold in place.

END OF SECTION

SECTION 05 1200

STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction, and General Provisions of the Contract, including General and Supplementary Conditions and Division - 1 Specification Sections, apply to this Section.

1.02 SECTION INCLUDES

- A. Structural steel framing members.
 - 1. Steel will not be fireproofed.
- B. Base plates and headed studs.

1.03 RELATED REQUIREMENTS

- A. Section 01 4533 - Structural Testing and Special Inspection.
- B. Section 03 1510 - Post-Installed Anchors.
- C. Section 05 4000 - Cold Formed Metal Framing. Cold formed framing affecting structural steel work.
- D. Section 05 5000 - Metal Fabrications: Steel fabrications affecting structural steel work.

1.04 REFERENCE STANDARDS

- A. AISC (MAN) - Steel Construction Manual; American Institute of Steel Construction, Inc.; 2005.
- B. AISC 360 - Specification for Steel Buildings; American Institute of Steel Construction, Inc.; 2005.
- C. AISC S303 - Code of Standard Practice for Steel Buildings and Bridges; American Institute of Steel Construction, Inc.; 2005.
- D. AISC S348 (Research Council on Structural Connections) - Specification for Structural Joints Using ASTM A325 or A490 Bolts; 2004.
- E. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2005.
- F. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2007.
- G. ASTM A 108 - Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished; 2007.
- H. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.
- I. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength; 2007b.
- J. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2009.
- K. ASTM A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2009.
- L. ASTM A496-02 - Steel Wire, Deformed, for Concrete Reinforcement
- M. ASTM A 500/A 500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2007.
- N. ASTM A 563 - Standard Specification for Carbon and Alloy Steel Nuts; 2007a.
- O. ASTM A 563M - Standard Specification for Carbon and Alloy Steel Nuts [Metric]; 2007.

- P. ASTM A780 - Standard Specification for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings; 2001
- Q. ASTM A 992/A 992M - Standard Specification for Structural Steel Shapes; 2006a.
- R. ASTM E 709 - Standard Guide for Magnetic Particle Testing; 2008.
- S. ASTM F 436 - Standard Specification for Hardened Steel Washers; 2009.
- T. ASTM F 959 - Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners; 2007a.
- U. ASTM F 1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength; 2007a.
- V. ASTM F1852 - Twist Off Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2002
- W. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 2007.
- X. AWS D1.1/D1.1M - Structural Welding Code - Steel; American Welding Society; 2008.
- Y. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002 (Ed. 2004).

1.05 SUBMITTALS

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 1. Review the Contract Documents prior to preparing shop drawings to determine if the structure is in conflict with OSHA requirements or any other safety regulation. Notify the Architect if any conflicts are noted. Do not prepare shop drawings affected by the conflict until the conflict is resolved.
 2. Prepare complete shop and setting drawings based on referenced AISC Specifications.
 3. Indicate profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
 4. Indicate type and location of shop and field connections. Detail all required field welds.
 5. Indicate cambers.
 6. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
 7. Clearly indicate members considered to be Architecturally Exposed Structural Steel (AESS) and detail members and connections consistent with AESS criteria included in this specification section.
 8. If shop drawings are resubmitted after the original review, identify all changes made to the shop drawings after the original submittal with clouds or similar markings.
- C. Submit AISC Quality Certification Program certificates (for reduction in shop special inspections only if the fabricator is so certified) and welder qualifications to the Special Inspector-Technical.
- D. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification within the previous 12 months.

1.06 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with AISC "Manual of Steel Construction".

- B. Fabricator: Company specializing in performing the Work of this Section with minimum five years of documented experience. Fabrication plant shall be certified in category I or II according to the requirements of the AISC Quality Certification Program and shall be acceptable to and approved in writing by the structural engineer, Architect, and building official. Do not proceed with steel fabrication until the Architect has provided final written approval.
 - 1. As an alternative to fabricator certification, the Contractor may pay for full time inspection during the fabrication of the Project steel. This inspection shall be conducted by the Owner's inspection company at the fabrication plant. In addition, the fabrication plant shall also be acceptable to and approved in writing by the Structural Engineer, Architect, and Building Official. Do not proceed with the Work until the A/E has provided final written approval.
- C. Design connections not detailed on the drawings under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- D. Codes and Standards:
 - 1. AISC - Manual of Steel Construction.
 - 2. AISC 360 - Specification for Structural Steel Buildings
 - 3. AISC - Code of Standard Practice for Steel Buildings and Bridges
 - 4. AWS D1.1.
 - 5. AISC S348 - Specification for Structural Joints Using ASTM A325 or A490 Bolts
 - 6. SSPC - SSPC Painting Manual - Volume 2
- E. Provide personnel qualified according to AWS D1.1 for all shop and field welding.

1.08 PROJECT/SITE CONDITIONS

- A. Verify all dimensions given on the Drawings and make such field measurements as are necessary to lay out the work properly and assure proper elevations. Be fully responsible for accuracy of all measurements and laying out of the work.
- B. Upon execution of a licensing agreement and payment of a service fee determined by engineer, the engineer will make electronic versions of structural framing plans available to the contractor for the purpose of preparing erection drawings.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Steel Angles, Plates, and Channels: ASTM A 36/A 36M.
- B. Steel W Shapes and Tees: ASTM A 992/A 992M.
- C. Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B.
- D. Pipe: ASTM A 53/A 53M, Grade B, Finish black.
- E. Structural Bolts and Nuts: Carbon steel, ASTM A 307, Grade A.
- F. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, medium carbon, plain.
 - 1. Tension control bolts meeting ASTM F1852 are also acceptable.
- G. Unheaded Anchor Rods: ASTM F 1554, Grade 36, plain, with matching ASTM A 563 or A 563M nuts and ASTM F 436 Type 1 washers. Hot dip galvanize where noted.
- H. Load Indicator Washers: Provide washers complying with ASTM F 959 at all connections requiring high-strength bolts. Not required if tension control bolts are used.
- I. Welding Materials: AISC Specification A35 and referenced AWS specifications, type required for materials being welded, E70 electrodes.

- J. Shop and Touch-Up Primer: Fabricator's standard, compatible with finish coatings, complying with VOC limitations of authorities having jurisdiction.
- K. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.
- L. Post-installed anchors: See Section 03 1510
- M. Deformed Bar Anchors: ASTM A496, AWS D.1, Chapter 7, arc stud welded.

2.02 FABRICATION

- A. Fabricate according to referenced AISC publications.
- B. Shop fabricate to greatest extent possible.
- C. Do not substitute sections or modify details without written approval of the Structural Engineer. Provide full-length pieces between connections or splices indicated on the drawings. Do not permit built-up lengths. Do not use warped or damaged sections.
- D. Design shop and field connections unless detailed on the Drawings. Use standard connections as shown in Part 9 of the AISC Manual where possible. Bolt field connections, unless otherwise indicated on the Drawings.
- E. Perform bracing, blocking, cutting, fitting, drilling, tapping, welding, punching, etc., as required to complete work and to join work of others. Weld clip angles and plates to beams and punch holes for fastening work of other trades as shown on the Drawings.
- F. Furnish anchor bolts of size and type shown on the drawings for all field connections to be permanently bolted to concrete or masonry.

2.03 FINISH

- A. Prepare structural component surfaces in accordance with SSPC SP 3 unless otherwise indicated.
- B. Prepare faying surfaces at slip-critical bolted connections according to the requirements of AISC S348.
- C. Shop prime structural steel members to a DFT of 2.0 - 3.5 mils. Do not prime surfaces that will be fireproofed or field welded.
- D. Galvanize structural steel exposed to weather, lintels in exterior masonry walls, embedded in concrete (exterior or interior), and shelf angles and plates in exterior masonry walls to comply with ASTM A123/A123M
 - 1. Prepare items to be galvanized in accordance with ASTM A385.
 - 2. Close and seal weld vent holes in pipes, tubes, and other closed members. Touch up damaged areas using procedures and products from ASTM A780.

2.04 SOURCE QUALITY CONTROL

- A. If Fabricator is not a Category I AISC certified fabricator, see field quality control section of Part 3 for special inspection requirements of shop fabricated work.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

- A. Erect structural steel in compliance with AISC "Code of Standard Practice for Steel Buildings and Bridges".
- B. Allow for erection loads, and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing.
- C. Exercise care in handling structural steel during unloading, storage, and erection to prevent bends, twists, or other damage.
- D. Place structural steel stored at the site on substantial shores or blocking. Provide shores or blocking of sufficient size and strength to prevent any part of the steel from touching the ground.

