

MONTEREY COUNTY
RESOURCE MANAGEMENT AGENCY

**PUBLIC WORKS AND FACILITIES –
ARCHITECTURE**

VOLUME TWO OF THREE

PROJECT MANUAL

**JAIL HOUSING ADDITION
PROJECT NO. 8819
BID NO. 10568**



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DIVISION 02
EXISTING CONDITIONS

SECTION 02 30 00
SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Geotechnical Engineering Report:

1. A Geotechnical Engineering Report has been prepared for the site of this Project by Butano Geotechnical Engineering, Inc., 231 Green Valley Road, Suite E, Freedom, California, 95019, phone: 831-724-2612..
2. The report is titled as: Geotechnical Investigation – Design Phase, Monterey County Adult Jail Housing Addition, 1410 Natividad Road, Salinas, California.
3. The report number is: 12-126-M, dated July 29, 2013.

B. Use of Data:

1. This report was obtained for use in Project design and is referenced for Contractor's information only.
2. Contents of the report referenced in this Section do not constitute a warranty of subsurface conditions.
3. Copies of this report can be obtained, upon request, at Architect's office.
4. Contractor shall visit the site to verify existing conditions.

1.2 QUALITY ASSURANCE

A. A Geotechnical Engineer/Testing Laboratory will be retained and paid by Owner to observe performance of work in connection with excavating, trenching, placing of compacted fill and backfilling operations and at the conclusion of the excavations to provide the following services:

1. Determine if the soil at the bottom of the excavations is suitable as a base for the structure.
2. Determine if compacted fill, backfill or any other required fill meets the requirements of the Specifications.
3. Determine if imported fill materials comply with the specified requirements.
4. Determine necessary adjustments in moisture content of soil, size of equipment, thickness of layers, and any tests as may be required to ensure a properly placed fill conforming to applicable requirements of Specifications.
5. Observation and testing by Geotechnical Engineer/Testing Laboratory shall be provided during filling and compacting operations. Contractor shall give at least two working days' notice prior to beginning such operations, to allow proper scheduling of observation and testing work.
6. Field density tests shall be performed by Geotechnical Engineer/Testing Laboratory after compaction of each layer of fill. Where compaction equipment has disturbed the surface to a depth of several inches, density tests shall be taken in the compacted material below the disturbed surface. Additional layers of fill shall not be placed until the field density tests indicate that the specified density has been obtained.

- B. If Contractor fails to meet technical or design requirements of the Contract Drawings and requirements/recommendations of Geotechnical Engineering Report, necessary readjustments shall be made until all work is deemed satisfactory by Geotechnical Engineer/Testing Laboratory and Architect.
 - 1. No deviation from Specifications shall be permitted without written acceptance from Architect.
- C. Differing Site Conditions: Report differences observed between actual conditions at the site and the conditions indicated in Geotechnical Engineering Report immediately upon discovery. Report the nature and extent of differences to Owner and Architect orally to permit early verification of the conditions, and concurrently submit it in writing.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 02 41 00

DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Removal of designated construction.
- B. Identification of utilities.
- C. Demolition requirements.

1.2 RELATED SECTIONS

- A. Division 01 Sections, as applicable.

1.3 PROJECT RECORD DOCUMENTS

- A. Submit under provisions of Division 01.
- B. Accurately record actual locations of capped utilities and subsurface obstructions.

1.4 REGULATORY REQUIREMENTS

- A. Perform work of this Section under provisions of CBC Chapter 33, CFC Chapter 14, and NFPA 241 for demolition work, safety of structure, dust control and safety of occupants.
- B. Obtain required permits from authorities.
- C. Do not close or obstruct egress width to exits.
- D. Do not disable or disrupt building fire or life safety systems without three-day prior written notice to Owner.
- E. Conform to procedures applicable when discovering hazardous or contaminated materials.

1.5 SCHEDULING

- A. Schedule work under the provisions of Division 01.
- B. Describe demolition removal procedures and schedule.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 PREPARATION

- A. Provide, erect and maintain temporary barriers as required.

- B. Erect and maintain temporary partitions to prevent spread of dust, odors and noise to adjoining facilities.
- C. Protect existing materials and finishes that are not scheduled or otherwise required to be demolished.
- D. Mark location of utilities.

3.2 DEMOLITION REQUIREMENTS

- A. Conduct demolition to minimize interference with adjacent and occupied buildings.
- B. Maintain protected egress and access to the Work.

3.3 DEMOLITION

- A. Disconnect, remove, cap and identify designated utilities within demolition areas.
- B. Demolish in an orderly and careful manner. Protect existing supporting structural members and materials.
- C. Except where noted otherwise, remove demolished materials from site. Do not bury or burn materials on site.
- D. Remove demolished materials from site as Work progresses. Upon completion of Work, leave areas in clean condition.
- E. Remove temporary Work.

END OF SECTION

DIVISION 03
CONCRETE

SECTION 03 11 00
CONCRETE FORMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete formwork, shoring, bracing, and anchorage.
- B. Concrete formwork accessories.

1.2 RELATED SECTIONS

- A. Section 03 20 00 – Concrete Reinforcing.
- B. Section 03 30 00 – Cast-In-Place Concrete.
- C. Section 31 20 00 – Earth Moving.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ACI 301 – Specifications for Structural Concrete.
 - 2. ACI 347 – Guide to Formwork for Concrete.
 - 3. AHA A135.4 – Basic Hardboard.
 - 4. ASTM E1643 – Standard Practice for Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
 - 5. PS 1 – Construction and Industrial Plywood.

1.4 DESIGN REQUIREMENTS

- A. Design, engineer, and construct concrete formwork, shoring, and bracing in accordance with design and code requirements, resulting in cast-in-place concrete conforming to required shape, line, and dimension.

1.5 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specifications for the following:
 - 1. Forms for architectural cast concrete finish.

- 2. Accessories:
 - a. Chamfer strips.
 - b. Keyed construction joint.
 - c. Form ties.
 - d. Form release agent.

C. Shop Drawings: Indicate dimensions, materials, bracing, and location of joints and ties.

1.6 QUALITY ASSURANCE

- A. Conform to ACI 347 for design, fabrication, erection, and removal of forms.
- B. Field Samples: Provide only as requested by Architect.
- C. Pre-Installation Meetings:
 - 1. Conduct pre-installation meeting in accordance with Division 01.
 - 2. Convene pre-installation meeting prior to commencing work of this Section.
 - 3. Coordinate work in this Section with work in related Sections.

PART 2 PRODUCTS

2.1 FORM MATERIALS

- A. Architectural Cast Concrete Finish:
 - 1. Phenolic-faced plywood (minimum 167 g/m² on both faces); minimum 5/8 inch thickness; conforming to PS 1 APA HDO Plyform Class II or better; sound, undamaged sheets with clean, true edges, joints taped.
- B. Smooth Concrete Concealed from View: Plywood; 5/8 inch minimum thickness; conforming to PS 1 APA B-B Plyform Class II or better.
- C. Concrete Concealed from View:
 - 1. 2x lumber, plywood conforming to PS 1 APA Plyform Class II or better, tempered concrete form hardboard conforming to AHA A135.4, or other acceptable material.

2.2 ACCESSORIES

- A. Chamfer Strips: Wood, metal, or rubber strips; size as shown on Drawings, minimum 3/4 inch by 3/4 inch.
- B. Expansion Joint Filler: Refer to Section 03 30 00.
- C. Foam Board Separation: Expanded polystyrene in size and thickness to suit application.
- D. Keyed Construction Joint: Minimum 24 gauge galvanized steel; shaped with formed key (minimum 1-1/2 inch) for load transfer; and with knockouts for dowel placement.
 - 1. Basis-of-Design Product: G-33 Screed Key Joint by Dayton/Richmond Concrete Accessories, Miamisburg, OH; 800-745-3700; www.daytonrichmond.com. Provide the named product or accepted equal.

- E. Form Ties: Provide as indicated and as required.
 - 1. Galvanized steel; adjustable length; cone type; snap-off type with 1 inch back break dimension; free of defects that could leave holes larger than 1 inch in concrete surface.
 - 2. Substitution: In lieu of galvanized steel ties, Contractor may use stainless steel form ties of equal or higher strength.
 - a. Stainless Steel Form Tie System:
 - 1) Stainless Steel Snap Tie, Product No. A-44 by Dayton Superior, Miamisburg, OH; 800-745-37000; www.daytonsuperior.com.
 - 2) Stainless Steel Snap Ties by Meadow Burke, Tampa, FL; 877-518-7665, www.meadowburke.com.
 - 3) Or accepted equal.
- F. Plastic Stakes: At Contractor's option, solid plastic stakes may be used in lieu of wood and steel stakes. Provide solid plastic stakes for use in areas with continuous vapor retarder.
 - 1. Basis-of-Design Product: VaporStake™ by VaporStake LLC, Chino Hills, CA; 714-519-4211, www.vaporstake.com.
 - 2. Material: Non-corrosive, leak-resistant, solid PVC, with one pointed end and multiple pre-drilled holes for nailing; diameter and length as recommended by stake manufacturer, and as required by field conditions.
- G. Nails, Spikes, Lag Bolts, Through-Bolts, Anchors: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.
- H. Spreaders: Metal; use of wood spreaders will not be permitted.
- I. Form Release Agent: Commercially formulated form release agents that will not bond with, stain or adversely affect concrete surface, and will not impair subsequent treatment of concrete surfaces, nor impede the wetting of surfaces to be cured with water or curing compounds. Product shall meet the VOC requirements at the location of use.
 - 1. Product: Duogard as manufactured by W.R. Meadows or accepted equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions.
- B. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 EARTH FORMS

- A. Concrete may be placed against cut earth where feasible, conforming to the following criteria:
 - 1. Earth form trenches shall be able to stand without caving in.
 - 2. Sluffage will not be permitted.
 - 3. When, in the opinion of the Building Official and Architect, soil conditions do not require formwork per CBC Section 1808.8.5.

- B. Hand trim sides and bottoms of earth forms. Remove loose soil prior to placing concrete.
- C. When, in the opinion of the Building Official and Architect, soil conditions do not require formwork.

3.3 FORMWORK ERECTION

- A. Erect formwork, shoring, and bracing in accordance with ACI 301.
- B. Provide bracing to ensure stability of formwork. Shore or strengthen formwork subject to overstressing by construction loads.
- C. Arrange and assemble formwork to permit ease of dismantling and stripping and prevent damage to concrete during stripping.
- D. Align joints and make watertight. Keep form joints to a minimum.
- E. Obtain approval from Architect before framing openings not specifically indicated on Drawings.
- F. Perform electrical and mechanical work requiring concrete formwork under provisions of this Section.
- G. Stakes (wood and metal) used to support formwork or reinforcement, will not be permitted to occur within finished concrete work.
 - 1. Pulling of stakes and puddling concrete in after concrete placement will not be permitted.
 - 2. Locate non-plastic stakes appropriately to prevent embedment of stakes in the concrete after placement.
 - 3. Plastic stakes, when used in areas with vapor retarder, shall not be removed.
 - 4. Seal plastic stakes with vapor retarder manufacturer's sealing mastic in accordance with ASTM E1643 and Section 03 30 00 requirements.
 - a. Dip pointed side of plastic stake in mastic before driving through vapor retarder to seal the stake perimeter at penetration.

3.4 FORM RELEASE AGENT APPLICATION

- A. Apply form release agent on formwork in accordance with manufacturer's recommendations.
- B. Apply prior to placement of reinforcing steel, anchoring devices and embedded items.
- C. Do not apply form release agent where concrete surfaces will receive special finishes or applied coverings that are affected by agent.
- D. Soak inside surfaces of untreated forms with clean water. Keep surfaces coated prior to placement of concrete.

3.5 INSERTS, EMBEDDED PARTS AND OPENINGS

- A. Locate and set in place items which will be cast directly into concrete.
- B. Coordinate work of other Sections such as but not limited to openings, slots, reglets, recesses, chases, sleeves, bolts, anchors and other inserts.

- C. Install accessories in accordance with manufacturer's instructions, straight, level and plumb. Ensure items are not disturbed during concrete placement.
- D. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

3.6 CONSTRUCTION JOINTS

- A. Refer to Section 03 30 00.
- B. Locate construction joints so as not to impair the strength of the structure and only at locations indicated on Drawings and as acceptable to Architect. Form keys in cold joints as shown or required.

3.7 UNDERSLAB VAPOR RETARDER

- A. Protect underslab vapor retarder from damage at all times.

3.8 FORMWORK CLEANING AND INSPECTION

- A. Inspect erected formwork, shoring and bracing to ensure that work is in accordance with formwork design and that supports, fastenings, wedges, ties, and embedded items are secure to prevent displacement and distortions.
- B. Clean forms and adjacent surfaces as formwork is erected and prior to concrete placement. Remove wood chips, sawdust, dirt, and other debris.
- C. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain through cleaning ports.
- D. Close temporary openings with tight fitting panels, flush with inside face of forms and neatly fitted so joints will not be apparent in exposed concrete surfaces.

3.9 ADJUSTMENTS

- A. When a concrete pour has been stopped for a sufficient length of time so that shrinkage or warp has separated the forms and the concrete, provide for form adjustment to draw the forms into firm contact with concrete before placing additional concrete. Take precautions to prevent any shoulder or ledge from being formed at a cold joint.

3.10 FORM REMOVAL

- A. Refer to Section 03 30 00.
- B. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- C. Remove forms progressively and in accordance with ACI 347.

3.11 FORM REUSE

- A. Forms in good condition may be reused.
- B. Clean and inspect forms prior to reuse. Do not re-use split, warped, delaminated, or otherwise damaged forms that will impair surface condition and quality of cast concrete exposed to view.

- C. Do not reuse wood formwork more than three times for concrete surfaces to be exposed to view. Do not patch formwork.

3.12 FORMWORK TOLERANCES

- A. Construct formwork to maintain tolerances required by ACI 347.
- B. Concrete work out of alignment, level or plumb will be cause for rejection of the whole work affected and, if so rejected, such work shall be removed and replaced, as directed by Architect, at no cost to Owner.
- C. All concrete exposed to view, except as otherwise indicated and specified shall have a smooth finish of uniform texture, free from form marks or other visible irregularities and free from form coating, oils or other matter that will prevent bonding of patching work, painting or other finish materials.

END OF SECTION

SECTION 03 20 00
CONCRETE REINFORCING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel reinforcement and accessories for concrete.

1.2 RELATED SECTIONS

- A. Section 03 11 00 – Concrete Forming.
- B. Section 03 30 00 – Cast-in-Place Concrete.
- C. Section 04 22 00 – Concrete Unit Masonry.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.
 - 2. ACI 301 – Specifications for Structural Concrete.
 - 3. ACI 318/318R – Building Code Requirements for Structural Concrete and Commentary.
 - 4. ACI SP-66 – ACI Detailing Manual.
 - 5. ASTM A497/A497M – Standard Specification for Steel Welded Wire Reinforcement, Deformed, for Concrete.
 - 6. ASTM A615/A615M – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
 - 7. ASTM A706/A706M – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
 - 8. AWS D1.4 – Structural Welding Code – Reinforcing Steel.
 - 9. CRSI Manual of Standard Practice.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature, installation instructions, and product specification for the following products:
 - 1. Mechanical splicing devices.

2. Bar supports.

C. Placement Drawings:

1. Prepare in accordance with ACI SP-66.
2. Indicate bar sizes, spacing, locations, and quantities of steel reinforcement, bending and cutting schedules, and supporting and spacing devices.
3. Identify placement drawings with reference to sheet and detail numbers from the Contract Documents.
4. Do not use scaled dimensions from Drawings to determine lengths of steel reinforcement.
5. Submit one copy of reproducible placement drawings in addition to those required by Division 01.
6. Contractor shall be responsible for correctness and completeness of steel reinforcing requirements.
7. Begin fabrication only when placement drawings have been accepted.

D. Samples:

1. Bar supports: One for each type and grade.
2. Mechanical splicing devices: One of each type.

E. Quality Assurance/Control Submittals:

1. Submit certified copies of mill test reports of reinforcing materials analysis to Owner's testing agency.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with CRSI Manual of Standard Practice; ACI 301; and 2013 California Building Code (CBC) Chapter 17 "Structural Tests and Special Inspections", and Chapter 19 "Concrete", and as follows:
 1. Steel Reinforcement, Tests and Materials: CBC Section 1903 "Specifications for Tests and Materials".
 2. Anchorage: CBC Section 1909 "Anchorage to Concrete-Strength Design".
 3. Reinforcing Bar Welding Inspection: CBC Section 1705 "Required Verification and Inspection", Table 1705.2.2 "Required Verification and Inspection of Steel Construction Other Than Structural Steel", and CBC Section 1903.8 "Welding of Reinforcing Bars".
- B. Structural Testing for Seismic Resistance: Perform tests for seismic resistance as required by CBC Chapter 17, Section 1705.12 "Testing and Qualification for Seismic Resistance" and Paragraph 1705.12.1 "Concrete Reinforcement".
- C. Structural Tests and Inspections: Refer to project Enforcement Agency Structural Tests and Inspection Sheet.
- D. Pre-Installation Meetings:
 1. Conduct pre-installation meeting in accordance with Division 01.
 2. Convene pre-installation meeting prior to commencing Work of this Section.
 3. Coordinate Work in this Section with Work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver steel reinforcement in bundles marked with identification tags.
- C. Handle and store materials to prevent damage and contamination, excessive rusting or coating with grease, oil, or other objectionable materials.
- D. Store steel reinforcement, fabricated assemblies, and accessories off the ground on platforms, skids, or other supports.
- E. Deliver and store welding electrodes in accordance with AWS D1.4.

PART 2 PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60, low-alloy deformed steel bars.
- B. Reinforcing Steel Indicated to be Welded: ASTM A706/A706M, Grade 60, low-alloy deformed steel bars.
- C. Tie Wire: ASTM A497/A497M; double annealed steel wire; No. 16 gauge.

2.2 ACCESSORIES

- A. Bar Supports (Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars in place): Provide in accordance with CRSI Manual of Standard Practice from steel wire, plastic, or precast concrete or fiber-reinforced concrete of equal to or greater compressive strength than surrounding concrete. Provide as follows:
 - 1. Footings: Precast concrete blocks with tie wires.
 - 2. Slab on ground: Precast concrete blocks, plastic coated steel fabricated with bearing plates, or specifically designed wire-fabric supports fabricated of plastic.
 - 3. Where legs of wire bar supports contact forms: CRSI Class 1 plastic-protected or CRSI Class 2 stainless steel bar supports.
 - 4. Where support is no closer to concrete surface than 1/2 inch: CRSI Class 3 wire supports.
 - 5. Supports placed against ground: Precast concrete blocks not less than 4 inch square with embedded wire.
- B. Welding Materials For Reinforcing Steel:
 - 1. Weld Filler Material: AWS D1.4; low hydrogen, 80 ksi tensile strength.
- C. Mechanical Splices: Splicing devices capable of developing 125 percent of the specified yield strength of the bar in compression and tension.
 - 1. Metal Sleeve with Cast Filler Metal:
 - a. Acceptable Product: Cadweld Rebar by Erico International Corporation, Solon, OH; 800-248-2677; www.erico.com, or accepted equal.

2. Mechanical Threaded Connections: Provide threaded mechanical connections using a metal coupling sleeve with internal threads.
 - a. Acceptable Product: Lenton Couplers by Erico International Corporation DB-SAE Dowel Bar Splicers by Dayton Concrete Accessories, Miamisburg, OH; 800-745-3700, www.daytonconcreteacc.com, or accepted equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions.
- B. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 PREPARATION

- A. Clean steel reinforcement of rust and mill scale, earth, moisture, and other foreign materials before fabrication or placement.

3.3 STEEL REINFORCEMENT FABRICATION

- A. Fabricate to shapes, dimensions, and tolerances in accordance with accepted placement drawings conforming to CRSI Manual of Standard Practice, ACI SP-66, ACI 318/318R, ACI 117, and CBC Chapter 19.
- B. Standard Hooks and Bends: Conform to ACI 318/318R.
- C. Bending: Cold bend steel reinforcement in the field or at the mill. Heating for bending is not permitted unless otherwise specifically allowed by Architect.
- D. Weld steel reinforcement in accordance with AWS D1.4.

3.4 PLACEMENT

- A. Place steel reinforcement in accordance with accepted placement drawings in conformance with tolerances specified in ACI 117.
- B. Install steel reinforcement in largest practical lengths. Accurately position, support, and secure reinforcement against displacement. Locate support reinforcement with bar supports to maintain minimum concrete cover.
- C. Tie all splices and crossing points. Point wire tie ends away from the form.
- D. Concrete Cover: Refer to Drawings.
- E. Laps: Refer to Drawings.
 1. Offset laps in adjacent bars.
- F. Splices:
 1. Splice reinforcing as shown.
 2. Tie lap splices securely to prevent displacement during concrete placement.
 3. Install mechanical splice in accordance with manufacturer's written instructions.

4. Locate splices only where shown and accepted by Architect.

G. Welding:

1. Welding is not permitted unless specifically detailed on Drawings or accepted by Architect.
2. Employ shielded metal-arc method. Comply with AWS D1.4.
3. Welding is not permitted on bars where the carbon content is not known or is determined to exceed 0.75 percent.
4. Welding is not permitted within two bar diameters of any bent portion of a bar which has been bent cold.
5. Welding of crossing bars is not permitted.

- H. Maintain minimum clear distance between parallel bars at not less than 1-1/2 times nominal bar diameter, 1-1/2 times maximum size of coarse aggregate, or 1-1/2 inch.

- I. Dowels: Place where indicated on Drawings. Grease loose end to prevent concrete from bonding to dowel. Sleeves may be used when accepted by Architect.

- J. Dowels for Masonry Reinforcement: Coordinate with masonry work reinforcement requirements. Match masonry reinforcing steel. Refer to Section 04 22 00.

- K. Field Adjustments: Move steel reinforcement as necessary to avoid interference with other reinforcing steel or other embedded items within accepted tolerances.

1. Sleeves and embedded items: Do not cut bars to clear sleeves or slots through slabs or walls. Wrap bars around these openings.
2. Openings: Compensate for steel reinforcement terminated at openings in slabs by placing one half of steel reinforcement terminated on each side of openings for the full span length.
3. Steel reinforcement moved to avoid interference with other reinforcements, conduits, or embedded items, including additional steel reinforcement to meet structural requirements are subject to inspection and approval before concrete placement.

3.5 FIELD QUALITY CONTROL

- A. General: Comply with requirements of Division 01.

- B. Testing Service: Owner will select and pay for independent testing agency, which will perform the following:

1. Inspect shop and field welding per AWS D1.4, including checking materials, equipment, procedures, and welder qualifications.
2. Inspector shall employ non-destructive testing or any other aid to visual inspection deemed necessary to assure adequacy of weld.
3. Additional requirements for testing and inspection: Refer to Structural Drawings.

- C. Placement of steel reinforcement shall be inspected where noted on Structural Drawings.

3.6 PROTECTION

- A. Protect steel reinforcement from damage and displacement.

- B. Protect for potential rust staining of adjacent surfaces. Wrap steel reinforcement with impervious tape or other methods as accepted by Architect. Remove protective cover and clean reinforcement before concrete placement.
- C. Install safety caps on all exposed ends of vertical steel reinforcement that pose a danger to life safety.

END OF SECTION

SECTION 03 30 00
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Cast-in-place concrete.
 - 1. Architectural concrete at exposed locations.
- B. Concrete admixtures.
- C. Curing and surface slab treatment.
- D. Grouting, bonding, and patching materials.
- E. Accessories:
 - 1. Underslab vapor retarder with pipe boots.
 - 2. Expansion joints.
- F. Precast concrete wheel stops.

1.2 RELATED SECTIONS

- A. Section 03 11 00 – Concrete Forming.
- B. Section 03 20 00 – Concrete Reinforcing.
- C. Section 05 31 00 – Steel Decking.
- D. Section 05 50 00 – Metal Fabrications.
- E. Section 07 26 50 – Vapor Emission Control System.
- F. Section 07 92 00 – Joint Sealants.
- G. Section 09 65 00 – Resilient Flooring.
- H. Section 09 68 13 – Tile Carpeting.
- I. Divisions 21-23 – Mechanical Sections, as applicable to the Project.
- J. Divisions 25-28 – Electrical Sections, as applicable to the Project.
- K. Section 31 20 00 – Earth Moving.
- L. Section 33 31 00 – Sanitary Utility Sewage Piping.
- M. Section 33 39 00 – Sanitary Utility Structures.
- N. Section 33 41 00 – Storm Utility Drainage Piping.
- O. Section 33 49 00 – Storm Utility Structures.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. ACI publications 221R, 302.1R, 302.2R, 303R, 305R, 306R, and 309R contain recommended practices for concrete work. Submit any proposed deviations from these recommendations to Architect for review prior to commencing concrete work.
- D. Referenced Standards:
1. ACI 117 – Specification for Tolerances for Concrete Construction and Materials.
 2. ACI 221R – Guide for Use of Normal Weight and Heavyweight Aggregates in Concrete.
 3. ACI 301 – Specifications for Structural Concrete.
 4. ACI 302.1R – Guide for Concrete Floor and Slab Construction.
 5. ACI 302.2R – Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.
 6. ACI 303R – Guide to Cast-In-Place Architectural Concrete Practice.
 7. ACI 303.1 – Standard Specification for Cast-in-Place Architectural Concrete.
 8. ACI 305R – Guide to Hot Weather Concreting.
 9. ACI 305.1 – Specification for Hot Weather Concreting.
 10. ACI 306R – Guide to Cold Weather Concreting.
 11. ACI 306.1 – Standard Specification for Cold Weather Concreting.
 12. ACI 309R – Guide for Consolidation of Concrete.
 13. ACI 318 – Building Code Requirements for Structural Concrete.
 14. ACI SP-15 – Field Reference Manual: Specifications for Structural Concrete ACI 301-10 with Selected ACI and ASTM References.
 15. ASTM C31/C31M – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
 16. ASTM C33 – Standard Specification for Concrete Aggregates.
 17. ASTM C39/C39M – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
 18. ASTM C94/C94M – Standard Specification for Ready Mixed Concrete.
 19. ASTM C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens).
 20. ASTM C114 – Standard Test Methods for Chemical Analysis of Hydraulic Cement.
 21. ASTM C143/C143M – Standard Test Method for Slump of Hydraulic Cement Concrete.

- 22. ASTM C150 – Standard Specification for Portland Cement.
- 23. ASTM C157/C157M – Standard Test Method for Length Change of Hardened Hydraulic-Cement, Mortar and Concrete.
- 24. ASTM C171 – Standard Specification for Sheet Materials for Curing Concrete.
- 25. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
- 26. ASTM C309 – Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete.
- 27. ASTM C348 – Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars.
- 28. ASTM C494/C494M – Standard Specification for Chemical Admixtures for Concrete.
- 29. ASTM C595 – Standard Specification for Blended Hydraulic Cements.
- 30. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- 31. ASTM C881/C881M – Standard Specification for Epoxy Resin Base Bonding Systems for Concrete.
- 32. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
- 33. ASTM C928 – Standard Specification for Packaged, Dry, Rapid Hardening Cementitious Materials for Concrete Repairs.
- 34. ASTM C939 – Standard Test Method for Flow of Grout for Preplaced Aggregate Concrete (Flow Cone Method).
- 35. ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars.
- 36. ASTM C1028 – Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull Meter Method.
- 37. ASTM C1059 – Standard Specification for Latex Agents for Bonding Fresh to Hardened Concrete.
- 38. ASTM C1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- 39. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
- 40. ASTM C1315 – Standard Specification for Liquid Membrane-Forming Compounds Having Special Properties for Curing and Sealing Concrete.
- 41. ASTM C1602/C1602M – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
- 42. ASTM D882 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
- 43. ASTM D1709 – Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.

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| 44. ASTM D1751 | – Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types). |
| 45. ASTM D4397 | – Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications. |
| 46. ASTM E96/E96M | – Standard Test Methods for Water Vapor Transmission of Materials. |
| 47. ASTM E154 | – Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover. |
| 48. ASTM E329 | – Standard Specification for Agencies Engaged in Construction Inspection and/or Testing. |
| 49. ASTM E1155 | – Standard Test Method for Determining F_F Floor Flatness and F_L Floor Levelness Numbers. |
| 50. ASTM E1643 | – Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs. |
| 51. ASTM E1745 | – Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs. |
| 52. ASTM F1249 | – Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor. |
| 53. ISO/IEC/EN 17025 | – General Requirements for the Competence of Testing and Calibration Laboratories (formerly ISO/IEC Guide 25-1990 and ASTM E548). |
| 54. NRMCA | – Quality Control Checklist – Section 2. |
| 55. NRMCA | – Plant Certification Checklist – Section 3. |

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specification for each product. Include manufacturer's written instructions and installation procedures.
- C. Drawings: Submit concrete pouring plan showing proposed locations of construction and control joints for review by Architect prior to concrete placement.
- D. Samples: Submit product samples when requested by Architect or testing laboratory.
- E. Quality Assurance/Control Submittals:
 - 1. Certificates:
 - a. Manufacturer's Certification of Compliance that materials (cementitious materials, aggregates, and admixtures) conform to specifications.
 - b. Manufacturer's certificate of compatibility stating that admixtures, slab curing materials, and surface treatments are compatible with subsequent floor finishes and adhesives.

2. Reference Documents: Maintain one copy of ACI SP-15 on site.
3. Concrete mixture proportions and characteristics for each class/type of concrete used.
4. Concrete mixture proportion data for each class/type of concrete used:
 - a. Calculation of required average compressive strength and supporting test records.
 - b. Documentation indicating proposed mixture proportions will produce an average compressive strength greater than the required average compressive strength, including field strength test records or trial mixtures.
 - c. Provide documentation in accordance with Concrete Mix Design Submittal Checklist located at the end of this Section.
5. Test Reports.
6. Batch Ticket: Furnish accepted batch tickets at the time of delivery for each concrete load. Indicate on each ticket equipment used for measuring and quantities, by weight, of cement, sand, each class of aggregate, admixtures, and amount of water in the aggregate, water added at the batching plant, and any water withheld at the batch plant. In addition, include mix number, total yield in cubic yards, date and time of day (dispatch time, plant departure time, site arrival time, unloading start and end time).
7. Concrete Placement Record: Keep a record on site including time and date of concrete placing for each portion of the structure for the duration of the project. Record additional information not included in batch ticket such as admixtures added at the job site. Make records available to Architect for review. Submit record to Architect at project completion.
8. Protection of Slabs and Foundations: Submit plans for protection of slabs and foundations, including the following, if applicable:
 - a. Cold Weather Concreting: Comply with submittal requirements of ACI 306.1.
 - b. Hot Weather Concreting: Comply with submittal requirements of ACI 305.1.