- E. Remove dirt, oil, loose scale, burrs, pits, paint and other defects that would prevent solid seating of parts.
- F. Field weld components indicated on shop drawings.
- G. Use carbon steel bolts only for temporary bracing during construction, unless otherwise specifically permitted on drawings. Install high-strength bolts in accordance with AISC "Specification for Structural Joints Using ASTM A325 or A490 Bolts".
- H. Where A307 bolts are used, tighten to a snug tight fit as obtained with the full effort of a man using an ordinary spud wrench. Verify that all parts are in contact. Use self-locking nuts or upset bolt threads to prevent nuts from bracing off.
- I. Where A325 bolts are used, tighten bolts and provide washers in accordance with "Specification for Structural Joints Using ASTM A325 or A490 Bolts". Use tension control bolts or direct tension indicators for slip-critical (SC) and fully tensioned bolts (FT).
- J. Pre-heat material to be welded and maintain interpass temperatures as required. Do not weld below 0 degrees F.
- K. Remove all ceramic welding ferrules from shear studs.
- L. Do not cut steel or enlarge holes without written approval of the Structural Engineer.
- M. Do not field cut or alter structural members without approval of Architect and Structural Engineer.
- N. After erection, prime welds, abrasions, and surfaces not shop primed, except surfaces to be in contact with concrete or specified to be unprimed.
- O. Repair or replace structural steel damaged during shipment, unloading, or erection at no cost to the Owner.
- P. Install expansion and adhesive anchors in strict accordance with manufacturer's recommendations.

3.03 CLEANING AND REPAIR

- A. After erection and welding of steel, remove clay, mud or other foreign materials from all members.
- B. Apply a field touch-up coat of paint on all welded connections and damaged areas using the same color and type of paint used on the shop coat.
- C. Repair damaged galvanized members with procedures and products from ASTM A780.

3.04 FIELD QUALITY CONTROL

- A. Structural Testing and Special Inspection
 - 1. Structural Special Inspection shall be performed by qualified parties as specified herein, and in accordance with the provision of Section 01 4533.
 - 2. If special inspection of Fabricator's work is required, special inspector may test and inspect structural steel at plant before shipment.
 - 3. Definitions:
 - a. ASNT - American Society for Non-Destructive Testing
 - b. CAWI - American Welding Society Certified Associate Weld Inspector
 - c. CWI - American Welding Society Certified Weld Inspector
 - 4. Personnel Qualifications
 - a. Special Inspector Technical I: CAWI or ASNT Level I, employed by a testing agency and supervised by a CWI or ASNT Level III with a minimum of 10 years experience.
 - b. Special Inspector Technical II: CAWI with minimum 3 years experience or ASNT Level II, employed by a testing agency and supervised by a CWI or ASNT Level III with a minimum of 10 years experience.

- c. Special Inspector – Structural I: Graduate civil/structural engineer, or other personnel acceptable to the SER, with experience in design of structural systems of the project type. Inspections shall be performed under the direct supervision of a licensed structural engineer, as defined in Section 01 4533. The licensed engineer shall review and approve all inspection reports.
 - d. Individuals performing welding inspection must be AWS certified.
5. The Owner will provide the following tests and inspections:
- a. Shop Fabricated Work: Perform tests and inspections required below, except bolt and welding inspections may be reduced or deleted, if fabrication shop satisfies AISC Quality Certification Program - Category I, or more stringent criteria, or is approved by Building Official and SER.
 - b. Test high strength bolted connections according to the requirements of RCSC "Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts", and as follows:
 - 1) Preparation: Visually inspect mating surfaces and bolt type for all bolted connections for general conformance with the contract documents prior to bolting. Qualifications: Technical II.
 - 2) Slip Critical Bolts and Fully Tensioned Bolts: Visually observe all connections. Verify that all plies of connected elements have been brought into contact. Verify all tips are removed from "twist-off" bolts or direct tension indicators show fully tensioned bolts. Qualifications: Technical II.
 - 3) Bearing Bolts: Visually observe all connections to confirm all plies of connected elements have been brought into contact. (Applies only to bolts designed with threads included in failure plane; all other bolts require testing as for fully tensioned bolts.) Qualifications: Technical II.
 - c. Welding Procedures and Preparation: Qualifications: Technical II. Verify the following:
 - 1) Qualifications of all welders as AWS certified.
 - 2) Proposed welding procedures and materials.
 - 3) Adequate preparation of fraying surfaces.
 - 4) Preheat and interpass temperatures of steel, proper technique and sequence of welding, and cleaning and number of passes.
 - d. Test and inspect welding as follows
 - 1) Fillet Welds: Visually inspect 100% of all fillet welds, for size, length, and quality, per AWS D1.1. Qualifications: Technical II.
 - 2) Partial Penetration Welds: Test 100% of all partial penetration welds exceeding 5/16 inch, using Ultrasonic Testing per AWS D1.1, Section 6. Visually inspect 100 % and test 25% of all penetration welds less than 5/16 inch using Magnetic Particle Testing per ASTM E 709 performed on root pass and on finished weld. Qualifications: Technical II.
 - 3) Full Penetration Welds: Test 100% of all full penetration welds exceeding 5/16 inch, using Ultrasonic Testing per AWS D1.1 Section 6. Visually inspect 100% and test 25% of all full penetration welds less than 5/16 inch, using Magnetic Particle Testing per ASTM E 709 performed on root pass and on finished weld. Qualifications: Technical II.
 - e. Submittals: Verify mill test reports and other submitted documentation for compliance with contract documents. Qualifications: Structural I
 - F. Materials: Verify materials delivered to site comply with contract documents and approved shop drawings. Qualifications: Technical I
 - G. Detail Compatibility: On a periodic basis, inspect the following to verify member orientation, configuration, type, and size comply with details indicated on the contract documents and shop drawings. Qualifications: Structural I.
 - 1) Permanent bracing and stiffening members.
 - 2) Proper applications of joint details and conditions. Observations need not exceed 25% at standard connections.
 - 3) Other work critical to the integrity of the building structure.

END OF SECTION

SECTION 05 50 00

METAL FABRICATIONS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes: All labor, material necessary to complete all items of miscellaneous metal as listed on the schedule in Part 2 and shown on the Drawings.
1. The design, fabrication, transportation to the project site, and associated operations required to complete miscellaneous metals, including all the various metal items manufactured to more or less standard details in sizes conforming to specific requirements of the project.
- B. Related work specified in other sections:
1. Structural Testing and Special Inspection – Section 01 45 33.
 2. Installation of loose lintels and other items embedded in concrete masonry - Section 03 30 00 and 04 20 00.
 3. Steel support brackets for countertops - Section 06 40 00/06 41 00/12 32 16.

1.03 REFERENCE STANDARDS

- A. The following specifications and standards are incorporated by reference. Materials and operations shall comply with requirements of the specified issue of published reference. Where provisions of these Project Specifications are at variance with those reference specifications, the maximum criteria or requirements shall govern.
1. ASTM A36-03a, "Carbon Structural Steel"
 2. ASTM A53-02, "Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless"
 3. ASTM A123-02, "Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products"
 4. ASTM A307-02, "Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength"
 5. ASTM A325-02, "Structural Bolts, Steel, Heat Treated, 120/105 KSI Minimum Tensile Strength"
 6. ASTM A500-03, "Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes"
 7. ASTM A563-00, "Carbon and Alloy Steel Nuts"
 8. ASTM A666-00, "Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar"
 9. ASTM A992-02, "Steel for Structural Shapes for Use in Building Framing"
 10. ASTM F1554-99, "Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength"
 11. AWS D1.1-2002, "Structural Steel Welding Code"

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
 - 1. Shop drawings required for all items. Show all work to be fabricated with all construction details shown in appropriate scale, methods of attachment to other materials, finished dimensions, shop welds and grinding of welds, field assembly joints, etc. Indicate welded connections, including net weld lengths, using standard AWS welding symbols.
 - 2. Calculations: Accompany shop drawings with a complete structural design and analysis prepared and certified by a Professional Engineer (P.E.) licensed in the State in which the project is located. The design and analysis shall show all design loads, reactions, forces or stresses, and structural characteristics of members and connections for the items listed in section 2.01.B. Include a certified letter stating that shop drawings as submitted conform to the requirements on the design calculations.
 - 3. Coordinate work with other suppliers and subcontractors; obtain their approved shop drawing where necessary, or obtain any necessary additional detail information regarding mounting conditions or other aspects of related work.

1.05 PRODUCT PROTECTION

- A. Package, handle, deliver and store at the job site in a manner that will avoid damage or deformation. Damaged material will be rejected.
- B. Furnish items to be built into concrete, masonry, carpentry, etc. as the work progresses.

1.06 JOB CONDITIONS

- A. Verify dimensions in field, as required, for pre-cut or prefabricated items.
- B. Examine job conditions and adjoining construction which may affect the acceptability of the work.

PART 2: PRODUCTS

2.01 DESIGN

- A. All materials shall be free from defects impairing strength, durability, appearance, and shall be of the best commercial quality for the purposes indicated. Structural properties shall be such to withstand safely all strains and stresses to which they will be normally subjected.
- B. Metal railings, stairs, catwalks, ladders, and other items specified in this section shall be designed to resist self-weight and the more stringent of:
 - 1. Superimposed Dead and Live Loads indicated on the Contract Documents, and
 - 2. Loads set forth by the governing Building Code.
- C. The maximum Live Load deflection shall be $L/360$. Deflection determined based on structural section(s) alone.

2.02 MATERIALS

- A. Structural Steel: ASTM A36 or A992.
- B. Fastenings: Bolts, welds, rivets or other fastenings as required.

- C. Anchor Bolts, Nuts: ASTM F1554, Grade 36.
- D. Shop Paint Primer: Manufacturer's standard rust inhibiting primer.
- E. Galvanizing: ASTM A123.
- F. Expansion and Adhesive Anchors.
 - 1. Wedge Anchors: Hilti "Kwik Bolt II" or Ramset/Redhead "Trubolt" or equal.
 - 2. Heavy Duty Sleeve Anchors: Hilti "HSL" or equal.
 - 3. Adhesive Anchors: Hilti "HVA" or "HIT", Ramset/Redhead "EPCON" or equal.

2.03 GENERAL REQUIREMENTS FOR FABRICATION

- A. Weld permanent connections wherever possible; use continuous welds where exposed and grind smooth, straighten members after welding.
- B. Perform welding in accordance with AWS D1.1.
- C. Perform shop cutting, drilling, fitting and assembly wherever possible. Take field measurements before fabrication when required.
- D. Provide all supporting members, fasteners, framing, hangers, bracing, brackets, straps, bolts, angles, etc. required to set, connect the work rigidly and properly to other construction.
- E. Install welded end caps at all handrail terminations.

2.04 SHOP COATS PROTECTIVE TREATMENT

- A. Clean free of all mill scale, rust and foreign matter by wire brushing, scraping, sandblasting or flame cleaning. Remove grease, oil with solvent. Dust, dirt: Remove with air blast or brush.
- B. Apply one shop coat of specified primer to all ferrous metal products, except galvanized. Provide primer for field touch up. Be responsible for quality and adhesion of shop prime finish.
- C. Hot-dip galvanize all ferrous metal items exposed to weather in the finish work and shop prime with primer recommended for use on galvanized metal.

2.05 SCHEDULE OF MISCELLANEOUS METAL ITEMS

- A. Items listed in this Section are intended only as a guide, but do not relieve responsibility for verifying quantities and inclusion of all similar items. Thoroughly examine all Drawings for items of miscellaneous metal fabrications.
 - 1. Loose and fixed masonry lintels, as scheduled.
 - 2. Field welded steel angles for support of storefront and masonry walls.
 - 3. Overhead bracing for masonry walls.
 - 4. Other miscellaneous metal items shown on Drawings.

PART 3: EXECUTION

3.01 INSTALLATION GENERAL REQUIREMENTS

- A. Anchor to concrete and masonry with expansion or adhesive anchors where built-in anchorage is not provided; do not fasten to wood plugs set in masonry.
- B. Vertical members set into concrete or masonry: As shown.
- C. Bolts, screws, etc., for field connections: Same material, finish as base material.

3.02 FIELD SPLICES, WELDS

- A. Perform field welding in accordance with AWS D1.1.
- B. Welders shall be certified by AWS.
- C. Continuously weld field splices and grind smooth where exposed to view.
- D. Fill exposed splice joints with body filler and sand smooth.
- E. Touch-up joints, welds with specified primer.
- F. Touch-up damaged hot dipped galvanizing with Galvanizing Repair Compound per manufacturer's requirements.

3.03 FIELD QUALITY CONTROL

- A. Structural Testing and Special Inspection
 - 1. Comply with the requirements of Section 05 10 00 – Structural Steel Framing
 - 2. The Owner will employ a Special Inspector for the following:
 - a. Visual inspect 100% of all fillet welds, for size, length, and quality, per AWS D1.1. Qualifications: Technical II.

END OF SECTION 05 50 00

SECTION 06 10 53

CARPENTRY

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes:

1. Miscellaneous blocking, sleepers and nailers, shown on Drawings or required.
2. Curbs and blocking at roof. Wood blocking under coping.
3. Blocking within gypsum wallboard partitions for support of markerboards, casework, hardware, other wall mounted specialties.
4. Batt insulation within wood framing.

- B. Related work specified in other sections:

1. Concrete Formwork - Section 03 30 00
2. Insulation - Section 07 21 00
3. Miscellaneous Specialties - Division 10
4. Prefabricated Roof Curbs for Air Handling - Division 23.
5. Wood Laboratory Casework - Section 12 35 53

1.03 QUALITY ASSURANCE

- A. Lumber Grades: Western Wood Products Association "Product Use Manual".
- B. Preservative Treated Lumber: American Wood Preservers Bureau, "LP-2 Pressure Treated with Water-Borne Preservatives".

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.

1. Furnish certificates for preservative treated lumber.
2. Submit roofing material manufacturer's current printed instructions for installation of nailers.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Immediately upon delivery to job site, place materials in area protected from weather.
- B. Store materials a minimum of 6 in. above ground on framework or blocking and cover with protective waterproof covering providing for adequate air circulation or ventilation.
- C. Do not store seasoned material in wet or damp portions of building.
- D. While unloading, protect sheet materials from corners breaking and damaging surfaces.

1.06 COORDINATION

- A. Coordinate blocking for roof applications with Divisions 7, 22 and 23.
- B. Coordinate blocking for miscellaneous specialties with Division 10 suppliers.
- C. Coordinate blocking for door stops in gypsum walls with Section 08 71 00.
- D. Obtain product data, sizes and anchorage requirements prior to installation of blocking.

PART 2: PRODUCTS

2.01 ROUGH HARDWARE

- A. Nails, spikes, screws, bolts and similar items of size and types to rigidly secure members in place or as otherwise indicated.
- B. Non-corrosive type fasteners for redwood and preservative treated and fire retardant lumber such as stainless steel or double dipped galvanized.

2.02 LUMBER

- A. Framing, blocking lumber: No. 2 or better, S4S, Douglas Fir-Larch, Hem-Fir or Southern Pine, moisture content not to exceed 19%.
 - 1. Provide preservative-treated lumber for work exposed to moisture or indirect contact with concrete slabs. Preservative-treated lumber is not required for roof blocking.
 - 2. Provide fire-retardant lumber for all interior framing and blocking. Blocking for handrails, millwork, cabinets, window and door frames do not require fire-retardant lumber in Type I and Type II construction.
- B. Redwood: No. 2 or better under R.I.S. rules.

2.03 PLYWOOD

- A. Meet APA C-D exterior, thickness as shown on Drawings.
- B. Provide preservative-treated plywood when exposed to moisture, and as shown on Drawings.
- C. Interior Finish Plywood: Paint grade birch.

2.04 INSULATION

- A. Batt Insulation: Conform to requirements of Section 07 21 00, Insulation.

PART 3: EXECUTION

3.01 ROUGH CARPENTRY

- A. Provide wood nailers of size, shape where indicated, required.
- B. Fasten securely to substrate with appropriate fasteners. Use expansion-type anchors at masonry or concrete, self-tapping screws at steel. Use corrosive resistant fasteners for roofing applications or where otherwise exposed to moisture.
- C. Install work that is component of the roofing system according to roofing material manufacturer's current printed instructions.
- D. Install blocking for windows, storefront and entrances according to approved Shop Drawings. Blocking shall be continuous the width or height of rough openings, unless otherwise shown on Drawings. Install sill sealer under windowsill blocking as detailed
- E. Install blocking for finish materials, such as windows and sheet metal fascias, with minimum number of joints, plumb, level, true and straight with no distortions. Discard materials which are unsound, warped, bowed, twisted, improperly treated, not adequately seasoned.

3.02 INSULATION

- A. Install fiberglass insulation within wood construction as noted on the drawings.

3.03 FINISH CARPENTRY

- A. Install hardwood with minimum number of joints possible, using full-length pieces to the greatest extent possible. Stagger joints in adjacent and related members. Cope at returns, miter at corners, to product tight fitting joints with full surface contact throughout length of joint. Use scarf joints for end-to-end joints.
- B. Secure hardwood to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing as required for a complete installation. Use fine finishing nails for exposed nailings, countersunk and filled flush with finished surface, and matching final finish where transparent is indicated.

END OF SECTION 06 10 53

SECTION 07 21 00

INSULATION

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes product specification of the following:
1. Floor insulation used horizontally typically under concrete slabs.
 2. Batt insulation used with interior stud wall construction.
 3. Vapor barriers used under slab, and in combination with batt insulation in walls.
- B. Installation of insulation specified in other sections:
1. Cast-in-Place Concrete – Section 03 30 00
 2. Gypsum Board – Section 09 21 16
 3. Acoustical Ceilings – Section 09 51 00
 4. Membrane Waterproofing – Section 07 13 00

1.03 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material to the site in unopened packages, with identification labels intact.
- B. Store under water-resistant cover and protect from weather and direct sunlight.
- C. Remove damaged materials from site.