F. Closeout Submittals:

1. Concrete placement record.
2. Show location of embedded utilities in record drawings.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Concrete Supplier: Firm specializing in products specified in this Section with a minimum five years documented experience; successfully supplying similar materials (design, content, and performance) as specified in this Section.
2. Concrete Batch Plant: Complies with requirements of ASTM C94 and is currently certified per NRMCA Plant Certification Checklist - Section 3 or other certification acceptable to Architect.
3. Contractor's Design Laboratory: Under the direction of civil engineer licensed by the State of California; conforming to ASTM E329 and ASTM C1077.
4. Independent Testing Laboratory: Conforming to ASTM E329, ASTM C1077, and ISO/IEC/EN 17025, acceptable to Architect.

B. Structural Tests and Inspections: Refer to project Enforcement Agency Structural Tests and Inspection Sheet.

- C. Regulatory Requirements: Conform to requirements of 2013 California Building Code (CBC), Chapter 19, "Concrete", Chapter 17 "Structural Tests and Special Inspections", and as follows:
1. Materials:
 - a. Cementitious Materials: CBC Chapter 19, Section 1903 "Specifications for Tests and Materials" and Section 1913.2.5 "Cementitious Materials".
 - b. Concrete Aggregates: CBC Chapter 19, Section 1903 "Specifications for Tests and Materials".
 2. Quality:
 - a. Proportions of Concrete: CBC Chapter 19, Section 1905 "Modifications to ACI 318", Paragraph 1905.1 "General" and Paragraph 1905.1.1.
 - b. Strength Tests of Concrete: CBC Chapter 19, Section 1905 "Modifications to ACI 318" Paragraph 1905.1.2.
 3. Inspection: CBC Chapter 17, Section 1705 "Required Verification and Inspection" Article 1705.3 "Concrete Construction", as applicable.
- D. Drying Shrinkage Test: Perform per ASTM C157/C157M modified as follows:
1. Prepare 4 inch x 4 inch x 11 inch prisms with an effective gage length of 10 inches fabricated, cured, dried, and measured per ASTM C157/C157M except that specimens shall be removed from molds at an age of 23 hours +/- 1 hour after trial batching, and shall be placed immediately in water at 73 degrees F +/- 3 degrees for at least thirty minutes, and shall be measured within thirty minutes thereafter to determine original length and then submerged in saturated lime water at 73 degrees F +/- 3 degrees.
 2. Measurement to determine expansion expressed as a percentage of original length shall be made at seven days. This length at seven days shall be the base length for drying shrinkage calculations. Specimens shall then be stored immediately in a humidity control room, maintained at 73 degrees F +/- three degrees F and fifty percent +/- four percent relative humidity for the remainder of the test.
 3. Measurements to determine shrinkage expressed as a percentage of base length shall be made and reported separately for 7, 14, and 21 days of drying after 7 days of moist curing.
- E. Quality Control: Comply with NRMCA Quality Control Checklist – Section 2.
- F. Materials Quality Assurance: Obtain cement and aggregates from same source for the duration of the work unless specifically accepted by Architect.
- G. Pre-Installation Meetings:
1. Conduct pre-installation (pre-pour) meeting in accordance with Division 01.
 2. Convene pre-installation (pre-pour) meeting one week prior to commencing work of this Section attended by concrete supplier.
 3. Meeting minutes shall be taken and distributed to meeting attendees within three days of meeting.
 4. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.

- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Store cement and other cementitious materials in weathertight buildings, bins, or silos which exclude moisture and contaminants and keep building materials completely separated.
- D. Arrange and use aggregate stockpiles in a manner to avoid excessive segregation and to prevent contamination with other materials or with other sizes of aggregates. Do not store aggregates directly on ground unless a sacrificial layer is left undisturbed.
- E. Refer to manufacturers' product data sheets for recommended shelf life and storage conditions for admixtures.
- F. Clearly and accurately label materials after containers have been opened.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. BASF Corporation – Admixture Systems, Cleveland, OH; 800-228-3318, www.basf-admixtures.com.
 - 2. BASF Corporation – Building Systems, Shakopee, MN; 800-433-9517, www.buildingsystems.basf.com
 - 3. Grace Construction Products – W. R. Grace & Co., Cambridge, MA; 877-423-6491, www.na.graceconstruction.com.
 - 4. Insulation Solutions, Inc., East Peoria, IL; 866-698-6562, www.insulationsolutions.com.
 - 5. L. M. Scofield Company, Los Angeles, CA; 323-720-3000, www.scofield.com.
 - 6. Pecora Corp., Harleysville, PA; 800-523-6688, www.pecora.com.
 - 7. Raven Industries Inc, Sioux Falls, SD; 800-635-3456, www.ravenind.com.
 - 8. Reef Industries, Inc., Houston, TX; 800-231-6074, www.reefindustries.com.
 - 9. Sika Corp., Lyndhurst, NJ; 800-933-7452, www.sikaconstruction.com.
 - 10. Stego Industries, LLC, San Clemente, CA; 877-464-7834, www.stegoindustries.com.
 - 11. The Euclid Chemical Co., Cleveland, OH; 800-321-7628, www.euclidchemical.com.
 - 12. Tremco, Beachwood, OH; 800-852-9068, www.tremcosealants.com.
 - 13. TXI – Pacific Custom Material, Inc., Port Costa, CA; 510-787-0150.
 - 14. US Mix Products Co., Denver, CO; 800-397-9903, www.usspec.com.
 - 15. W. R. Meadows, Inc., Hampshire, IL; 800-342-5976, www.wrmeadows.com.
- B. Substitutions: Manufacturers and products are listed in this Section to establish minimum requirements as to quality and performance. Comply with requirements of Division 01 for substitutions.

2.2 CONCRETE MATERIALS

A. Cementitious Materials:

1. Cement: ASTM C150, Type II, low alkali (equivalent alkalis ($\text{Na}_2\text{O} + 0.658\text{K}_2\text{O}$) no more than 0.6 percent per ASTM C114), gray.
2. Supplementary Cementitious Materials (SCM):
 - a. Fly Ash: ASTM C618, Class F or Class N. Class C is not permitted.
 - b. Slag Cement: ASTM C989, Grade 100 or Grade 120.

B. Aggregates: Aggregates used in concrete shall have a combined aggregate distribution similar to the aggregates used in the concrete represented by field test data or used in trial mixtures. Fine and coarse aggregates: ASTM C33. Low-shrinkage producing coarse aggregates per ACI 221R; and uniformly graded as follows:

Sieve Number or Size in Inches	Percent Retained by Weight		
	1-1/2 inch Max.	1 inch Max.	3/4 inch Max.
2 inch	0-5	—	—
1-1/2 inch	0-8	0-5	—
1 inch	8-18	0-8	0-5
3/4 inch	8-18	8-18	0-8
1/2 inch	8-18	8-18	8-18
3/8 inch	8-18	8-18	8-18
No. 4	8-18	8-18	8-18
No. 8	8-18	8-18	8-18
No. 16	8-18	8-18	8-18
No. 30	8-18	8-18	8-18
No. 50	0-18	0-18	0-18
No. 100	0-8	0-8	0-8
No. 200	0-8	0-8	0-8

1. Maximum Nominal Size of Coarse Aggregate: CBC Section 1903 “Specifications for Tests and Materials”, and as follows:
 - a. 1-1/2 inches,
 - b. 1/5 the narrowest dimension between sides of forms,
 - c. 1/3 depth of slab, or
 - d. 3/4 the minimum clear spacing between individual reinforcing bars or bundles of bars.
2. Aggregate sources shall not contain any alkali-silica reactive material in accordance with ASTM C33, Appendix XI.

C. Water: Potable and complying with ASTM C1602/C1602M.

2.3 ADMIXTURES

A. General:

1. Manufacturer certified to contain no more than 0.05 percent water-soluble chloride ions by mass of cementitious material. Admixtures containing calcium chloride or thiocyanates not allowed.
2. Compatible with other admixtures and cementitious materials in the concrete mix.
3. Obtain Architect's written acceptance prior to use of admixtures. Use admixtures according to manufacturer's written instructions.

B. Water Reducing:

1. Normal Range: ASTM C494/C494M, Type A.
 - a. Acceptable products:
 - 1) MasterPozzolith Series by BASF Corporation – Admixture Systems.
 - 2) Eucon Series by The Euclid Chemical Co.
 - 3) WRDA 64 by Grace Construction Products.
 - 4) Plastocrete 161 by Sika Corp.
 - 5) Or accepted equal.
2. Mid Range Water-Reducing: ASTM C494/C494M, Type A or Type F.
 - a. Acceptable products:
 - 1) MasterPolyheed Series BASF Corporation – Admixture Systems.
 - 2) Eucon Series by The Euclid Chemical Co.
 - 3) Duracem 55 by Grace Construction Products.
 - 4) Or accepted equal.
3. High Range Water-Reducing: ASTM C494/C494M, Type F or G.
 - a. Acceptable products:
 - 1) MasterRheobuild 1000 or MasterGlenium Series by BASF Corporation – Admixture Systems.
 - 2) Eucon Series or Plastol Series by The Euclid Chemical Co.
 - 3) Duracem 100 by Grace Construction Products.
 - 4) Sikament 10 ESL by Sika Corp.
 - 5) Or accepted equal.

C. Shrinkage Reducing: Reduces dry shrinkage up to 80 percent at 28 days, and up to 50 percent at one year and beyond as tested per ASTM C157/C157M.

1. Acceptable products:
 - a. MasterLife SRA 20 by BASF Corporation – Admixture Systems.
 - b. Eclipse Floor and Eclipse Plus by Grace Construction Products.
 - c. Eucon SRA Series or Conex by The Euclid Chemical Co.
 - d. Or accepted equal.

- D. Set Retarding: ASTM C494/C494M, Type B or Type D.
 - 1. Acceptable products:
 - a. Pozzolith Series or MasterSet DELVO Series by BASF Corporation – Admixture Systems.
 - b. Eucon Retarder Series, Eucon DS, or Eucon Stasis by The Euclid Chemical Co.
 - c. Or accepted equal.
- E. Set Accelerating: ASTM C494/C494M, Type C or Type E.
 - 1. Acceptable products:
 - a. MasterSet AC 534 or MasterSet FP 20 by BASF Corporation – Admixture Systems.
 - b. Accelguard Series by The Euclid Chemical Co.
 - c. Or accepted equal.
- F. Workability-Retaining: Shall retain concrete workability without affecting time of setting or early-age strength development. ASTM C494/C494M, Type S.
 - 1. Acceptable Products:
 - a. MasterSure Z 60 by BASF Corporation – Admixture Systems.
 - b. Plastol AMP Series by The Euclid Chemical Co.
 - c. Or accepted equal.

2.4 CURING MATERIALS AND SLAB TREATMENT

- A. General:
 - 1. Comply with regulations of the California Air Resources Board and the local Air Pollution Control/Air Quality Management District.
 - a. VOC Limit: 350 g/L.
 - 2. Verify compatibility with subsequent adhesives and coatings before application; furnish Manufacturer's certificate of compatibility. Coordinate with related Sections.
- B. Curing Compound: Select as appropriate for compatibility of subsequent adhesives and coatings.
 - 1. Acrylic emulsion blend; meets or exceed ASTM C309, Type 1, Class B.
 - a. Acceptable products:
 - 1) MasterKure CC 160WB by BASF Corporation – Building Systems.
 - 2) Diamond Clear VOX by The Euclid Chemical Co.
 - 3) Vocomp 20 by W. R. Meadows, Inc.
 - 4) US SPEC Hydrasheen 15% by US Mix Products Co.
 - 5) Or accepted equal.
 - 2. Water-emulsion, white, wax-based; meets or exceed ASTM C309, Type 2, Class A.
 - a. Acceptable products:
 - 1) Kurez VOX White Pigmented by The Euclid Chemical Co.
 - 2) US SPEC Maxcure Wax White by US Mix Products Co.
 - 3) Or accepted equal.

3. Water-emulsion, dissipating resin based; meets or exceed ASTM C309, Type 1, Class B.
 - a. Acceptable products:
 - 1) Kurez DR VOX The Euclid Chemical Co.
 - 2) US SPEC Maxcure Resin Clear by US Mix Products Co.
 - 3) Or accepted equal.
 4. Water based, acrylic emulsion; meets ASTM C1315, Type 1, Class B.
 - a. Acceptable products:
 - 1) MasterKure CC 1315 by BASF Corporation – Building Systems.
 - 2) Super Aqua-Cure VOX by The Euclid Chemical Co.
 - 3) US SPEC Radiance UV-25 by US Mix Products Co.
 - 4) Or accepted equal.
- C. Waterproof Sheet Materials for Curing: ASTM C171 and as follows:
1. Curing paper consisting of two sheets of kraft paper adhered together with a bituminous material with embedded cords or strands of fiber running in both directions not more than 1-1/4 inches apart.
 - a. Tensile strength in machine direction: Thirty foot-pounds per inch of width minimum.
 - b. Tensile strength in cross direction: Fifteen foot-pounds per inch of width minimum.
 2. Polyethylene film: ASTM D4397; minimum six mil thickness.
 3. White burlap-polyethylene sheeting: Consisting of burlap weighing not less than nine ounces per square yard extrusion coated on one side with at least four mil white opaque polyethylene sheet.
- D. Evaporation Retarder: Water-based polymer concentrate, readily dilutable in water.
1. Acceptable Products:
 - a. MasterKure ER50 by BASF Corporation – Admixture Systems.
 - b. Eucobar by The Euclid Chemical Co.
 - c. US SPEC Monofilm ER by US Mix Products Co.
 - d. Or accepted equal.
- E. Surface Retarder: Water soluble liquid, formulated to retard wet surface of mortar in concrete.
1. Acceptable Products:
 - a. MBT EAC-S Regular or Deep by BASF Corporation – Admixture Systems.
 - b. Sure Etch Series by The Euclid Chemical Co.
 - c. Rugasol-S by Sika Corp.
 - d. Or accepted equal.

- F. Penetrating Sealer: Low gloss, low VOC, waterborne modified acrylic solution; odorless, colorless.
 - 1. Acceptable Products:
 - a. Cementone Clear Concrete Sealer by L. M. Scofield Company.
 - b. MasterKure HD 200 WB by BASF Corporation – Building Systems.
 - c. Eucosil by The Euclid Chemical Co.
 - d. US SPEC Industraseal by US Mix Products Co.
 - e. Or accepted equal.
- G. Unpigmented Mineral Dry-Shake Floor Hardener: Quartz-silica mixture of finely graded nonmetallic aggregates, plasticizer and cement binder.
 - 1. Acceptable Products:
 - a. MasterTop 110 ABR by BASF Corporation – Building Systems.
 - b. Surflex by The Euclid Chemical Co.
 - c. US SPEC Dense Top by US Mix Products Co.
 - d. Or accepted equal.
- H. Vapor Emission Control System: Refer to Section 07 26 50.

2.5 GROUTING, BONDING, AND PATCHING MATERIALS

- A. Grout:
 - 1. Cement Grout: Mixture of one part cement and two parts sand proportioned by volume, admixtures for pressure grouting, and sufficient water to form a workable mix.
 - 2. Non-shrink Grout: ASTM C1107, non-metallic aggregate grout; 7000 psi minimum 28-day compressive strength at fluid water ratio per ASTM C939.
 - a. Acceptable products:
 - 1) MasterFlow 928 by BASF Corporation – Building Systems.
 - 2) NS Grout, Hi-Flow Grout, or Euco Pre-Cast Grout by The Euclid Chemical Co.
 - 3) US SPEC MP Grout by US Mix Products Co.
 - 4) Or accepted equal.
 - 3. Non-shrink Drypack Grout: Non-shrink, natural aggregates, 7000 psi minimum 28-day compressive strength.
 - a. Acceptable products:
 - 1) MasterFlow 100 by BASF Corporation – Building Systems.
 - 2) Dry Pack Grout by The Euclid Chemical Co.
 - 3) Sealtight Pac-it by W.R. Meadows, Inc.
 - 4) US SPEC GP Grout by US Mix Products Co.
 - 5) Or accepted equal.

B. Bonding Materials:

1. Bonding Agent/Admixture:

- a. Interior or exterior applications: Acrylic or SBR, latex cement bonding agent/admixture; non-re-emulsifiable; meets or exceeds ASTM C1059, Type II.

- 1) Acceptable products:

- a) Akkro-7T, Flex-Con or SBR Latex by The Euclid Chemical Co.
- b) US SPEC Acrylcoat by US Mix Products Co.
- c) Sealtight Acry-Lok by W. R. Meadows, Inc.
- d) Or accepted equal.

- b. Interior applications or exterior applications not subject to constant water immersions: Ethyl-vinyl acetate (EVA) copolymer liquid bonding agent and admixture; re-emulsifies once and will not re-wet; meets or exceeds ASTM C1059.

- 1) Acceptable products:

- a) Tammsweld by The Euclid Chemical Co.
- b) US SPEC Multicoat by US Mix Products Co.
- c) Or accepted equal.

- 2. Structural Bonding Epoxy Adhesive: Two component, 100 percent solids, 100 percent reactive; meets or exceeds ASTM C881/C881M, Type II, Grade 2, Class B or C as appropriate.

- a. Acceptable products:

- 1) MasterEmaco ADH 1090RS, MasterEmaco ADH 1420, or MasterEmaco ADH 327RS by BASF Corporation – Building Systems.
- 2) Dural 452 MV by The Euclid Chemical Co.
- 3) Sealtight Rezi-Weld 1000 by W. R. Meadows, Inc.
- 4) Or accepted equal.

- C. Self-Leveling Underlayment: Portland cement based, self-leveling 1 inch thick to featheredge. Fast setting – minimum compressive strength 2200 psi after one day; minimum 4400 psi compressive strength at 28 days per ASTM C109.

- 1. Acceptable products:

- a. MasterTop 110 SL by BASF Corporation – Building Systems.
- b. Flo-Top or EucoFloor SL 160 by The Euclid Chemical Co.
- c. US SPEC Self-Leveling Underlayment by US Mix Products Co.
- d. Or accepted equal.

- D. Repair Mortar: Exceeds ASTM C928, R1 and R2; rapid setting – minimum 1300 psi at three hours; 5500 psi at seven days per ASTM C109.

- 1. Acceptable products:

- a. MasterEmaco T 415/430 or MasterEmaco T 1060/1061 Repair Mortars by BASF Corporation – Building Systems.
- b. Euco-Speed, Versaspeed, or Speedcrete 2028 by The Euclid Chemical Co.
- c. US SPEC Transpatch by US Mix Products Co.

- d. Or accepted equal.
- E. Repair Mortar (for patching over steel): Liquid polymer modified, containing an integral corrosion inhibitor, exceeds C928, R2; rapid setting – minimum 2500 psi at one day; 5000 psi at seven days per ASTM C109.
 - 1. Acceptable products:
 - a. MasterEmaco N 350CI with Acrylic Additive or MasterEmaco T 310CI by BASF Corporation – Building Systems.
 - b. Concrete-Top Supreme by The Euclid Chemical Co.
 - c. US SPEC H2 by US Mix Products Co.
 - d. Sikatop 122 Plus by Sika Corp.
 - e. Or accepted equal.
- F. Epoxy Joint Filler: Two component, 100 percent solids, semi-rigid epoxy; hardness: minimum 75 Shore A per ASTM D2240.
 - 1. Acceptable products:
 - a. MasterSeal CR 190 by BASF Corporation – Building Systems.
 - b. Euco 700 by The Euclid Chemical Co.
 - c. US SPEC SR 50-EJF by US Mix Products Co.
 - d. Sikadur 51 NS by Sika Corp.
 - e. Or accepted equal.

2.6 ACCESSORIES

- A. Underslab Vapor Retarder, Plastic: Performance shall exceed ASTM E1745, Class A requirements, as modified below. Material properties shall match one of the acceptable products listed below.
 - 1. Properties:
 - a. Thickness: Minimum 15 mils (ACI 302.2R, as applicable).
 - b. Water Vapor Permeance (as tested before and after ASTM E1745 mandatory conditioning): Maximum 0.01 Perms (based on Test Method ASTM E1745).
 - c. Tensile Strength: Minimum 60 lbf/in (ASTM D882).
 - d. Puncture Resistance: Minimum 3000 g (ASTM D1709, Method B).
 - 2. Acceptable Products:
 - a. Viper Vaporcheck II 15 Mil by Insulation Solutions, Inc.
 - b. VaporBlock VB15 by Raven Industries.
 - c. Griffolyn® 15 Mil Green by Reef Industries, Inc.
 - d. 15 Mil Vapor Barrier by Stego Industries, LLC.
 - e. Perminator 15 Mil by W.R. Meadows, Inc.
 - f. Substitutions: Under provisions of Division 01.

B. Vapor Retarder Accessories:

1. Seam Tape: Water vapor transmission rate 0.03 perms or lower, per ASTM E96. Provide seam tape as standard with vapor retarder manufacturer.
2. Vapor Proofing Mastic: Water vapor transmission rate 0.03 perms or lower per ASTM E96 as standard with vapor retarder manufacturer.
3. Boots for Pipe Penetrations: Provide prefabricated pipe boots as standard with vapor retarder manufacturer.
4. Bedding Layer and Cushion/Protection Course: Fine graded material such as crusher fines or manufactured sand.

C. Cone Hole Plugs: Precast high strength cement compound plugs matching size and shape of form tie cone and matching color of poured-in-place concrete as provided by same manufacturer of form ties. Refer to Section 03 11 00.

D. Capillary Barrier: Clean gravel or crushed rock; 3/4 inch nominal maximum size with no material passing a No. 4 sieve.

E. Expansion Joints:

1. Joint-Filler Strips: ASTM D1751; bituminous type; preformed, resilient, flexible, and non-extruding.
 - a. Acceptable Products:
 - 1) Sealtight Fiber Expansion Joint by W.R. Meadows, Inc.
 - 2) Or accepted equal.
2. Self-Leveling Polyurethane Sealant: ASTM C920; Type M; Grade P; Class 25; use T and M.
 - a. Acceptable products:
 - 1) THC 900/901 by Tremco Inc.,
 - 2) Urexpan NR-200 by Pecora Corp.,
 - 3) MasterSeal SL2 by BASF Building Systems,
 - 4) Or accepted equal.

F. Anchors, Anchor Bolts, Nuts, and Washers: Refer to Section 05 12 00.

2.7 PRECAST CONCRETE WHEEL STOPS

- A. Provide precast concrete wheel stops, size and shape as indicated on Drawings.
- B. Concrete: Precast, air entrained concrete with a minimum compressive strength of 2,500 psi. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.
- C. Dowels: Galvanized steel, 3/4-inch diameter, 10-inch minimum length. Provide where indicated, or as required by design condition.

2.8 CONCRETE MIX

A. General:

1. Proportion concrete design mixes per ACI 301 Section 3.9, ACI 318 Chapter 5, and CBC Section 1904 "Durability Requirements".
2. Proportion concrete design mixes per ACI, prepared and tested by an independent testing laboratory acceptable to Architect prior to design mix approval. For each mix design, prepare and perform tests as follows:
 - a. Drying shrinkage test per modified ASTM C157/C157M as specified in this Section; provide at least three test specimens. Drying shrinkage test not required for below grade concrete.
 - b. Compression test; provide at least six test specimens.
3. Proportioning without field experience or trial mixtures may be permitted with written approval from Architect, where concrete manufacturer can establish the uniformity of its production for concrete of similar type and strength based on recent test data in accordance with ACI 318, Chapter 5 "Concrete Quality, Mixing and Placing", Article 5.4 "Proportioning without Field Experience or Trial Mixtures".
4. Proportion concrete design mix to attain compressive strength as specified below and as needed, with early strength to meet Contractor's work program.

B. Mix Design:

MIX DESIGN TABLE

Location	Req'd SCM (% by weight of total cementitious materials)	Req'd early Compressive Strength (psi)	Req'd 28-day Compressive Strength (psi)	Slump (inch)	Air Content	Max. W/C Ratio	Max. Air-dry weight (lbs/ft ³)	ACI Exposure Class
Below grade concrete (footings, piers, grade beams).	0-15	2500 prior to loading	4000	4	None	0.50	145	F0, S0, P0, C1
Slab-on-ground and building curbs.	0-15	-	4000	4	None*	0.45	145	F0, S0, P0, C1
Walls, columns, beams, and structural elevated slabs	0	3500 prior to loading	5000	4	None	0.45	145	F0, S0, P0, C1
Concrete fill over metal deck and concrete topping slab over precast concrete planks.	0-15	2500 prior to loading	4000	4	None*	0.45	145	F0, S0, P0, C1

*3 percent maximum air at steel troweled concrete unless Contractor can assure that delamination will not occur. Protect slabs until space is conditioned if air content is less than 4.5 percent.

1. Maximum Water Content: 300 pounds per cubic yard.

2. Maximum Drying Shrinkage: 0.048 percent as tested per modified ASTM C157/C157M as specified in this Section after 7 days moist curing plus 21 days drying. This requirement does not apply to below grade concrete.
3. Slump shown in Mix Design Table above is for concrete without water reducing admixtures and is to be measured at the point of delivery. Slump tolerance shall be +/- 1 inch.
4. Slump Limits for Concrete with Water-Reducing and or Mid-Range Water Reducing Admixtures: 8 inches with a tolerance of +/- 1-1/2 inch at point of delivery. Concrete shall be proportioned to a slump of 2 to 4 inches before admixture is added.
5. Slump Limits for Concrete with High-Range Water-Reducing Admixture: 10 inches with a tolerance of +/- 1-1/2 inch at point of delivery. Concrete shall be proportioned to a slump of 2 to 4 inches before admixture is added.

C. Admixtures:

1. Use specified admixtures as acceptable to Architect. Verify compatibility of concrete admixtures when using multiple admixtures.

2.9 CONCRETE MIXING

- A. Concrete shall be mixed per ACI 318 Chapter 5, Section 5.8.
- B. Ready-Mixed Concrete: Per ACI 318 Section 5.8.2.
- C. Job-Mixed Concrete: Per ACI 318 Section 5.8.3.

2.10 SOURCE QUALITY CONTROL

- A. Owner shall employ a testing laboratory accepted by Architect to perform the following:
 1. Review mix designs and certificates of compliance for materials Contractor proposes to use.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine and verify the following prior to concrete placement.
 1. Forms are erected, adequately braced, sealed, lubricated (if required), and bulkhead provided where placing is to stop.
 2. Thoroughly water soak wood forms other than plywood at least twelve hours before concrete placement.
 3. Steel reinforcement are accurately positioned, securely tied and braced. Verify concrete cover requirements.
 4. Coordination with related work is completed.
 5. Anchors and embedded items are in position, securely held and braced.
 6. Construction joints and previously placed concrete are prepared as specified.
 7. Compliance with cold-weather or hot-weather requirements.
 8. Compliance with cleaning and preparation requirements.

- B. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.
- C. Concrete formwork, reinforcement, inserts, and embedded items are subject to Architect's acceptance. Notify Architect at least 48 hours prior to concrete placement.

3.2 PREPARATION

- A. Capillary barrier below interior slabs shall be compacted using one pass of a smooth drum or vibratory roller. Compaction shall be verified by Geotechnical Engineer.
- B. Underslab Vapor Retarder: Install in accordance with manufacturer's written instructions, ASTM E1643, and as specified in this Section.
 - 1. Lay underslab vapor retarder at interior on-ground concrete work.
 - 2. Apply underslab vapor retarder directly on underlying subgrade, base course, or capillary water barrier, unless it consists of crushed material or large granular materials which could puncture the underslab vapor retarder. In this case, choke the surface with a bedding layer of approximately 1/2 inch fine-graded material rolled or compacted over the fill before placing the underslab vapor retarder.
 - 3. Unroll vapor retarder with longest dimension parallel with direction of concrete placement.
 - 4. Lay vapor retarder using the greatest widths and lengths practicable to eliminate joints wherever possible. Lap over footings and seal to foundation walls.
 - 5. Overlap joints 6 inches and seal with compatible seal tape per manufacturer's written recommendations.
 - 6. Seal all penetrations per manufacturer's written instructions using mastic and seal tape. No penetration of underslab vapor retarder is permitted except for reinforcing steel and permanent utilities.
 - 7. Replace torn, punctured, and damaged underslab vapor retarder material prior to placing concrete.
 - 8. Minor repairs may be made by patches of underslab vapor retarder overlapping edges 6 inches and sealing all four sides with tape.
 - 9. Cover underslab vapor retarder with a cushion/protection course of fine-graded material, thickness as indicated on the Structural Drawings.
 - 10. Control concrete placement so as to prevent damage to underslab vapor retarder. Screed pins and similar implements that will puncture underslab vapor retarder are not permissible.
- C. Cleaning: Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt and other debris before placing concrete.
- D. Refer to Section 03 11 00 for formwork preparation.
- E. Refer to Section 03 20 00 for reinforcing steel preparation.

3.3 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301 and as specified in this Section.
 - 1. Place and finish Architectural Concrete in the locations indicated on Drawings in accordance with ACI 303.1 and 303R.