1.04 ENVIRONMENTAL REQUIREMENTS

- A. Do not install rigid insulation (on vertical surfaces with adhesive) when temperature is below 40° F., during rain or wet weather, or when surfaces are wet.

1.05 SCHEDULING

- A. Coordinate installation with other trades whose work may be affected or have effect.

PART 2: PRODUCTS

2.01 MATERIALS

- A. Rigid Board Insulation: Rigid closed cell extruded polystyrene thermal board insulation as manufactured by Amoco Foam Products, Diversifoam Products, Dow Chemical, Pactiv Building Products and Owens Corning.
1. Thermal Resistance: Aged R-value per inch of 5 at 75° F mean temperature per ASTM C518.
 - a. Floor Insulation:
 - 1) Conforming to ASTM C578-95 type VI.
 - 2) Compressive strength: 40 psi per ASTM C203.
- B. Batt Insulation: Unfaced fiberglass batt as manufactured by Certain Teed, Johns Manville, and Owens Corning.
1. Thermal resistance: Minimum R-value of 3.3 per inch per ASTM C518.
 2. Conforming to property requirements of ASTM C665, type 1 and ASTM E136.
- C. Sound Batt Insulation: ASTM C665, type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag, wool or rock wool.
1. Fire resistance-rated assemblies: Comply with mineral-fiber requirements of assembly.
 2. Use 2" thick batts at stud cavities, 3" thick elsewhere. If substituting fiberglass batts, fill stud cavity full.
- D. Vapor Barriers:
1. Walls: Glass reinforced or laminated polyethylene sheet, minimum perm rating, 0.1 when tested in accordance with ASTM-E96, Procedure A.
 - a. Manufacturers/Products: Fortifiber "Moistop", Rufco SS-300, Glas-Krafat, inc.
 - b. Vapor Barrier Tape: Compatible polyethylene self adhesive tape recommended by vapor barrier manufacturer.
 - c. Adhesive: Manufacturers vapor-proofing mastic.
 2. Under Floor Slabs: Meet requirements of ASTM E1745 Class A.
 - a. Materials: Meets Class A, 15 mil minimum thickness polyolefin geomembrane,
 - 1) Water vapor transmission rate per ASTM E96 of 0.008 grains/sf/hr WVTR or lower
 - 2) Maintain permeance rating of less than 0.01 perms per ASTM F 1249 after mandatory conditioning tests per ASTM E 154 Sections 8, 11, 12 and 13.
 - 3) Puncture resistance of 2200 grams when tested in accordance with ASTM D 1709.
 - 4) Tensile strengths of 75 lbf./in. when tested in accordance with ASTM D 882.
 - b. Only the following manufacturers/products are acceptable (no substitutions):
 - 1) Stego Industries / Stego Wrap Vapor Barrier (15 mil).
 - 2) Reef Industries / Vaporguard.
 - 3) Fortifiber Building Group / Moistop Ultra 15 mil.
 3. Vapor Barrier Accessories:
 - a. Seam tape and vapor proofing mastic conforming to the following property and as recommended by vapor barrier manufacturer:
 - 1) Water Vapor Transmission Rate per ASTM E96 or ASTM F1249: 0.3 perms or lower.

- b. Pipe boots constructed from vapor barrier material, pressure sensitive tape and/or mastic per manufacturer's instructions.

PART 3: EXECUTION

3.01 INSTALLATION

- A. Refer to specific specification sections for installation.

END OF SECTION 07 21 00

SECTION 07 51 15

ROOF PATCHING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Maintain existing warranty issued by Firestone mfg. Roofer must be certified by manufacturer to work on warranted roof.
- B. Existing roof does not carry a warranty.
- C. Scope of work includes cutting in and patching of vents, curbs, drains and/or any other miscellaneous work identified on Architectural, Mechanical or Electrical plans.
- D. Provide either asphalt bitumen or cold tar type built-up roofing system, including insulation. Contractor responsible to determine suitable system to be compatible with existing roofing system.
- E. Provide a SBS Modified Bitumen Built-Up Roofing system, including insulation.
- F. Provide an EPDM roofing system including insulation.

1.03 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
 - 1. Submit roofing contractors letter certifying roof has been inspected and composition of existing roof determined.
 - 2. Submit roofing manufacturer's letter certifying roof has been inspected and existing warranty has been maintained.

1.04 QUALITY ASSURANCE

- A. Comply with governing codes and regulations. Provide products of acceptable manufacturers which have been in satisfactory use in similar service for three years. Use experienced installers. Deliver, handle and store materials in accordance with manufacturer's instructions.
- B. FM Class I, UL Class A, Class 90 wind uplift.

1.05 WARRANTY

- A. Maintain existing Firestone (mfg) warranty, verify duration of warranty with the Owner.

PART 2: PRODUCTS

2.01 MATERIALS

A. EPDM

1. Insulation (Based and Tapered): Polyisocyanurate insulation faced with a universal fiber glass reinforced facer as approved by roofing manufacturer.
2. EPDM membrane: 60 mil at fully adhered, 45 mil at ballasted.
3. Protection board: ½" high density wood fiberboard with non-asphaltic binders.
4. Provide products for use with specified roofing system including, but not limited to taper primer/wash, bonding cement, lap cement, seam tape, peel and stick tape, flashing, lap caulk, sealing mastic, pourable sealer, prefabricated flashing, termination bar, fasteners / anchors, and pipe boots.

PART 3: EXECUTION

3.01 INSTALLATION

- A. Inspect substrate and report unsatisfactory conditions in writing. Beginning work means acceptance of substrate. Coordinate installation with other trades, including carpentry, flashing and penetrating work.
- B. Comply with NRCA Roofing and Waterproofing Manual and manufacturer's installation instructions.
- C. Clean, prime and prepare substrate.
- D. Install insulation in one layer with tightly butted joints and neatly fitted around penetrations.
- E. Install walkway protection membrane at locations indicated and where required to provide access to roof mounted equipment.
- F. Restore or replace damaged components. Protect work from damage.

END OF SECTION 07 51 15

SECTION 07 84 00

FIRESTOPPING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 DEFINITIONS

- A. Firestopping: Material or combination of materials used to retain integrity of fire-rated construction by maintaining an effective barrier against the spread of flame, smoke, and hot gases through penetrations in, or construction joints between, fire rated wall and floor assemblies.

1.03 GENERAL DESCRIPTION OF THE WORK OF THIS SECTION

- A. Only tested firestop systems shall be used in specific locations as follows:
 - 1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers (walls and partitions), horizontal barriers (floor/ceiling assemblies), and vertical service shaft walls and partitions.
 - 2. Safing slot gaps between edge of floor slabs and curtain walls.
 - 3. Openings between structurally separate sections of wall or floors.
 - 4. Gaps between the top of walls and ceilings or roof assemblies.
 - 5. Openings and penetrations in fire-rated partitions or walls containing fire doors.
 - 6. Openings around structural members which penetrate floors or walls.

1.04 RELATED WORK OF OTHER SECTIONS

- A. Coordinate work of this section with work of other sections as required to properly execute the work and as necessary to maintain satisfactory progress of the work of other sections, including:
 - 1. Section 03 30 00 - Cast-In-Place Concrete
 - 2. Section 07 92 00 - Joint Sealers
 - 3. Section 09 21 16 - Gypsum Drywall Systems
 - 4. Division 23 - HVAC
 - 5. Division 21 - Fire Protection
 - 6. Division 22 - Plumbing

1.05 REFERENCES

- A. Test Requirements: ASTM E 814, "Standard Method of Fire Tests of Through Penetration Fire Stops"
- B. Test Requirements: UL 1479, "Fire Tests of Through-Penetration Firestops"
- C. Test Requirements: UL 2079, "Tests for Fire Resistance of Building Joint Systems"

- D. Underwriters Laboratories (UL) of Northbrook, IL publishes tested systems in their "FIRE RESISTANCE DIRECTORY" that is updated annually.
 - 1. UL Fire Resistance Directory:
 - a. Firestop Devices (XHJI)
 - b. Fire Resistance Ratings (BXRH)
 - c. Through-Penetration Firestop Systems (XHEZ)
 - d. Fill, Voids, or Cavity Material (XHHW)
 - e. Forming Materials (XHKU)
 - f. Joint Systems (XHBN)
 - g. Perimeter Fire Containment Systems (XHDG)
 - 2. Alternate Systems: "Omega Point Laboratories Directory" (updated annually).
- E. Test Requirements: ASTM E 1966, "Standard Test Method for Fire Resistive Joint Systems"
- F. Test Requirements: ASTM E 2307, "Standard Test Method for Determining Fire Resistance of Perimeter Fire Barrier Systems Using Intermediate-Scale, Multi-story Test Apparatus"
- G. Inspection Requirements: ASTM E 2174, "Standard Practice for On-site Inspection of Installed Fire Stops"
- H. ASTM E 84, "Standard Test Method for Surface Burning Characteristics of Building Materials"
- I. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments
- J. International Building Code as modified by local jurisdiction.
- K. NFPA 101 - Life Safety Code
- L. NFPA 70 - National Electric Code

1.06 QUALITY ASSURANCE

- A. A manufacturer's direct representative to be on-site during initial installation of firestop systems to train appropriate contractor personnel in proper selection and installation procedures. This will be done per manufacturer's written recommendations published in their literature and drawing details.
- B. Firestop System installation must meet requirements of ASTM E 814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
- C. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
- D. Firestop Systems do not reestablish the structural integrity of load bearing partitions/assemblies, or support live loads and traffic. Installer shall consult the structural engineer prior to penetrating any load bearing assembly.
- E. For those firestop applications that exist for which no UL tested system is available through a manufacturer, an engineering judgment derived from similar UL system designs or other tests will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Engineering judgment drawings must follow requirements set forth by the International Firestop Council.

1.07 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
 - 1. Product Data: Manufacturer's specifications and technical data for each material including the composition and limitations, documentation of UL firestop systems to be used and manufacturer's installation instructions.
 - 2. Manufacturer's engineering judgment identification number and drawing details when no UL system is available for an application. Engineering judgment must include both project name and contractor's name who will install firestop system as described in the assembly drawing.
 - 3. Material safety data sheets provided with product delivered to job-site.
 - 4. Documentation from manufacturer that all firestopping installations on-site meet their requirements.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials undamaged in manufacturer's clearly labeled, unopened containers, identified with brand, type, and UL label where applicable.
- B. Coordinate delivery of materials with scheduled installation date to allow minimum storage time at job-site.
- C. Store materials under cover and protect from weather and damage in compliance with manufacturer's requirements, including temperature restrictions.
- D. Comply with recommended procedures, precautions or remedies described in material safety data sheets as applicable.
- E. Do not use damaged or expired materials.

1.09 PROJECT CONDITIONS

- A. Do not use materials that contain flammable solvents.
- B. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- C. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- D. Weather conditions: Do not proceed with installation of firestop materials when temperatures exceed the manufacturer's recommended limitations for installation printed on product label and product data sheet.
- E. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 - PRODUCTS

2.01 FIRESTOPPING, GENERAL

- A. Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by the firestopping manufacturer based on testing and field experience.

- B. Provide components for each firestopping system that are needed to install fill material. Use only components specified by the firestopping manufacturer and approved by the qualified testing agency for the designated fire-resistance-rated systems.
- C. Firestopping Materials are either “cast-in-place” (integral with concrete placement) or “post installed.” Provide cast-in-place firestop devices prior to concrete placement.

2.02 ACCEPTABLE MANUFACTURERS

- A. Subject to compliance with through penetration firestop systems (XHEZ), joint systems (XHBN), and perimeter firestop systems (XHDG) listed in Volume 2 of the UL Fire Resistance Directory: Products specified are by Hilti, Inc., Tulsa, Oklahoma, 800-879-8000/www.us.hilti.com
 - 1. Equivalent products by 3M Fire Protection Products 800-328-1687/www.3m.com are acceptable.

2.03 MATERIALS

- A. Use only firestop products that have been UL 1479, ASTM E 814 or UL 2079 tested for specific fire-rated construction conditions conforming to construction assembly type, penetrating item type, annular space requirements, and fire-rating involved for each separate instance.
- B. L-Rated Systems: Where through-penetration firestop systems are indicated in smoke barriers, provide through-penetration firestop systems with L-ratings of not more than 5.0 cfm/sq. ft. at both ambient temperatures and 400 deg F.
- C. Cast-in place firestop devices for use with noncombustible and combustible pipes (closed and open systems), conduit, and cable bundles penetrating concrete floors, the following products are acceptable:
 - 1. HILTI
 - a. CP 680 Cast-In Place Firestop Device
 - 1) Add Aerator adaptor when used in conjunction with aerator (“sovent”) system.
 - b. CP 682 Cast-In Place Firestop Device for use with noncombustible penetrants
- D. Sealants, caulking materials, or foams for use with non-combustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT), the following products are acceptable:
 - 1. HILTI
 - a. FS-ONE Intumescent Firestop Sealant
 - b. CP 604 Self-leveling Firestop Sealant
 - c. CP 620 Fire Foam
 - d. CP 606 Flexible Firestop Sealant
 - e. CP 601s Elastomeric Firestop Sealant
- E. Sealants or caulking materials for use with sheet metal ducts, the following products are acceptable:
 - 1. HILTI
 - a. CP 601s Elastomeric Firestop Sealant
 - b. CP 606 Flexible Firestop Sealant
 - c. FS-ONE Intumescent Firestop Sealant

- F. Sealants, caulking or spray materials for use with fire-rated construction joints and other gaps, the following products are acceptable:
1. HILTI
 - a. CP CFS-SP WB Joint Spray
 - b. CP 601s Elastomeric Firestop Sealant
 - c. CP 606 Flexible Firestop Sealant
 - d. CP 604 Self-leveling Firestop Sealant
- G. Pre-formed mineral wool designed to fit flutes of metal profile deck and gap between top of wall and metal profile deck; as a backer for spray material.
1. HILTI
 - a. CP 777 Speed Plugs
 - b. CP 767 Speed Strips
- H. Intumescent sealants, caulking materials for use with combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed, flexible cable or cable bundles and plastic pipe, the following products are acceptable:
1. HILTI
 - a. FS-ONE Intumescent Firestop Sealant
- I. Firestop collar or wrap devices attached to assembly around combustible plastic pipe (closed and open piping systems), the following products are acceptable:
1. HILTI
 - a. CP 643N Firestop Collar
 - b. CP 644 Firestop Collar
 - c. CP 645/648 Wrap Strips
- J. Non curing, re-penetrable materials used for large size/complex penetrations made to accommodate cable trays and bundles, multiple steel and copper pipes, electrical busways in raceways, the following products are acceptable:
1. HILTI
 - a. FS 657 FIRE BLOCK
 - b. CP 675T Firestop Board
- K. Sealants or caulking materials used for openings between structurally separate sections of wall and floors, the following products are acceptable:
1. HILTI
 - a. CP CFS-SP WB Joint Spray
 - b. CP 601s Elastomeric Firestop Sealant
 - c. CP 606 Flexible Firestop Sealant
 - d. CP 604 Self-Leveling Firestop Sealant
- L. For data and communication penetrations in fire and smoke rated assemblies. (Allows for ease of re-penetration without the use of sealants or caulking.)
1. HILTI
 - a. CP 653 2" Speed Sleeve
 - b. CP 653 4" Speed Sleeve.

- M. Provide a firestop system with a "F" Rating as determined by UL 1479 or ASTM E814 which is equal to the time rating of construction being penetrated.
- N. Provide a firestop system with an Assembly Rating as determined by UL 2079 which is equal to the time rating of construction joint assembly.
- O. Identification Labels
 - 1. Pressure-sensitive, self adhesive, preprinted vinyl labels with the following verbiage:
 - a. "Warning: Fireblocking Application – Do Not Disturb. Notify Building Management of Any Damage"
 - b. Installing Contractor's name, address and phone number.
 - c. Date of installation.
 - d. Fireblocking/Stopping product manufacturer's name.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Verification of Conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.
 - 1. Verify penetrations are properly sized and in suitable condition for application of materials.
 - 2. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, rust, laitance, release agents, water repellents, and any other substances that may affect proper adhesion.
 - 3. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
 - 4. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.
 - 5. Do not proceed until unsatisfactory conditions have been corrected.

3.02 COORDINATION

- A. Coordinate location and proper selection of cast-in-place Firestop Devices with trade responsible for the work. Ensure device is installed before placement of concrete.
- B. Responsible trades to provide adequate spacing of field run pipes to allow for installation of cast-in-place firestop devices without interferences.

3.03 INSTALLATION

- A. Regulatory Requirements: Install firestop materials in accordance with UL Fire Resistance Directory or Omega Point Laboratories Directory.
- B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration and construction joint materials.
 - 1. Seal all holes or voids made by penetrations to ensure an air and water resistant seal.

2. Consult with mechanical engineer, project manager, and damper manufacturer prior to installation of UL firestop systems that might hamper the performance of fire dampers as it pertains to duct work.
 3. Protect materials from damage on surfaces subjected to traffic.
- C. Identification: Install identification labels no greater than 6 feet from penetration or 6 feet on center on continuous firestopping applications.

3.04 FIELD QUALITY CONTROL

- A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- B. Keep areas of work accessible until inspection by applicable code authorities.
- C. Inspection of through-penetration firestopping shall be performed in accordance with ASTM E 2174, "Standard Practice for On-Site Inspection of Installed Fire Stops" or other recognized standard.
- D. Perform under this section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- E. Manufacturer to inspect sealed penetrations for conformance with appropriate product data information for each contractor installing firestopping on site.