- B. Add no water during delivery and at the project site unless specifically accepted by Architect. If water is withheld at batch plant, indicate in delivery ticket the design water for accepted mix, moisture content of aggregates, and free water added at batch plant. If total water added at plant is less than design water to attain slump of accepted mix design, water may be added to concrete at job site, not to exceed the design water content, subject to the limitations specified in ASTM C94/C94M. If additional slump is required, use water reducing admixture.
- C. Discharge mixed concrete within 1-1/2 hours or before mixer has revolved 300 revolutions, whichever comes first, after the introduction of mixing water to the cement and aggregates. Reduce this time to 45 minutes when the concrete temperature exceeds 85 degrees F, unless appropriate measures as specified in ACI 305.1 are taken to maintain slump and temperature of concrete. Slump and concrete temperature can be maintained within limits longer with the use of retarding admixtures or hydration-control admixtures or ice.
- D. Place concrete within fifteen minutes after it has been discharged from the mixer. Handle concrete from mixer to forms in a continuous manner.
- E. Deposit concrete as close as possible to its final position in the forms, with no vertical drop greater than five feet except where suitable equipment is provided to prevent segregation and where specifically authorized.
- F. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If concrete cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
- G. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic to avoid cold joints.
- H. Pumping concrete, when specifically accepted, may be conveyed by positive displacement pump such as piston or squeeze pressure type; pneumatic placing equipment is not permitted. Use rigid steel pipe or heavy-duty flexible hose with an inside diameter at least three times the nominal maximum-size coarse aggregate, but not less than 4 inches. Aluminum pipe is not allowed.
- I. Provide adequate scaffolding, ramps and walkways in a manner so that personnel and equipment are not supported by in-place reinforcement.
- J. Consolidation: Consolidate placed concrete with mechanical vibrating equipment per ACI 309R.
 - 1. Consolidate each layer of concrete immediately after placing using internal vibrators, except for slabs 4 inches thick or less.
 - 2. Insert and withdraw vibrators vertically at uniformly spaced location no farther than the visible effectiveness of the vibrator. Hold vibrator stationary and slowly withdraw vertically while operating.
 - 3. Do not use vibrators to transport concrete inside forms.
 - 4. Place vibrator to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers that have begun to lose plasticity. Limit vibration duration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

- K. Concrete Floors and Slabs: Deposit and consolidate concrete for floors and slabs in a continuous operation within limits of construction joints until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope exterior surfaces for drainage as directed, unless otherwise shown. Slope interior floors to drains uniformly, where provided.
- L. Hot Weather Concreting: Place concrete according to ACI 305.1 and as follows:
 - 1. Cool components before mixing to maintain concrete temperature below 85 degrees F at time of placement. Chilled mixing water or chopped ice may be used to control temperature. Calculate and include water equivalent of ice in designed water cement ratio.
 - 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 - 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
 - 4. Protect concrete from surface drying; moisture loss from concrete in plastic state shall be maintained below 0.1 pounds per square foot per hour. Methods may include but are not limited to: evaporation retardant, sun shades, wind breaks, and fog misting.
- M. Cold Weather Concreting: Place concrete according to ACI 306.1 and as follows:
 - 1. Protect concrete work from physical damage or reduced strength as a result of frost, freezing, or low temperatures.
 - 2. When ambient temperature is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F and not more than 75 degrees F.
 - 3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade.
 - 4. Do not incorporate calcium chloride, salt or other materials containing antifreeze agents into the concrete mix.
 - 5. Upon Architect's written acceptance and subject to prior approval of mix design, accelerating admixtures, containing no calcium chloride, as specified in this Section may be used.
- N. Do not allow concrete overpour from formwork where underground products and systems need to be installed at or adjacent to the concrete work. If overpour occurs, remove as necessary to accommodate the installation of such items.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete, unless otherwise indicated on Drawings.

- B. Construction Joints: Locate and install joints as indicated on Drawings or as accepted by Architect, and in a manner that strength and appearance of concrete are not impaired.
 - 1. Comply with ACI 318, Chapter 6, Section 6.4 "Construction Joints".
 - 2. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated.
 - 3. Expose concrete aggregates, a minimum of 1/4 inch depth, creating a rough surface using a surface retardant. Within 24 hours after placing concrete, remove retarded surface mortar using either high pressure water jetting or stiff brushing or a combination of both to expose coarse aggregate. A rough surface of exposed aggregate may also be produced by sandblasting followed by high pressure water jetting.
 - 4. Where new concrete joins existing concrete (concrete more than sixty days old), clean and roughen existing concrete to expose coarse aggregate. Coat with epoxy bonding compound prior to placing new concrete.
 - 5. Horizontal joints: Apply a 1 inch wood grade strip, level and straight, 1/2 inch below the placement lift elevation for a neat joint.
- C. Slab-on-Ground Control Joints: Tool or saw-cut weakened plane joints at a depth of at least 1/4 slab thickness where shown on Drawings. Where not indicated in Drawings, provide at distances (in feet) every two times to three times of slab thickness (in inches).
 - 1. Tooled Joint: Form control joints after initial floating by grooving and finishing each joint edge to a 1/8-inch radius. Repeat grooving after applying surface finish.
 - 2. Sawed Joint: Saw cut 1/8-inch width as soon as the concrete has hardened sufficiently to prevent raveling (dislodging of the aggregates) of the edges of the saw cut and completed before shrinkage stresses become sufficient to produce cracking.
 - 3. Fill control joints with epoxy joint filler in accordance with manufacturer's written instructions.
- D. Slab-on-Ground Expansion Joints and Isolation Joints: Provide expansion joints and isolation joints where shown on Drawings, where slab abuts vertical surfaces, at curbs, gutters, and sidewalks.
 - 1. Extend joint-filler strips full width and extend to full depth of joint, terminating not less than 1/2 inch and not more than 1 inch from finish surface. Apply a removable capping flush to slab finish.
 - 2. Install strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
 - 3. Remove capping when concrete has cured and apply joint sealant.
- E. Dowel Joints: Install dowel sleeves and dowels or dowel bar and support assemblies at joints where shown on Drawings.

3.5 FORMED SURFACES FINISHING

- A. Leave texture imparted on formed concrete surface, unless otherwise specified, except that defective surfaces shall be repaired. Repair defective concrete as specified in this Section.
- B. Maintain uniform color of the concrete, unless painting of surfaces is required, by using only one mixture without changes in material or proportions for any structure or portion of structure exposed to public view.

- C. Repair and patch tie holes. Apply cone hole plugs matching color of cured concrete; and unless otherwise indicated, flush to concrete surface, as provided by form tie manufacturer using waterproof adhesive.

3.6 CONCRETE FLOORS AND SLABS FINISHING

- A. Comply with ACI 302.2R and as specified in this Section. Comply with flatness and levelness tolerance requirements of this Section.

- B. Float Finish:

1. Immediately following placing and consolidating concrete, begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface.
2. When concrete has sufficiently stiffened begin floating to a true and even plane free of ridges. Perform floating using power-driven equipment or hand floats if area is small or inaccessible to power-driven floats.
3. If bleedwater is present prior to finishing, carefully drag-off or remove by absorption with porous materials such as burlap. Dusting of surfaces with dry cement or other materials or the addition of any water during finishing is not permitted.
4. Check slab surfaces with a ten-foot straightedge at regular intervals while concrete is still plastic, to detect high or low areas.
5. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighten until surface is left with a uniform, smooth, granular texture.
6. Take extreme care during finishing operations to prevent over finishing or to prevent working water into the surface; this can cause crazing (surface shrinkage cracks which appear after hardening) of the surface. Slabs with surfaces exhibiting significant crazing as determined by Architect shall be removed and replaced.

- C. Trowel Finish:

1. After floating is complete and after surface moisture has disappeared, apply trowel finish using a power-driven trowel or hand trowel if area is small or inaccessible to power-driven trowel.
2. Steel trowel to a smooth, even, dense finish, free of blemishes including trowel marks.
3. Apply final steel troweling by hand.

- D. Broom Finish:

1. After floating, lightly trowel surface and then carefully score by pulling a broom across the surface. Use appropriate type of broom to achieve texture specified.
2. Broom as indicated or as directed by Architect. Where not specifically indicated, broom transverse to traffic or at right angles to the slope of the slab.
3. Adding water to facilitate brooming is not permitted.
4. Exterior ramps, walks, and slabs: Apply a slip-resistant finish as follows:
 - a. Where slope is six percent or greater: Heavy broom finish with at least 0.8 coefficient of friction per ASTM C1028.
 - b. Where slope is less than six percent: Medium broom finish with a minimum 0.6 coefficient of friction per ASTM C1028.

- E. Floor and Slab Flatness and Levelness Tolerance: Determine flatness and levelness using the F-Number System in accordance with ASTM E1155 using the inch-pound system of units. Calculate F-Numbers as follows:

1. Definitions:

- a. Face Flatness Number (F_F): The maximum slab curvature allowed over 24 inches computed on the basis of successive 12 inch elevation differentials.
- b. Face Levelness Number (F_L): The relative conformity of the slab surface to a horizontal plane as measured over a ten foot distance.

2. These floor flatness and floor levelness tolerances apply to concrete slabs-on-ground. At raised slabs, only the floor flatness tolerance applies.

3. Sampling Requirements: As described in ACI 117.

4. Calculations:

$$F_F = \frac{4.57}{\text{Maximum difference in elevation (in decimals of inches) between successive 12 inch elevation differences.}}$$

$$F_L = \frac{12.5}{\text{Maximum difference in elevation (in decimals of inches) between two points 10 feet apart.}}$$

5. Tolerances, unless noted otherwise:

- a. Trowel finish surfaces: F_F 25; F_L 20 (overall tolerance values).
- b. Float finish surfaces: F_F 20; F_L 17 (overall tolerance values).
- c. Minimum local tolerance (1/2 bay or as designated by Architect): 2/3 of specified tolerance values.

- F. Site Concrete Flatness Tolerance: 1/4 inch in 10 feet, non-cumulative; unless more restrictive tolerance is indicated or specified. This tolerance does not allow slopes to exceed the specified maximum slopes.

1. Surface cross slopes shall not exceed one unit vertical in fifty units horizontal (two percent).

- G. Mineral Dry-Shake Floor Hardener Finish: After initial floating, apply mineral dry-shake materials to surfaces according to manufacturer's written instructions and as follows:

1. Apply mineral dry-shake materials uniformly in a two-stage application using a mechanical spreader at rate minimum of 1.5 pounds per square foot, unless a greater amount is recommended by manufacturer.
2. Uniformly distribute approximately two-thirds of mineral dry-shake materials immediately following initial floating of total area. Allow first shake to remain unworked on the surface until it has absorbed moisture, then power-float surface.
3. Immediately after floating, apply remaining mineral dry-shake evenly; allow the shake materials to absorb moisture, then power-float surface.
4. After final floating, apply a trowel finish. Cure as recommended by manufacturer.

3.7 CURING AND PROTECTION

- A. Protect freshly placed concrete from premature drying, rapid temperature change, mechanical injury, and injury from flowing water for a curing period not less than seven days. Comply with ACI 306.1 for cold-weather protection and ACI 305R for hot-weather protection during curing.
- B. Curing Methods:
 - 1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. If curing compound is applied using a hand held, pump-up sprayer, it shall be back-rolled using a short nap roller.
 - 2. Moist Curing: Keep surfaces in a moist condition for not less than seven days using water saturated absorptive cover (burlap-polyethylene sheeting) kept wet continuously. Cover concrete completely in widest practicable width, with sides and ends lapped at least 12 inches, and sealed with waterproof tape or adhesive. Immediately repair and maintain rips and tears and keep traffic away from surface during curing period.
 - 3. Ponding or Immersion: Continuously immerse concrete throughout the curing period in water not more than twenty degrees below the temperature of the concrete.
- C. Concrete in Forms: Keep forms and exposed concrete surfaces covered and continuously moist. Provide soaker hoses at top of walls or other accepted means of keeping concrete and forms wet while forms remain in place. If forms are removed before end of curing period, continue curing by methods described in this Section.
- D. Floors and Slabs:
 - 1. Evaporation Retarder: Apply evaporation retarder to floors and slabs if hot, dry, or windy conditions cause moisture loss of 0.1 pounds per square foot per hour before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
 - 2. Cure by application of curing and sealing compound or by moist curing. Use appropriate curing method compatible with subsequent floor adhesives and coatings. Moist cure concrete surfaces to receive penetrating liquid floor treatments.
 - 3. Begin curing as soon as free water has disappeared from the concrete surface after placing and final finishing.
- E. Protection:
 - 1. Protect concrete surfaces from damage by tools, equipment, materials, and construction activity.
 - 2. Traffic, shoring, or loading will not be permitted on concrete surface until it has sufficiently hardened to prevent injury to finish and strength.
 - 3. Protect all flat work and other surfaces as required with full board of plywood coverings as necessary.

3.8 REMOVAL OF FORMS

- A. Formwork for sides of curbs, beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 48 hours after placing concrete provided concrete is hard enough not to be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved the following:
 - 1. At least seventy percent of 28-day design compressive strength.
 - 2. Determine compressive strength of in-place concrete by testing representative field or laboratory-cured test specimens according to ACI 301.
 - 3. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

3.9 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective concrete work and concrete not conforming to required lines, details, and elevations. Use materials and methods specified in this Section as accepted by Architect. Serious defects, defects affecting structural strength, or unsatisfactory patching may be cause for complete removal and replacement of concrete.
- B. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycomb, rock pockets, and voids more than 1/2 inch in any direction in solid concrete. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with drypack grout before bonding agent has dried. Fill form-tie voids with patching mortar or cone hole plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, repair mortar will match surrounding color. Patch a test area at inconspicuous location to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed, formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness.
 - 1. Repair defective finished surfaces including spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced section regardless of width, and other objectionable conditions.
 - 2. After concrete has cured fourteen days, correct high spots by grinding.
 - 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish areas to blend into adjacent concrete.

4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply mortar underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surface in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete. Place, compact, and finish to blend with adjacent finished concrete.
6. Repair random cracks and single holes 1 inch or less in diameter with drypack grout. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place drypack grout before bonding agent has dried. Compact and finish grouted areas to match adjacent concrete.

D. Moist cure patches and repairs for at least 72 hours.

E. Perform concrete structural repairs subject to Architect's acceptance.

3.10 FIELD QUALITY CONTROL

A. General: Comply with requirements of Division 01.

B. Testing Service: Owner will select and pay for independent testing agency.

C. Strength Test Specimen Cylinders: Conduct sampling, curing, and testing per ASTM C172, ASTM C31/C31M, and ASTM C39/C39M. Contractor shall provide moulds required for strength test cylinders.

1. Frequency: Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, nor less than once for each 150 cubic yards of concrete, nor less than once for each 5000 square feet of surface area for slabs or walls. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.
2. A strength test shall be the average of the strengths of at least two 6 inch by 12 inch cylinders or at least three 4 inch by 8 inch cylinders made from the same sample of concrete and tested at the test age designated for the determination of concrete compressive strength.
3. Cylinder Label and Records: Mark and date each test cylinder. Maintain records of test specimen cylinders and send copies to Contractor, Architect, and Owner. Record the following information:
 - a. Cylinder identification mark.
 - b. Date made.
 - c. Concrete supplier.
 - d. Slump/slump flow.
 - e. Specified concrete design strength.
 - f. Pour location and type of structural member.
 - g. Compressive strength test date and age.