3.05 ADJUSTING AND CLEANING

- A. Remove equipment, materials and debris, leaving area in undamaged, clean condition.
- B. Clean all surfaces adjacent to sealed holes and joints to be free of excess firestop materials and soiling as work progresses.

END OF SECTION 07 84 00

SECTION 07 92 00

SEALANTS AND CAULKING

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

A. Exterior colored sealants:

1. Miscellaneous joints where “sealant” or “caulk/caulking” is indicated on drawings.
2. Joints around mechanical, electrical and architectural penetrations of exterior masonry skin.

B. Interior colored sealants:

1. Note: Sealant on materials to be painted will be installed after painting is completed and shall match paint color. A “sacrificial” backer rod shall be installed prior to painting to protect joints from paint over spray. This backer rod may be pushed into the joint or removed prior to installation of final backer rod and sealant.
2. Interior joints in masonry.
3. Interior joints around hollow metal, including joint between hollow metal and hard surface flooring.
4. Joint between top of masonry, gypsum board, and plaster walls and structure.
5. Miscellaneous joints where “sealants” or “caulk/caulking” is indicated on Drawings.

C. Security sealants:

1. Flexible security sealants at masonry wall to ceiling or structure movement joints, control joints.

D. Sealant replacement:

1. Removal of existing sealants and prepping of joints prior to placement of new sealants.

E. Related work specified in other sections:

1. Sealant for firestopping – Section 07 84 00.
2. Caulking around windows, storefront and curtainwall – Division 8.
3. Glazing – Section 08 80 00.
4. Acoustical sealant – Section 09 21 16.
5. Sealing at plumbing fixtures and mechanical penetrations through rated walls – Division 21-25.
6. Sealing of electrical penetrations through rated walls – Divisions 26-28.

1.03 REFERENCES

- A. ASTM C 920 – Specification for Elastomeric Joint Sealants.

- B. ASTM C 1193 – Standard Guide for Use of Joint Sealants.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods including joint design, surface preparation, and application instructions.
 - 4. Submit manufacturer's test reports indicating test results of adhesion and/or compatibility testing of samples of substrates which either come in contact with or are in close proximity to sealants.
- C. Selection Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors or samples of custom color matches for Architect's acceptance.
- D. Samples of Warranty.
- E. Manufacturer's approval of installer.

1.05 QUALITY ASSURANCE

- A. Applicator Qualifications
 - 1. Company specializing in performing work of this section with minimum three years documented experience, minimum three successfully completed projects of similar scope and complexity, and approved by manufacturer.
 - 2. Designate one individual as project foreman who shall be on site at all times during installation.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in manufacturer's unopened original packaging. Inspect for damage.
- B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.
 - 1. Store materials in a clean, dry area indoors in accordance with manufacturer's instructions.
 - 2. Store sealants within temperature range in accordance with manufacturer's instructions.
 - 3. Keep containers sealed until ready for use.
 - 4. Do not use materials after manufacturer's use-before date.

1.07 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.
 - 1. Do not apply sealants to surfaces that are wet, damp, or contain frost.
 - 2. Do not apply sealants when air or surface temperature is below 40 degrees F.
 - 3. Use caution when applying sealants when air or surface temperature is above 120 degrees F.

1.08 WARRANTY

- A. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty for Exterior Sealants: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Ten years from date of Substantial Completion.

PART 2: PRODUCTS

2.01 EXTERIOR SEALANTS

- A. Silyl-Terminated Polyether Sealant: BASF/Sonneborn 150 w/ VLM Technology conforming to ASTM C 920, Type S, Grade NS, Class 50. Maximum VOC: 2 g/L.
 - 1. Colors: Custom colors to match material or finish sealant occurs in.

2.02 INTERIOR SEALANTS

- A. Polyurethane Sealant: Multi-component, high-performance polyurethane sealant conforming to ASTM C 920, Type M, Grade NS, Class 25. Maximum VOC: 25 g/L.
 - 1. Manufacturers/product:
 - a. Pecora, Dynatrol II
 - b. SIKA, SIKAFLEX 2-C
 - c. Sonneborn, Sonolastic NP2
 - d. Tremco, Dymeric 240/240FC
 - 2. Colors: Custom colors to match material or finish sealant occurs in.

2.03 ACCESSORIES

- A. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.
- B. Primer: Non-staining type, recommended by sealant manufacturer to suit application.
- C. Joint Backing: Round foam rod compatible with sealant; oversized 25 to 50 percent larger than joint width; recommended by sealant manufacturer to suit application.
- D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.
- E. Masking Tape: Non-staining, non-absorbent tape product compatible with joint sealants and adjacent joint surfaces.

PART 3: EXECUTION

3.01 EXAMINATION

- A. Inspect joints for compliance with requirements for joint configuration, installation tolerance, and other conditions affecting joint sealant performance. Correct unsatisfactory conditions before proceeding.

3.02 PREPARATION

- A. Prepare joints in accordance with ASTM C 1193 and manufacturer's instructions.
- B. Clean out joints immediately before installing joint sealants (within 1 to 2 hours of sealant application), in accordance with joint sealant manufacturer's recommendations and the following requirements:
 - 1. Remove from joint substrates foreign material which could interfere with adhesion of joint sealant, including paints other than permanent protective coating tested and approved for sealant adhesion and compatibility by sealant manufacturer, oil, grease, waterproofing, water repellants, water dirt, and frost.
 - 2. Clean porous joint substrates using approved methods such as brushing, grinding, blast cleaning, mechanical abrading, and acid washing as appropriate, or a combination of these methods, to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean metal and other nonporous substrates by using chemical cleaners or other means that neither are harmful to substrates nor leave residues capable of interfering with adhesion of joint sealants.
- C. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer. Apply primer to comply with joint sealant manufacturer's recommendations. Confine primers to area of joint sealer bond; do not allow spillage or migration onto adjoining surfaces. Allow primer to dry before applying sealant.
- D. Masking Tape: Use masking tape where required to prevent contamination of adjacent surfaces; remove tape immediately after tooling and before sealants begin to cure without disturbing seal.

3.03 EXISTING WORK

- A. Mechanically remove existing sealants.
- B. Clean joint surfaces of residual sealant and other contaminants capable of affecting sealant bond to joint surface by mechanical means.
- C. Allow joint surfaces to dry before installing new sealant.

3.04 SEALANT INSTALLATION

- D. Comply with joint sealant manufacturer's printed installation instructions.
- E. Installation of Sealant Backings:
 - 1. Install joint filler to provide support of sealant during application and at position required to produce the cross-sectional shape and depth of installed sealant relative to joint width that allows optimum sealant movement capability.

- a. Do not leave gaps between ends of joint fillers.
 - b. Do not stretch, twist, puncture, or tear joint fillers.
 - c. Remove fillers which have become wet prior to sealant application and replace with dry materials.
2. Install bond breaker tape when joint depth is too shallow to allow backer rod.

F. Installation of Sealant:

1. Install sealants by proven techniques that result in direct contact with and full wetting of joint substrates by joint sealant, completely filling recesses provided and providing uniform cross-sectional shapes and depths relative to joint widths. Sealant depth to be $\frac{1}{2}$ the width of the joint and $\frac{1}{3}$ the width at the center, creating an hourglass shape. Maximum depth of caulk at center to be $\frac{3}{8}$ ". Air pockets or voids are not acceptable.
2. Immediately after sealant application and prior to the skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents which discolor sealants or adjacent surfaces or which are not approved by sealant manufacturer.

3.05 PROTECTION AND CLEANING

- A. Protect joint sealers, during and after curing, from contamination or damage. Cut out and remove damaged or deteriorated sealers and replace with new materials.
- B. Clean excess sealants or sealant smears adjacent to joints as work progresses.

3.06 FIELD QUALITY CONTROL

- A. Perform adhesion tests on exterior sealant in accordance with manufacturer's instructions and ASTM C1193, Method A, Field-Applied Sealant Joint Hand-Pull Tab.
 1. Perform 5 tests for first 1,000 linear feet of applied exterior sealant and 1 test for each 1,000 feet of seal thereafter. If there is less than 1,000 feet, perform 1 test per floor per building elevation minimum.
 2. For sealant applied between dissimilar materials, test both sides of joint.
- B. Sealants failing adhesion test shall be removed, substrates cleaned, sealants re-installed, and re-testing performed.
- C. Maintain test log and submit report to Architect indicating tests, locations, dates, results, and remedial actions.

END OF SECTION 07 92 00

SECTION 08 10 00

STEEL DOORS AND FRAMES

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes:

1. All hollow metal doors, doorframes and borrowed light frames.
2. Rated doors and frames as scheduled and/or noted on Code Plans.

- B. Related work specified in other sections:

1. Grouting of frames, anchors – Section 04 20 00.
2. Finish hardware – Section 08 71 00.
3. Glazing – Section 08 80 00.
4. Painting – Section 09 91 00.