- h. Admixtures added to concrete mix.
 - i. Air content.
 - 4. Compressive Strength Tests: Test laboratory cured specimens at the following ages and report compressive strengths as follows:
 - a. 7 days where early compressive strength is required.
 - b. 28 days.
 - c. Hold specimens for one strength test in reserve.
 - 5. Test Reports: Furnish copies of test reports directly from testing agency to Contractor, Architect, and Owner.
- D. Slump Test: ASTM C143/C143M. Conduct slump testing when test cylinders are made and additionally for every 150 cubic yards of concrete. Perform additional tests when concrete consistency appears to change. Contractor shall provide slump cones.
- E. In the event the cylinders tested do not meet the required concrete design strength, conduct core tests and additional tests or inspections as may be required by Architect to ascertain strength of placed concrete. Costs for additional tests and inspections shall be borne by Contractor.

END OF SECTION

Concrete Mixture Design Submittal Checklist

- ☐ **Specify Use:** All mix designs must clearly note the concrete type or use. (i.e. footings, slab on grade, site concrete)
- ☐ **Mix Design:** Provide concrete mixture designs with proportions and characteristics including all admixtures.
- ☐ **Gradation:** Provide combined aggregate gradation by weight for all course and fine aggregates.
- ☐ **Weight:** Provide dry unit weight of mix. Normal weight concrete shall be limited to 145 PCF.
- ☐ **Material Certificates:** Provide supplier's certification that materials conform to specifications. This includes aggregates, admixtures, and cementitious materials such as cement and fly ash.
- ☐ **Product Data:** Provide product literature for each product and admixture used. Include manufacturer's specification, written instructions, and installation procedures.
- ☐ **Required SCM:** Mix design must contain the percentage or supplementary cementitious materials noted in mix design table of the specifications.
- ☐ **Admixtures:** Where multiple admixtures are used, provide a letter from all manufacturers indicating there are no compatibility problems or adverse effects resulting from combination of products.
- ☐ **Shrinkage:** Provide shrinkage test per modified ASTM C157/C157M at 21 days. Shrinkage test must be for the same mix specified or a similar mix with the same water cement ratio and aggregate source. (Exception: shrinkage testing is not required for below grade concrete)

- ☐ **Testing / Proportion Method:** Concrete must be proportioned per the requirements of ACI 318-11, Section 5. Indicated method used and provide complete test data and documentation for the chosen proportion method.

SECTION 03 45 00
PRECAST CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Performance criteria, materials, production, and erection of structural and architectural precast and precast, prestressed concrete. The work performed under this Section includes all labor, material, equipment, related services, and supervision required for the manufacture, transportation, and erection of the precast concrete work shown on the Drawings.
 - 1. Columns.
 - 2. Beams.
 - 3. Walls.
 - 4. Spandrels.
 - 5. Hollow core planks.
 - 6. Solid floor planks.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 07 19 19 – Silicone Water Repellents.
- C. Section 07 54 23 – Thermoplastic Polyolefin Roofing.
- D. Section 07 62 00 – Sheet Metal flashing and Trim.
- E. Section 07 92 00 – Joint Sealants.
- F. Section 08 11 13 – Hollow Metal Doors and Frames.
- G. Section 08 34 63 – Detention Doors and Frames.
- H. Section 09 30 00 – Tiling.
- I. Section 09 65 00 – Resilient Flooring.
- J. Section 09 91 00 – Painting.
- K. Section 10 11 00 – Visual Display Surfaces.
- L. Section 10 14 00 – Signage.
- M. Section 10 21 13.19 – Plastic Shower Compartments.
- N. Section 13 34 23 – Modular Precast Concrete Cells.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
1. AASHTO M251 – Standard Specification for Plain and Laminated Elastomeric Bridge Bearings.
 2. AASHTO – Standard Specifications for Highway Bridges.
 3. ACI 211.1 – Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
 4. ACI 216.1/TMS 0216.1 – Code Requirements for Determining Fire Resistance of Concrete and Masonry Construction Assemblies.
 5. ACI 318 – Building Code Requirements for Structural Concrete and Commentary.
 6. ASTM A27 – Standard Specification for Steel Castings, Carbon, for General Application.
 7. ASTM A36 – Standard Specification for Carbon Structural Steel.
 8. ASTM A47 – Standard Specification for Ferritic Malleable Iron Castings.
 9. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold Finished.
 10. ASTM A123 – Standard Specification for Zinc (Hot Dip Galvanized) Coatings on Iron and Steel Products.
 11. ASTM A153 – Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
 12. ASTM A283 – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
 13. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.
 14. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 15. ASTM A416 – Standard Specification for Steel Strand, Uncoated Seven Wire for Prestressed Concrete.
 16. ASTM A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
 17. ASTM A496 – Standard Specification for Steel Wire, Deformed, for Concrete Reinforcement.
 18. ASTM A500 – Standard Specification for Cold Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 19. ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts.
 20. ASTM A572 – Standard Specification for High Strength Low Alloy Columbium Vanadium Structural Steel.

- 21. ASTM A615 – Standard Specification for Deformed and Plain Carbon Steel Bars for Concrete Reinforcement.
- 22. ASTM A675 – Standard Specification for Steel Bars, Carbon, Hot Wrought, Special Quality, Mechanical Properties.
- 23. ASTM A706 – Standard Specification for Low Alloy Steel Deformed and Plain Bars for Concrete Reinforcement.
- 24. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings.
- 25. ASTM A886 – Standard Specification for Steel Strand, Indented, Seven Wire Stress Relieved for Prestressed Concrete.
- 26. ASTM B633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel.
- 27. ASTM C33 – Standard Specification for Concrete Aggregates.
- 28. ASTM C42 – Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- 29. ASTM C150 – Standard Specification for Portland Cement.
- 30. ASTM C330 – Standard Specification for Lightweight Aggregates for Structural Concrete.
- 31. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
- 32. ASTM C567 – Standard Test Method for Determining Density of Structural Lightweight Concrete.
- 33. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
- 34. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
- 35. ASTM C881 – Standard Specification for Epoxy Resin Base Bonding Systems for Concrete.
- 36. ASTM C1017 – Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete.
- 37. ASTM C1077 – Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation.
- 38. ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic Cement Grout (Nonshrink).
- 39. ASTM C1218 – Standard Test Method for Water Soluble Chloride in Mortar and Concrete.
- 40. ASTM C1240 – Standard Specification for Silica Fume Used in Cementitious Mixtures.
- 41. ASTM C1602 – Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete.
- 42. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
- 43. ASTM D2240 – Standard Test Method for Rubber Property 8212; Durometer Hardness.

- 44. ASTM E165 – Standard Practice for Liquid Penetrant Examination for General Industry.
- 45. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
- 46. ASTM E709 – Standard Guide for Magnetic Particle Testing.
- 47. ASTM F44 – Standard Specification for Metallized Surfaces on Ceramic.
- 48. ASTM F68 – Standard Specification for Oxygen Free Copper in Wrought Forms for Electron Devices.
- 49. ASTM F436 – Standard Specification for Hardened Steel Washers.
- 50. AWS D1.1 – Structural Welding Code – Steel.
- 51. AWS D1.4 – Structural Welding Code – Reinforcing Steel.
- 52. AWS C5.4 – Recommended Practices for Stud Welding.
- 53. PCI MNL 116 – Quality Control for Plants and Production of Structural Precast Concrete Products.
- 54. PCI MNL 120 – PCI Design Handbook – Precast and Prestressed Concrete.
- 55. PCI MNL 124 – Design for Fire Resistance of Precast Prestressed Concrete.
- 56. PCI MNL 135 – Tolerance Manual for Precast and Prestressed Concrete Construction.
- 57. PCI TR-6 – Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants.
- 58. SSPC Paint 20 – Zinc-Rich Coating, Type I – Inorganic and Type II – Organic.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Retain quality control records and certificates of compliance for five years or period of warranty, whichever is greater.
- B. Design Mixes: For each precast concrete mixture. Include compressive strength and water-absorption tests, if required.
- C. Erection Drawings: Detail fabrication and installation of structural precast concrete units. Indicate member locations, plans, elevations, dimensions, shapes, cross sections, openings, extent and location of each finish, connections, support conditions and types of reinforcement, including special reinforcement.
 - 1. Indicate separate face and backup mix locations.
 - 2. Indicate welded connections by AWS standard symbols and show size, length, and type of each weld. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
 - 3. Indicate locations and details of anchorage devices to be embedded in or attached to structure or other construction.
 - 4. Indicate plans and/or elevations showing member locations with all openings shown and located.
 - 5. Indicate location of each structural precast concrete unit by same identification mark placed on unit.
 - 6. Indicate relationship of structural precast concrete members to adjacent materials.

7. Indicate shim sizes and grouting sequence.
 8. Indicate and coordinate all electrical rough-ins and conduit locations to accommodate power, signal, and security electronics devices.
 9. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, notify the Architect immediately and submit design calculations and drawings. Do not adversely affect the appearance, durability or strength of units when modifying details or materials. Maintain the general design concept when altering size of units and alignment.
- D. Provide handling procedures, sequence of erection, and bracing plan.
- E. Comprehensive structural design signed and sealed by a Structural Engineer licensed in the State of California responsible for its preparation.
- F. Samples: Provide two reference samples for initial verification of design intent, approximately 24 inches by 24 inches by 2 inches, representative of finishes and textures of exposed surfaces of precast concrete panels.
1. When back face of precast concrete unit is to be exposed, show samples of the workmanship and texture of the concrete.
- G. Welding Certificates: Copies of certificates for welding procedure specifications (WPS) and personnel.
- H. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include list of completed projects with project names and addresses, names and addresses of architects, Architects and Owners, and other information specified. Manufacturer shall have a minimum of two years of production experience in structural precast concrete work comparable to that shown and specified, in not less than three projects of similar scope with the Architect determining the suitability of the experience.
- I. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
- J. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements.
1. Concrete materials.
 2. Reinforcing materials and prestressing tendons.
 3. Admixtures.
 4. Bearing pads.
 5. Structural-steel shapes and hollow structural sections.

1.5 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide structural precast concrete units and connections capable of withstanding design loads within limits and under conditions indicated on Drawings.
1. Loads: As indicated.

- B. Structural Performance: Provide structural precast concrete units and connections capable of withstanding design loads within limits and under conditions indicated:
1. Dead Loads at Tiers, Floors, and Roof: Precast self weight plus superimposed loads as indicated on Drawings.
 2. Live Loads at Tiers, Floors, and Roof: As indicated on Drawings.
 3. Wind Loads:
 - a. Walls: 20 psf.
 - b. Parapets: 46 psf.
 4. Seismic:
 - a. Base Shear: In-Plane Wall Force as indicated on Drawings.
 - b. Out-of-Plane Wall Force: $0.50W_p$.
 - c. Out-of-Plane Wall Connection Force: $1.00 W_p$.
 5. Design framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live load deflection, shrinkage and creep of primary building structure, and other building movements. Member deflections shall meet the limits of ACI 318.
 6. Thermal Movements: Provide for thermal movements noted.
 - a. The precast system design shall consider the maximum seasonal climatic temperature change.
 - b. In-plane thermal movements of individual members directly exposed to the sun shall consider a temperature range of 20 degrees F to 115 degrees F.
 - c. Member and connection design shall consider through thickness thermal gradients as appropriate.
 7. Fire Resistance Rating: Provide components to meet the following fire ratings:
 - a. Exterior Walls: Refer to Drawings for rating required.
 - b. Floors: Refer to Drawings for rating required.
 - c. Roofs: Refer to Drawings for rating required.

1.6 QUALITY ASSURANCE

- A. Erector Qualifications: A precast concrete erector Qualified by the Precast/Prestressed Concrete Institute (PCI) prior to beginning work at the jobsite. Submit a current Certificate of Compliance furnished by PCI designating qualification in Category S2 (Complex Structural Systems) for load-bearing members.
- B. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in producing structural precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.
1. Professional Engineer Qualifications: A Professional Engineer who is licensed in the State of California and who is experienced in providing Engineering services of the kind indicated. Engineering services are defined as those performed for installations of structural precast concrete that are similar to those indicated for this project in material, design, and extent.

2. Participates in PCI's Plant Certification program at the time of bidding and for the duration of the project, and is designated a PCI-certified plant for all precast concrete items specified in this Section.
 3. Has sufficient production capacity to produce required units without delaying the Work.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing indicated.
- D. Design Standards: Comply with ACI 318 and the design recommendations of PCI MNL 120, "PCI Design Handbook – Precast and Prestressed Concrete," applicable to types of structural precast concrete units indicated.
- E. Quality-Control Standard: For manufacturing procedures and testing requirements and quality control recommendations for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Concrete Products."
1. Comply with dimensional tolerances of PCI MNL 135, "Tolerance Manual for Precast and Prestressed Concrete Construction."
- F. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code – Steel"; and AWS D1.4, "Structural Welding Code – Reinforcing Steel."
- G. Fire Resistance: Where indicated, provide structural precast concrete units whose fire resistance meets the prescriptive requirements of the governing code or has been calculated according to PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete," ACI 216.1/TMS 0216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies," and is acceptable to authorities having jurisdiction.
- H. Sample Panel: After reference sample acceptance and before fabricating precast concrete units, produce a sample panel to establish the accepted range of selections made under sample Submittals. Produce one sample panel approximately 16 square feet in area incorporating full scale details of architectural features to demonstrate the expected range of finish and texture variations.
1. Locate panels where indicated or, if not indicated, as directed by Architect.
 2. Damage part of an exposed-face surface for each finish and texture, and demonstrate adequacy of repair techniques proposed for repair of surface blemishes.
 3. Maintain sample panels at the manufacturer's plant in an undisturbed condition as a standard for judging the completed Work.
 4. Demolish and remove sample panels when directed.
- I. Preinstallation Conference: Conduct conference at project site in compliance with requirements of Division 01.

1.7 PRODUCT STORAGE, DELIVERY AND HANDLING

- A. Store units with adequate dunnage and bracing and protect units to prevent contact with soil, staining, and to prevent cracking, distortion, warping or other physical damage.
- B. Store units, unless otherwise specified, with dunnage across full width of each bearing point.
- C. Place stored units so identification marks are clearly visible, and units can be inspected.

- D. Deliver all structural precast concrete units in such quantities and at such times to assure compliance with the schedule and proper setting sequence to ensure continuity of installation.
- E. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses which would cause cracking or damage.
- F. Place dunnage of even thickness between each unit.
- G. Lift and support units only at designated points shown on the Shop Drawings.

1.8 SEQUENCING

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, templates, instructions, and directions, as required, for installation.

1.9 WARRANTY

- A. All labor and materials under the Precast Manufacturer's contract shall be warranted by the Precast Manufacturer for a period of one year following final acceptance of the precast panels by Architect.

PART 2 PRODUCTS

2.1 FABRICATORS

- A. Fabricators: Subject to compliance with requirements, provide products by one of the following:
 - 1. KIE-CON.
 - 2. Clark Pacific.
 - 3. Hanson Structural Precast.
 - 4. Coreslab Structures (LA), Inc.
- B. Substitutions: Under provisions of Division 01.

2.2 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and capable of producing required finish surfaces.
 - 1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- B. Reveals: Smooth, sizes and shapes as indicated on Drawings.
- C. Surface Retarder: Chemical set retarder capable of temporarily delaying hardening of newly placed concrete mixture to depth of reveal specified.