1.03 QUALITY ASSURANCE

- A. Provide doors and frames complying with the SDI Standard 100-"Recommended Specifications Standard Steel Doors and Frames" and as herein specified.
- B. Obtain hardware templates from hardware supplier (Section 08 71 00) and obtain necessary hardware for factory application.
- C. Where noted on Door Schedule, provide nationally recognized testing agency label of proper classification. Label requirements take precedence over conflicting details. Advise the Architect of any conflict before fabricating work on that item is started.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.

1. Coordinate with any special conditions of anchorage. Submit door/opening schedule on shop drawings indicating relationship of door, number of room, number and function of door, such as Corridor A-13 to Lavatory A-14.
2. Shop Drawings: Include the following:
 - a. Elevations of each door design.
 - b. Details of doors, including vertical and horizontal edge details and metal thicknesses.
 - c. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - d. Locations of reinforcement and preparations for hardware.

- e. Details of each different wall opening condition.
 - f. Details of anchorages, joints, field splices, and connections.
 - g. Details of accessories.
 - h. Details of molding, removable stops, and glazing.
 - i. Detail of conduit and preparations for power, signal, and control systems.
 - j. Rating of doors and frames as noted on door/opening schedule and/or Code Plan.
3. Submit documentation for UL 10C or other approved testing agency stating doors have passed UBC Standard 7-2.

1.05 PRODUCT PROTECTION

- A. Deliver doors and frames in suitable crating or packaging to prevent damage in transit and storage.
- B. Storage at jobsite:
 1. Store frames on plywood and block at least 4" above plywood, under waterproof cover.
 2. Store doors under cover in a dry area with doors set upright with ¼ inch spacers between doors. Keep doors at least 4" above ground.
 3. Do not store HM material in a manner that traps excess humidity.
 4. Materials that are rusted prior to installation may be rejected.

PART 2: PRODUCTS

2.01 MANUFACTURERS

- A. Approved Manufacturer(s): Steelcraft, Pioneer, Ceco, Curries.
- B. Accompany any request for acceptance of alternative manufacturers by descriptive details or brochures demonstrating compliance with specifications, and sample frame corner.

2.02 MATERIALS

- A. Steel: Commercial quality, level, cold rolled steel conforming to ASTM A366, free of scale and surface defects. Commercial quality hot rolled and pickled steel conforming to ASTM A569 may be used at contractor's option for interior frames. Where noted, form frames of galvanized steel conforming to ASTM A526 or A527, A60 zinc coating. Gauges are as follows unless otherwise noted:
 1. Interior Frames: 16 gauge.
 2. Flush Doors: 16 gauge galvanized (exterior), 18 gauge (interior).
 3. Rough Bucks and Stiffeners: 12 gauge.
 4. Miscellaneous Trim: 16 gauge.
- B. Rust-Inhibitive Primer
 1. Manufacturer's standard rust inhibitive baked-on primer. Provide additional primer for touch-up.
 2. Pretreat galvanized metal in accordance with paint manufacturer's recommendations.

2.03 FABRICATION

- A. Make hardware mortises and reinforcements according to templates. Provide hinge, lock, door holder and closer hardware reinforcements. Mortise, drill tap for hardware; fabricate grooves, rabbets as necessary for weatherstripping, soundstripping.
- B. Fabricate doors to a maximum tolerance of 1/16 inch from a straight edge when laid on face of door in any direction, including diagonal.
- C. Attach proper testing agency's labels as indicated on the Drawings. Provide equal labeled frames for labeled doors. Frames with glazing in rated walls must conform to UBC Standard 7.4 (hose stream test). Provide intumescent fire and smoke material for fire rated openings as required by door and frame manufacturer to comply with UL 10C, UBC Test 7-2.
- D. Clearances: Edge clearances shall be provided as follows:
 - 1. Between doors and frame, at head and jambs - 1/8"
 - 2. At door sills:
 - where no threshold is used – 5/8" maximum to finish floor surface
 - where threshold is used – 1/4" maximum between door and threshold
 - where required for hardware operation – as recommended by hardware manufacturer
 - 3. Between meeting edges of pairs of doors - 1/8"

2.04 METAL FRAMES

- A. Provide custom metal frames of the types and styles indicated on the drawings or schedules and complying with SDI 100 for materials and construction requirements.
- B. Provide metal frames for doors, transoms, sidelights, borrowed lights, and other openings, as shown on the drawings. Provide thermally broken frames at exterior wall.
- C. Miter corners on face of all frames, internally weld face and grind smooth exterior. Die coped frames at mullions and stops. Provide with floor anchors.
- D. Provide one removable and one fixed stop at perimeter of openings for glazed frames. Removable stop on secure side.
- E. Provide closed metal covers over all hardware cutouts to protect against mortar.
- F. Provide integral channel frames, subframes and stiffeners to structure where indicated or required for fastening and stiffening frames.
- G. In masonry walls, provide three (3) - 16 gauge corrugated, adjustable, slip type standard frame anchors up to 7'-6" height jamb; frames 7'-6" to 8'-0" - 4 anchors; frames over 8'-0" - 1 anchor for each 2' or fraction thereof in height. In labeled frames, anchors shall be non-removable.
- H. Provide steel spreader temporarily attached to feet of both jambs for welded frames.
- I. Provide three factory installed silencers on single door frames at strike jamb; four (two at each head) silencers on double door frames.
- J. Hinge reinforcements to have 10 gauge straps welded directly above and below each hinge pocket.
- K. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26.

2.05 FLUSH HOLLOW METAL DOOR

- A. Provide custom metal doors for the types and styles indicated on the Drawings or schedules and complying with SDI 100 for materials and construction requirements. Fully insulate exterior doors.
- B. Close top and bottom edges of all doors with a continuous recessed steel channel not less than 16 ga., full width spot welded to both faces. Provide an additional flush closing channel at top edge for exterior doors. Provide openings to bottom closure of exterior door to permit escape of moisture.
- C. Edge profiles to be 1/8" bevel in 2".
- D. Provide glass light openings as indicated complete with one fixed stop and one removable stop fastened with flat head Phillips screws not over 10 inches o.c.
- E. For 60 minute and greater rated doors installed in enclosed stairways, conform to maximum transmitted temperature end point of 450° as specified in UBC Standard No. 43-2.
- F. All doors to have minimum 16-gauge lock reinforcement and either continuous 14-gauge hinge rail or minimum 8-gauge plate hinge reinforcement.
- G. All faced edge seams to be continuously wire welded, finished smooth.

2.06 HARDWARE LOCATION

- A. Prepare for hardware at mounting heights and locations as recommended by the Builder's Hardware Manufacturing Association.

2.07 HOLLOW METAL PANELS

- A. Provide hollow metal panels of same materials, construction, and finish as specified for adjoining hollow metal frames.

2.08 SHOP PAINTING

- A. Completely clean all frames by degreasing process, followed by one coat rust inhibitive primer equal to a salt spray test (5% solution) of 70 hours. Thoroughly prime all surfaces without runs, smears, or bare spots, and under and inside all removable stops.
- B. Completely clean all doors of impurities and pressure sand to a smooth surface and correct all irregularities with metallic putty sanded smooth. Provide one (1) spray coat of primer, baked on. Thoroughly paint unexposed inside surfaces of exterior doors, fire doors, and other doors occurring in excessive moisture area.
- C. Provide vinyl wash pre-treatment of galvanized steel as recommended by shop primer manufacturer.
- D. Provide primer for field touch up of rusted areas, splices, connections, welds and abrasions.

2.09 MODIFICATIONS TO EXISTING HOLLOW METAL

- A. Where modifications to existing doors or frames are required to accept new doors or hardware, neatly make modifications in field per hardware templates. Provide flush metal blank off plates, welded in place, ground smooth, filled with body putty, where existing hardware is removed. Or, provide new door or frame conforming to project requirements.

PART 3: EXECUTION

3.01 INSTALLATION

- A. Prime-Coat Touchup: Prior to erection sand smooth rusted, damaged, connection points and welded areas of prime coat and apply touchup primer.
- B. Securely fasten Work in place, without twists, warps, bulges or other unsatisfactory defacing of workmanship. Set plumb, level square to proper elevation true to line and eye. Set clips and other anchors with piston driven fasteners equal to Ramset or drilled-in anchors as approved. Fasten units and trim together with neat, uniform and tight joints.
- C. As masonry is being laid fill jambs solid with mortar and provide accurately cut wood spreaders temporarily at mid-section of frames, install jamb anchors.
- D. At steel columns and/or concrete surfaces, install sub-frame or rough bucks as specified. At steel columns use 5/16" diameter self-tapping metal screws and at concrete use expansion bolts of the same diameter. Install frame to sub-frame and/or rough buck with countersunk self-tapping metal screws. Fill screw holes with a suitable metallic filler, sand and prime.
- E. Where field installed hardware is required, provide wood or other suitable filler to avoid drilling and tapping into mortar inside frames.
- F. For all attachments including removable stops, use flat head self-tapping screws. Drill and tap in the field for surface mounted closers, brackets, rim exit devices, door holders, and other surface hardware. At horizontal exterior surfaces, set screws with neoprene gaskets or set with caulking compound under screw head and wipe clean.
- G. All field splices to be welded and filled with body putty and ground smooth, no exposed screw heads will be accepted. Locate splices where shown on final reviewed shop drawings.

3.02 PROTECTION

- A. Protect installed hollow metal work against damage from other construction.
- B. Repair or replace all damaged work at no extra cost to Owner.

END OF SECTION 08 10 00

SECTION 08 14 00

WOOD DOORS

PART 1: GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings, Details of Construction and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification Sections, apply to work specified in this section.

1.02 SUMMARY

- A. Section includes:

1. Solid core flush wood doors and transom panels.
2. Rated doors as noted on schedule and/or Code Plan.
3. Factory finishing of wood doors.
4. Factory fitting to frames (prefitting).
5. Factory preparation for hardware (premachining).
6. Glazing, glazing stops and preparation of doors to receive glazing.

- B. Related sections:

1. Metal doorframes: Section 08 10 00.
2. Finish hardware: Section 08 71 00.
3. Glazing: Section 08 80 00.

1.03 REFERENCES

- A. Window and Door Manufacturers Association (WDMA) Industry Standard: WDMA I.S.1A-04
- B. NFPA 80-1997 Standard for Fire Doors and Fire Windows. National Fire Protection Association; 1997.
- C. American National Standards Institute (ANSI) A115.W Series.
- D. ASTM E 152-81a -- Standard Methods of Fire Tests of Door Assemblies; 1981.
- E. How to Store, Handle, Finish, Install and Maintain Wood Doors; National Wood Window and Door Association (NWWDA); undated.
- F. International Building Code (IBC) Current Edition.

1.04 SUBMITTALS

- A. Submit in accordance with Section 01 33 00.
1. Product Data: Submit door manufacturer's product data for each type of wood door, including details of core and edge construction, and trim for openings.

2. Shop Drawings:
 - a. Location and size of each door.
 - b. Elevation of each kind of door.
 - c. Details of construction.
 - d. Location and extent of hardware blocking.
 - e. Fire ratings of doors as noted on door/opening schedule and/or Code Plan.
 - f. Requirements for factory finishing.
 - g. Documentation for UL 10C or other approved testing agency stating doors have passed UBC Standard 7-2.
 - h. VOC content of materials and finishes.
3. Samples:
 - a. Beads for glazed openings: Submit 6-inch-long sections of glazing beads for each material, type, and finish required.

1.05 QUALITY ASSURANCE

- A. Quality Standards: Provide flush doors complying with the following standards:
 1. Manufacturer must be an approved WDMA Door Manufacturer in accordance with WDMA I.S.1A-04.
- B. Fire-Rated Wood Doors:
 1. Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM E 152.
 2. Acceptable testing and inspection agencies include:
 - a. Underwriters Laboratories, Inc.
 - b. Warnock Hersey International, Inc.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Protect wood doors during transit, storage, and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standard and recommendations of NWWDA I.S. 1, Appendix, "How to Store, Handle, Finish, Install, and Maintain Wood Doors," as well as with manufacturer's instructions.
 1. Package doors at factory prior to shipping, using manufacturer's standard method.
- B. Identify each door with individual opening numbers using temporary, removable, or concealed markings.
 1. Correlate door identification with designation system used on shop drawings.

1.07 WARRANTIES

- A. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, installer, and contractor, agreeing to repair or replace defective doors which warp (bow, cup, or twist), which show telegraphing of core construction in face veneers, or which do not conform to tolerance limitations of specified quality standards. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the contractor under the contract documents.
1. Include reinstallation which may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.
 2. Warranty shall be in effect during the following period of time after date of substantial completion:
 - a. Solid core flush interior doors: Life of installation.
 3. Submit per Section 01 78 23.

PART 2: PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Manufacturer:
1. Provide products complying with requirements of the contract documents and made by one of the following:
 - a. Algoma Hardwoods, Inc.
 - b. Marshfield DoorSystems Inc.
 - c. Eggers Industries.
 - d. VT Industries
- B. Flush Doors: comply with requirements of WDMA I.S.1A-04.
- C. Fire Rated Doors:
1. Construction: Manufacturer's standard core construction in accordance with testing agency requirements for fire rating indicated, and as specified herein.
 2. Edges: Provide manufacturer's standard laminated edge (stile) construction for use with mortise hinges and for indicated fire resistance ratings.
 3. Labels: Permanently affixed to hinge stile.

2.02 SOLID CORE WOOD FACED DOORS

- A. Solid Core Door (non-rated):
1. PC-5 WDMA Premium
 2. Application: Non-rated interior door.
 3. Faces:
 - a. Wood Veneer:
 - 1) Natural ash or birch or maple (heartwood/sapwood), match existing.

- 2) Cut: Plain sliced.
 4. Construction: 5-ply Standard construction is per WDMA Extra Heavy Duty Performance Levels.
 5. Core: Heavy duty wood based particleboard, PC. Meet WDMA performance criteria without additional blocking.
- B. Solid Core Door (rated):
1. FD-5 WDMA Premium
 2. Application: Labeled fire door.
 3. Faces and Construction: Same as non-rated door.
 4. Core: High-density mineral core laminated to both sides of 3/4" fire retardant plywood.
 5. Reinforcing for Hardware: Fire retardant treated top rail and lockblocks for secure anchorage of hardware, without thru bolts as noted in NWWDA I.S. I-A - 1997.
 6. For 60 minute and greater rated doors installed in enclosed stairways, conform to maximum transmitted temperature end point of 450° as specified in UBC Standard No. 43-2.
 7. Provide factory primed rated astragals or metal edges as required by listing agency.
 8. Provide intumescent fire and smoke material for fire rated openings as required by door and frame manufacturer to comply with UL 10C, UBC Test 7-2.
 - a. Positive Pressure Category "A" type doors required.

2.03 GLAZING

- A. Glazing Stops:
1. Non-Rated and 20 minute
 - a. Wood, of the same species/compatible with door species.
 2. Fire-Rated 45 minute or above, manufacturers options:
 - a. Flush, wood veneer clad PVC, of same species/compatible to door facing.
 - b. Veneer wrapped rolled steel, of same species/compatible to door facing.
 - c. Manufacturer to verify compatibility of glazing system with positive pressure requirements.
- B. Glass and Glazing for Acoustical Doors:
1. Provided by the wood door manufacturer in accordance with requirements of Section 08 80 00.

2.04 FABRICATION

- A. Fixed Panels: Provide panels of same quality, construction, and appearance as adjacent doors, as follows:
1. Grain and pattern matching: Comply with specified quality standards for matching of faces between doors and panels.
 2. Transom panels: Mark top edge of transom panel to ensure correct orientation in opening.

- B. Openings: Cut, trim, and seal openings in doors at the factory.
- C. Prefitting: Fabricate and trim doors to size at factory to conform to hollow metal frames as shown on approved frame shop drawings and floor finishes as indicated in the finish schedule.
- D. Premachining: Make all mortises and cutouts required for hardware at the factory to conform to approved hardware schedules, hardware templates, and door frame shop drawings.

2.05 FACTORY FINISHING

- A. Doors to be factory finished to meet or exceed WDMA I.S. 1A TR-6.

PART 3: EXECUTION

3.01 INSPECTION

- A. Require installer to examine door frames after their installation, and doors prior to their hanging, for the following purposes:
 - 1. To verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
 - 2. To verify that doors are free of defects.
- B. Obtain installer's written report listing conditions detrimental to compliance with requirements of this section.
- C. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Condition doors to average prevailing humidity in installation area prior to hanging.
- B. Hardware Installation: Section 08 71 00.
- C. Install wood doors in accordance with manufacturer's instructions and referenced standards.
 - 1. Installation of the wood doors, and labeled wood doors shall comply with WDMA I.S.1A-04, Installation and NFPA 80.
 - 2. Dimensional tolerances for hardware cutouts, undercuts, meeting edges, heights and width shall comply with WDMA I.S.1A-04
- D. Prefit Doors: Fit to frames and machine for hardware to whatever extent not previously worked at factory as required for fit and uniform clearance at each edge.
- E. Shop-Finished Doors: Restore finish on edges of shop-finished doors before installation, if fitting or machining is required at the project site. Touch up any scratched doors to satisfaction of Architect prior to substantial completion or replace doors.

3.03 CLEANING AND ADJUSTMENT

- A. Replace doors that are warped, twisted, show through or not true in plane and that do not follow the warranty.
- B. Operation: Rehang or replace doors which do not swing or operate freely, as directed by the Architect.

- C. Refinish or replace doors damaged during installation, as directed by the Architect.
- D. Institute protective measures as recommended and accepted by door manufacturer to ensure that wood doors will be without damage or deterioration at time of substantial completion.

END OF SECTION 08 14 00