2.3 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A615, Grade 60 (Grade 420) or Grade 40 (Grade 300), deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A706, deformed.

2.4 PRESTRESSING TENDONS

A. Prestressing Strand: ASTM A416, Grade 250 (Grade 1720) or Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand or ASTM A886, Grade 270 (Grade 1860), indented, 7-wire, low-relaxation strand (including supplement).

2.5 CONCRETE MATERIALS

A. Portland Cement: ASTM C150, Type I or III.

1. Standard gray cement, same type, brand, and mill source throughout the precast concrete production.

B. Supplementary Cementitious Materials

1. Fly Ash Admixture: ASTM C618, Class F.

C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C33, with coarse, non-reactive aggregates.

1. Face-Mix Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match accepted sample panel.

2. Face-Mix Fine Aggregates: Selected, natural or manufactured sand of a material compatible with coarse aggregate to match accepted sample panel.

D. Lightweight Aggregates: Except as modified by PCI MNL 116, lightweight aggregates shall comply with ASTM C330, with absorption less than 11 percent.

E. Backup Concrete Aggregates: ASTM C33 or ASTM C330.

F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with ASTM C1602 and chemical limits of PCI MNL 116.

G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.

1. Water-Reducing Admixture: ASTM C494, Type A.

2. Water-Reducing and Retarding Admixture: ASTM C494, Type D.

3. High-Range, Water-Reducing Admixture: ASTM C494, Type F.

4. High-Range, Water-Reducing and Retarding Admixture: ASTM C494, Type G.

5. Plasticizing Admixture: ASTM C1017.

2.6 STEEL CONNECTION MATERIALS AND ACCESSORIES

A. Carbon-Steel Shapes and Plates: ASTM A36.

B. Carbon-Steel Headed Studs: ASTM A108, Grades 1010 through 1020, cold finished and bearing the minimum mechanical properties for studs as indicated under PCI MNL 116, Table 3.2.3.; AWS D1.1, Type A or B, with arc shields.

C. Carbon-Steel Plate: ASTM A283.

D. Malleable Iron Castings: ASTM A47. Grade 32510 or 35028.

- E. Carbon-Steel Castings: ASTM A27, Grade U-60-30 (Grade 415-205).
- F. High-Strength, Low-Alloy Structural Steel: ASTM A572.
- G. Carbon-Steel Structural Tubing: ASTM A500, Grade B or C.
- H. Wrought Carbon-Steel Bars: ASTM A675, Grade 65 (Grade 450).
- I. Deformed-Steel Wire or Bar Anchors: ASTM A496 or ASTM A706.
- J. Carbon-Steel Bolts and Studs: ASTM A307, Grade A or C (ASTM F68M, Property Class 4.6) carbon-steel, hex-head bolts and studs; carbon-steel nuts (ASTM A563, Grade A); and flat, unhardened steel washers (ASTM F44).
- K. High-Strength Bolts and Nuts: ASTM A325 or ASTM A490, Type 1, heavy hex steel structural bolts, heavy hex carbon-steel nuts, (ASTM A563) and hardened carbon-steel washers (ASTM F436).
- L. Zinc-Coated Finish: For exterior steel items, embed steel frame plates, and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A123 after fabrication.
 - 1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
 - 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with SSPC-Paint 20.
- M. Reglets: Reglets and flashing as specified in Section 07 62 00 and as shown on Drawings.
- N. Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install structural precast concrete units.
- O. Welding Electrodes: Comply with AWS standards.

2.7 BEARING PADS

- A. Provide one of the following bearing pads for structural precast concrete units, as recommended by precast fabricator for application:
 - 1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore A durometer according to ASTM D2240, minimum tensile strength 2250 psi per ASTM D412.
 - 2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. Surface hardness of 70 to 90 Shore A durometer. Capable of supporting a compressive stress of 3000 psi with no cracking, splitting or delaminating in the internal portions of the pad. Test one specimen for each 200 pads used in the Project.
 - 3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer. Surface hardness of 80 to 100 Shore A durometer. Conforming to Division II, Section 18.10.2 of AASHTO Standard Specifications for Highway Bridges.

4. Frictionless Pads: Polytetrafluoroethylene (PTFE), glass-fiber reinforced, bonded to stainless or mild-steel plates, of type required for in-service stress.

2.8 GROUT MATERIALS

- A. Nonshrink Grout: Premixed, packaged ferrous and non-ferrous aggregate shrink-resistant grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, Grade A of consistency suitable for application with a 30-minute working time.
- B. Epoxy-resin grout: Two-component mineral-filled epoxy-resin: ASTM C881 of type, grade, and class to suit requirements.

2.9 CONCRETE MIXES

- A. Prepare design mixes for each type of concrete required.
 1. Limit use of fly ash to 25 percent replacement of Portland cement by weight.
- B. Design mixes may be prepared by a qualified independent testing agency or by qualified precast plant personnel at structural precast concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 or PCI MNL 116 when tested in accordance with ASTM C1218.
- D. Normal-Weight Concrete Face and Backup Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 1. Compressive Strength (28 Days):
 - a. Hollow Core Planks: 4000 psi minimum,
 - b. Walls: 5000 psi minimum.
 - c. Beams and Columns: 6000 psi minimum.
 2. Release Strength: As required by design.
 3. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Lightweight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight aggregate concrete with the following properties:
 1. Compressive Strength (28 days): 4000 psi minimum.
 2. Release Strength: As required by design.
 3. Density (Unit Weight): Calculated equilibrium density of 115 pcf adjusted to +/- 3 pcf when tested in accordance with ASTM C567.

2.10 FORM FABRICATION

- A. Form: Accurately construct forms, mortar tight, of sufficient strength to withstand pressures due to concrete-placement and vibration operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of forms with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
 - 1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
- B. Maintain forms to provide completed structural precast concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
 - 1. Form joints are not permitted on faces exposed to view in the finished work.
 - 2. Edge and Corner Treatment: Uniformly chamfered or as built in on standard forms.

2.11 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement. Do not relocate bearing plates in units unless accepted by Architect.
 - 1. Weld headed studs and deformed bar anchors used for anchorage according to AWS D1.1 and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in structural precast concrete units as indicated on Drawings.
- D. Cast-in openings larger than 10 inches in any dimension. Do not drill or cut openings or prestressing strand without Architect's acceptance.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
 - 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete.
 - 2. Accurately position, support, and secure reinforcement against displacement during concrete placement and consolidation operations. Locate and support reinforcement by metal or plastic chairs, runners, bolsters, spacers, hangers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to PCI MNL 116.

3. Place reinforcing steel and prestressing tendon to maintain a minimum 3/4 inch concrete cover. Increase cover requirements in accordance with ACI 318 when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
 4. Install welded wire fabric in lengths as long as practicable. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Reinforce structural precast concrete units to resist handling, transportation, and erection stresses.
- G. Prestress tendons for structural precast concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
1. Delay detensioning or post-tensioning of precast prestressed concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under the same conditions as concrete member.
 2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat-cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
 3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
 4. Recess strand ends and anchorages exposed to view a minimum of 1/2 inch, fill with grout and sack rub surface.
 5. Protect strand ends and anchorage exposed to severe environments with bitumastic, zinc-rich or epoxy paint.
- H. Hollow Core Planks:
1. Hollow core planks shall be machine cast in 40 inch minimum width to 96 inch maximum width.
 2. Openings: Manufacturer shall provide for openings 12 inches square or larger as shown on Drawings. Round and small openings less than 12 inches shall be drilled or cut by the respective trades after grouting upon manufacturer's approval.
 3. Finishes: Bottom surface shall be flat and uniform with a block-like finish as resulting from and extrusion process without major chips, spalls, or imperfections. Top surface shall be machine troweled.
 4. Patching: Patching will be acceptable providing the structural adequacy of the hollow core plank is not impaired.
- I. Comply with requirements in PCI MNL 116 and requirements in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- J. Place face mix to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover.
1. Use only face mix for those units in which more than one major face (edge) is exposed.
 2. Where only one face of unit is exposed and at the fabricator's option either of the following mix design/casting techniques may be used:
 - a. A single design mix throughout the entire thickness of panel.

- b. Design mixes for facing and backup; using cement and aggregates for each type as indicated, for consecutive placement in the mold. Use cement and aggregate specified for facing mix. Use cement and aggregate for backup mix complying with criteria specified or as selected by the fabricator.
- K. Place concrete in a manner to prevent seams or planes of weakness from forming in precast concrete units.
 - 1. Place backup concrete to ensure bond with face mix concrete. Thoroughly consolidate placed concrete by internal and/or external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.
 - 2. Place self-consolidating concrete without vibration in accordance with PCI TR-6 "Interim Guidelines for the Use of Self-Consolidating Concrete."
- L. Comply with PCI MNL 116 procedures for hot and cold-weather concrete placement.
- M. Identify pickup points of precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast concrete unit on a surface that will not show in finished structure.
- N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using live steam or radiant heat and moisture. Cure units until the compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

2.12 FABRICATION TOLERANCES

- A. Fabricate structural precast concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 or PCI MNL 135 product tolerances as well as position tolerances for cast-in items.

2.13 FINISHES

- A. Unit Finish: Unit faces shall be free of joint marks, grain, and other obvious defects. Chamfers and corners, including false joints, shall be uniform, straight, and sharp.
 - 1. Smooth-Surface Finish: Provide surfaces free of excessive air voids, sand streaks, and honeycombs, with uniform color and texture.
 - 2. Textured-Surface Finish: Impart by molds to provide surfaces free of excessive air voids, streaks, and honeycombs, with uniform finish and texture.
- B. Exposed Face Surfaces: Match accepted sample panel.
- C. Exposed Top, Bottom, and Side Surfaces: Match exposed face surface finish.
- D. Exposed Back Surfaces: Smooth steel-trowel finish. Consolidate concrete, bring to proper level with straightedge, float and trowel to a smooth, uniform finish.
- E. Unexposed Surfaces: Float finish surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. No major imperfections, honeycombing, or defects are permitted.

2.14 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: Test and inspect precast concrete according to PCI MNL 116 requirements. If using self-consolidating concrete also test and inspect according to PCI TR-6 "Interim Guidelines for the Use of Self-Consolidating Concrete."
- B. In addition to PCI Certification, Owner will employ an independent testing agency to evaluate structural precast concrete fabricator's quality-control and testing methods.
 - 1. Allow Owner's testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with Owner's testing agency and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.
- C. Precast concrete units will be considered deficient if units fail to comply with ACI 318 strength requirements.
- D. Testing: If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 requirements, Owner will employ an independent testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C42.
 - 1. A minimum of three representative cores shall be taken from units of suspect strength, from locations directed by Architect.
 - 2. Cores shall be tested in an air-dry condition or if units will be wet under service conditions, test cores, after immersion in water, in a wet condition.
 - 3. Strength of concrete for each series of three cores will be considered satisfactory if the average compressive strength is equal to at least 85 percent of the 28-day design compressive strength and no single core is less than 75 percent of the 28-day design compressive strength.
 - 4. Test results shall be made in writing within five days after tests are performed, with copies to Owner, Architect, Contractor, and precast concrete fabricator. Test reports shall include the following:
 - a. Project identification name and number.
 - b. Date when tests were performed.
 - c. Name of precast concrete fabricator.
 - d. Name of concrete testing agency.
 - e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.
- E. Patching: If core test results are satisfactory and precast concrete units comply with requirements, clean and dampen core holes and solidly fill with precast concrete mix that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.

- F. Defective Work: Structural precast concrete units that do not comply with acceptability requirements in PCI MNL 116, including concrete strength, manufacturing tolerances, and color and texture range are unacceptable. Chipped, spalled or cracked units may be repaired. The Architect reserves the right to reject any unit if it does not match the accepted sample panel. Replace unacceptable units with precast concrete units that comply with these specifications.

PART 3 EXECUTION

3.1 PREPARATION

- A. Deliver anchorage devices that are embedded in or attached to the building structural frame or foundation before start of such work. Provide locations, setting diagrams, and templates for the proper installation of each anchorage device.

3.2 EXAMINATION

- A. Examine supporting structure or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 ERECTION

- A. Install loose clips, hangers, bearing pads, and other accessories required for connecting structural precast concrete units to supporting members and backup materials.
- B. Erect precast concrete level, plumb and square within the specified allowable tolerances. Provide temporary structural framing, supports and bracing as required to maintain position, stability, and alignment of units until permanent connections are completed.
 - 1. Install temporary steel or plastic spacing shims or bearing pads as precast concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
 - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 3. Remove projecting lifting devices and use sand-cement grout to fill voids within recessed lifting devices flush with surface of adjacent precast concrete surfaces when recess is exposed.
 - 4. Provide and install headers of cast-in-place concrete or structural-steel shapes for openings larger than one slab width according to hollow-core slab unit fabricator's written recommendations.
- C. Connect structural precast concrete units in position by bolting, welding, grouting, or as otherwise indicated on approved Erection Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and/or grouting is completed.
- D. Welding: Comply with applicable AWS D1.1 and AWS D1.4 requirements for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Protect structural precast concrete units and bearing pads from damage by field welding or cutting operations and provide noncombustible shields as required.

2. Clean weld affected metal surfaces with chipping hammer followed by brushing, and apply a minimum 0.004 inch thick coat of galvanized repair paint to galvanized surfaces in conformance with ASTM A780.
 3. Visually inspect all welds critical to precast connections. Visually check all welds for completion and remove, reweld, or repair all defective welds, if services of AWS-certified welding inspector are not furnished by Owner.
- E. At bolted connections, use lock washers or other acceptable means to prevent loosening of nuts after final adjustment.
1. Where slotted connections are used, check bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connection, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
- F. Grouting or Dry Packing Connections and Joints: Erection drawings shall indicate joints to be grouted and any critical grouting sequences. Grout open spaces at keyways, connections and joints where required or indicated. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces. Fill joints completely without seepage to other surfaces. Promptly remove grout material from exposed surfaces before it affects finishes or hardens. Keep grouted joints damp for not less than 24 hours after initial set.
- G. Field cutting of precast units is not permitted without acceptance of the Architect.
- H. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units unless accepted by Architect.

3.4 ERECTION TOLERANCES

- A. Erect structural precast concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135. Level out variations between adjacent members by jacking, loading, or any other feasible method as recommended by the manufacturer and acceptable to the Architect.

3.5 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Field welds will be subject to visual inspections and non-destructive testing in accordance with ASTM E165 or ASTM E709.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Repair or remove and replace work that does not comply with specified requirements.
- E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS

- A. Repairs will be permitted provided structural adequacy, serviceability and durability of units and appearance are not impaired.

- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet.
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged structural precast concrete units that cannot be repaired.

3.7 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.
- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect other work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION

DIVISION 04
MASONRY

SECTION 04 22 00
CONCRETE UNIT MASONRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Concrete masonry units (CMU).
- B. Reinforcement.
- C. Accessory items.
- D. Precast concrete caps.

1.2 RELATED SECTIONS

- A. Section 03 20 00 – Concrete Reinforcing.
- B. Section 03 30 00 – Cast-In-Place Concrete.
- C. Section 07 13 26 – Self-Adhering Sheet Waterproofing.
- D. Section 07 19 19 – Silicone Water Repellents.
- E. Section 07 54 23 – Thermoplastic-Polyolefin Roofing.
- F. Section 09 24 00 – Portland Cement Plastering.
- G. Section 09 91 00 – Painting.
- H. Divisions 21–23 – Mechanical.
- I. Divisions 25–28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ACI 315 – Details and Detailing of Concrete Reinforcement.
 - 2. ACI 530/ASCE 5/TMS 402 – Building Code Requirements for Masonry Structures.
 - 3. ACI 530.1/ASCE 6/TMS 602 – Specification for Masonry Structures.
 - 4. ASTM A951 – Standard Specification for Steel Wire for Masonry Joint Reinforcement.
 - 5. ASTM C5 – Standard Specification for Quicklime for Structural Purposes.

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| 6. ASTM C90 | – Standard Specification for Loadbearing Concrete Masonry Units. |
| 7. ASTM C94/C94M | – Standard Specification for Ready Mixed Concrete. |
| 8. ASTM C140 | – Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units. |
| 9. ASTM C144 | – Standard Specification for Aggregate for Masonry Mortar. |
| 10. ASTM C207 | – Standard Specification for Hydrated Lime for Masonry Purposes. |
| 11. ASTM C270 | – Standard Specification for Mortar for Unit Masonry. |
| 12. ASTM C404 | – Standard Specification for Aggregates for Masonry Grout. |
| 13. ASTM C476 | – Standard Specification for Grout for Masonry. |
| 14. ASTM C1019 | – Standard Test Method for Sampling and Testing Grout. |
| 15. ASTM C1364 | – Standard Specification for Architectural Cast Stone. |
| 16. ASTM D1056 | – Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber. |

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings indicating bar sizes, spacings and locations of reinforcing steel, bending and cutting schedules, and supporting and spacing devices.
- C. Certified Mix Design for grout and mortar: Include results of testing or test data when used to establish mix proportions for grout.
- D. Certificate of conformance stating that masonry units meet or exceed applicable ASTM specifications referenced in this Section.
- E. Two samples of each type of masonry unit specified, in selected colors.
- F. Two 12 inch long samples of each type of precast concrete cap.

1.5 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: The masonry work shall comply with the requirements of this Section and, in addition, shall conform to the applicable requirements of 2013 California Building Code (CBC), Chapter 17 "Structural Tests and Special Inspections", Chapter 19 "Concrete", and Chapter 21 "Masonry".
 - 1. Inspection:
 - a. Masonry Construction: Per Section 1705 "Required Verification and Inspection". Article 1705.4 "Masonry Construction".
 - b. Reinforcing Bar Welding: Per Section 1705, Table 1705.2.2 "Required Verification and Inspection of Steel Construction Other Than Structural Steel", Item 2b, and Table 1705.3 "Required Verification and Inspection of Concrete Construction", Item 2.

1.6 DEFINITIONS

- A. Grout Lift: The increment of height to which grout is placed into masonry in one continuous operation within a total grout pour.
- B. Grout Pour: The total height of masonry to be grouted prior to the erection of additional masonry. A grout pour consists of one or more grout lifts.
- C. High-Lift Grouting: Grout pour full height of construction between horizontal cold joints using multiple grout lifts.
- D. Low-Lift Grouting: Units laid and grouted to a maximum height of five feet-four inches prior to the erection of additional masonry.

1.7 TESTS AND INSPECTIONS

- A. Tests requested by Architect shall be made by a testing laboratory selected and paid for by Owner. Any masonry work failing to meet required design stresses as specified hereinafter shall be dismantled and replaced at no cost to Owner.
 - 1. Tests requested by Contractor to establish design stresses when tests made by the Testing Laboratory indicate defective masonry shall be paid for by Contractor.
- B. Inspection: Approval of the reinforcing steel after installation must be received from Architect and Special Inspector. Architect and Special Inspector shall be notified at least 48 hours in advance of the beginning of grouting operations.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Unload masonry units carefully and store on raised platform protected from weather.
- C. Protect cementitious materials against exposure to moisture. Use of cementitious or other materials that have become caked and hardened from absorption of moisture will not be permitted.

1.9 JOB AND ENVIRONMENTAL CONDITIONS

- A. Environmental:
 - 1. Cold Weather Conditions: Do not place unit masonry when temperature is below 40 degrees F unless Architect accepts and Contractor provides means for preventing damage from freezing before and after placement.
 - 2. Hot Weather Conditions: Protect masonry construction from direct exposure to wind and sun when erected; with an ambient air temperature of 99 degrees F in the shade with relative humidity less than fifty percent.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers, Concrete Masonry Units (CMU):
 - 1. Basalite Block Company, Inc., Dixon, CA; 800-776-6690, 707-678-1901, www.basalite.com.

2. Calstone Company, Sunnyvale, CA; 408-984-8800, www.calstone.com.
3. Angelus Block Co., Inc., Sun Valley, CA; 818-767-8576, www.angelusblock.com.

B. Acceptable Manufacturers, Precast Concrete Caps:

1. Basalite Block Company, Inc.
2. Napa Cast Stone.
3. Cast Stone Systems.
4. Thunderstone, Lincoln, NE; 402-420-2322, www.thunderstone.com.

C. Substitutions: Under provisions of Division 01.

2.2 CONCRETE MASONRY UNITS

- A. Hollow Load Bearing Units: ASTM C90, maximum oven dry density of 135 pounds per cubic foot, 1900 pounds per square inch minimum compressive strength. Provide open and closed-end units, bond beams, U beams, half units and any additional special shapes and sizes as required to complete the Work. Units shall be of the following types:
1. Standard smooth finish, sizes as indicated on Drawings; color as selected by Architect.
 2. Split-face texture one side and exposed ends, sizes as indicated on Drawings; color as selected by Architect.
 3. Split-face texture both sides and exposed ends, sizes as indicated on Drawings; color as selected by Architect.

2.3 MORTAR AND GROUT

- A. Portland Cement: Type I or II. Masonry cement will not be permitted.
- B. Aggregate:
1. For Mortar: ASTM C144.
 2. For Grout: ASTM C404.
- C. Hydrated Lime: Type S, ASTM C207.
- D. Quick Lime: ASTM C5.
- E. Water: Clean and potable, free from impurities detrimental to mortar and grout.
- F. Admixtures:
1. Unless otherwise specified, use admixtures only with Architect's acceptance and without adversely affecting bond or compressive strength.
 2. Grout Additive: Grout pours greater than five feet shall contain "Grout Aid" by Sika Chemical Corporation or "Pre-Mix Products Grout Additive" by Valley Abrasive Shot, Inc.
 - a. Mix grout additive as recommended by manufacturer.
- G. Color of mortar as selected by Architect.

2.4 REINFORCEMENT, ACCESSORIES, AND RELATED ITEMS

- A. Steel reinforcement including anchors, ties and accessories: shall conform to CBC Section 2103.14 "Metal Reinforcement and Accessories."

- B. Reinforcing Steel: Same type and quality specified for concrete reinforcing, Section 03 20 00.
- C. Wire Ties: No. 16 annealed wire for tying reinforcing steel.
- D. Wire Joint Reinforcement: 9 gauge continuous wire ladder in joint.
- E. Bonding Agent: MasterEmaco ADH 326 two-component 100 percent solids liquid epoxy bonding adhesive in compliance with ASTM C881, Type II, Grade 2, Class C as manufactured by Master Builders Solutions/BASF, or accepted equal.
- F. Control Joints: Closed cell neoprene rubber conforming to ASTM D1056, Grade 2A1. 3/8 inch thick by 3 inches wide. Product: Rapid Expansion Joint DA2015 as manufactured by Dur-O-Wal, a Hohmann & Barnard Company, Hauppauge, NY; 800.645.0616, www.dur-o-wal.com, or accepted equal.

2.5 PRECAST CONCRETE CAPS

- A. Precast Concrete Caps: Sizes and profiles as indicated on Drawings.
- B. Provide precast units complying with ASTM C1364 using either the vibrant dry tamp or wet-cast method.
- C. Fabricate units with sharp arrises and accurately reproduced details, with indicated texture on all exposed surfaces.
- D. Fabrication Tolerances:
 - 1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
 - 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
 - 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.

2.6 MIXES AND MIXING

- A. Mortar:
 - 1. Meet the requirements of CBC Section 2103.9 and ASTM C270.
 - a. Compressive Strength: 1,800 psi at 28 days.
 - b. Proportions by volume: One part Portland cement, 2.25 parts to 3 parts sand based on damp loose volume, and not less than a quarter and not more than half part lime.
 - 2. Mortar shall be mixed as follows, with a total mixing time not less than ten minutes.
 - a. Place approximately half of required water and sand into mixer while running.
 - b. Add cement and remainder of sand and water into mixer in that order and mix for a period of at least two minutes.
 - c. Add lime and continue mixing as long as needed to secure a uniform mass.
 - 3. Use and place mortar in final position within 2-1/2 hours after mixing. Mortars that have stiffened due to evaporation of water may be re-tempered with water as necessary to restore required consistency during that time period.

B. Grout:

1. Grout shall conform to the requirements of TMS 602 and shall be a coarse grout designed to attain a compressive strength of not less than 2,000 psi at 28 days.
2. Proportions: Grout shall be proportioned as specified by one of the following methods:
 - a. Based on proportions specified in ASTM C476.
 - b. Based on laboratory or field experience with the grout ingredients and the masonry units to be used.
 - 1) For coarse grout, the coarse and fine aggregates shall be combined such that the fine aggregate part is not greater than 80 percent of the total aggregate weight (mass). Coarse grout proportioned by weight shall contain not less than 564 pounds of cementitious material per cubic yard.
 - 2) If this method is selected, Contractor shall submit documented history of grout mix design and results of test data used to establish mix proportions from no less than ten different recent projects.
 - 3) Compressive strength shall be determined in accordance with ASTM C1019.
3. Aggregate for grout shall conform to the requirements set forth in ASTM C404, Aggregates for Grout. Coarse grout shall be used in grout spaces 2 inches or more in width and in all filled-cell masonry construction.
4. Materials for grout shall be measured in suitable calibrated devices. After the addition of water, all materials shall be mixed for at least three minutes in a drum type batch mixer. Mixing equipment and procedures shall produce grout with the uniformity required for concrete by ASTM C94.

2.7 SOURCE QUALITY CONTROL

A. Where required by governing code, Owner's Testing Agency will:

1. Select masonry units by random sampling at the plant and test units for strength, absorption, and moisture content in accordance with ASTM C140; report strengths based on net area.
2. Review mix designs for mortar and grout.
3. Review certificates of compliance for materials. Sample and test where non-conformance is suspected.
4. Perform masonry and grout tests.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive masonry and verify following:

1. That foundation surface is level to permit bed joint with range of 1/4 inch to 3/4 inch.
2. That edge is true to line to permit protection of masonry to less than 1/4 inch.
3. That projecting dowels are free from loose scale, dirt, concrete, or other bond-inhibiting substances and properly located.

B. Do not begin work before unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean concrete surfaces to receive masonry. Remove laitance or other foreign material lodged in surfaces by sandblasting or other means as required.
- B. Ensure masonry units are clean and free from dust, dirt or other foreign materials before laying the units.
- C. Establish lines, levels and coursing. Protect from disturbances.
- D. Provide temporary bracing during erection of masonry work. Maintain in place until masonry has set to provide permanent bracing.

3.3 COURSING

- A. Install unit masonry work in accordance with CBC Chapter 21.
- B. Place unit masonry to lines and levels indicated to the following tolerances:
 - 1. Variation from unit to adjacent unit: 1/32 inch maximum.
 - 2. Variation from plane to wall: 1/4 inch in 10 feet.
 - 3. Variation from plumb: 1/4 inch.
 - 4. Variation from level coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.
 - 5. Variation of joint thickness: 1/8 inch in 3 feet.
- C. Bond: Use running bond typical unless otherwise noted. Lay concrete masonry units with vertical joints located at center of unit in course below.
- D. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
- E. Preserve the vertical continuity of cells in concrete unit masonry. The minimum clear horizontal dimensions of vertical cores shall be 3 inches by 3 inches for an 8-inch wide block.

3.4 PLACING AND BONDING

- A. Do not install concrete masonry units which are wet, cracked, broken or chipped beyond ASTM C90 finish and appearance tolerances.
- B. Lay only dry concrete masonry units.
- C. Lay masonry in full bed of mortar, properly jointed with other work. Buttering of joint corners and deep or excessive furrowing of mortar joints are not permitted.
- D. Full bond intersections and external and internal corners.
- E. Do not shift or tap concrete masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
- F. Remove excess mortar.
- G. Perform jobsite cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.

3.5 JOINTS

- A. Horizontal and vertical joints at masonry units shall be as specified herein and concrete unit masonry construction shall be 3/8-inch wide and as follows:
 - 1. Point joint tight in masonry below ground.
 - 2. All end joints shall be fully filled with mortar and joints squeezed tight. Slushing of mortar into joints shall not be permitted. Mortar in bed joints shall be held back approximately 1/2 inch from cell to provide positive bond with grout.
 - 3. Exposed Joints:
 - a. Vertical and horizontal joints shall be concave, unless noted otherwise.
 - 1) At all surfaces to receive tile finish, cement plaster finish, roofing membrane, or sheet waterproofing, vertical and horizontal joints shall be flush.
 - 4. Concave joints shall be formed by striking the mortar flush, and after partial set tooled with a 20 inch long tool to provide a uniform joint, free of waves. Tool shall be of a diameter to provide a joint that is as close to flush as possible.

3.6 MASONRY REINFORCEMENT

- A. Place reinforcement in accordance with ACI 315, to a tolerance of $\pm 1/2$ inch from specified location.
- B. Reinforcing steel shall not be bent or straightened in a manner that will injure the material. Bars with kinks or bends not shown on the plans shall not be used. Heating of bars for bending will not be permitted.
 - 1. Bars shall conform accurately to the sizes, shapes, lines and dimensions shown on Drawings and with hooks and bends made as detailed. Bars shall be placed as indicated on Drawings and centered on grout space.
 - 2. At the time grout is placed around it, reinforcing steel shall be clean of mill scale or other coatings that will destroy or reduce bond.
 - 3. All vertical reinforcing steel shall be installed in one piece, full height of wall, and braced throughout its height in a manner that will retain the steel in proper position and provide the proper clearance.

3.7 GROUTING

- A. General Requirements:
 - 1. All cells shall be grouted solid.
 - 2. Use grout pump, hopper or bucket to place grout.
 - 3. Place grout in final position within 1-1/2 hours after introduction of mixing water.
 - a. Place grout and rod with a 3/4-inch flexible cable vibrator sufficiently to cause it to flow into all voids between the cells and around the reinforcing steel. Slushing with mortar will not be permitted.
 - b. Do not insert vibrators into lower pours that are in a semi-solidified state.
 - 4. Stop grout approximately 1-1/2 inches below top of last course; except at top course bring grout to top of wall. Where bond beams occur, stop grout pour a minimum of 1/2 inch below the top of the masonry.

5. Prior to grouting, the grout space shall be cleaned so that all spaces to be filled with grout do not contain mortar projections greater than 1/2 inch, mortar droppings or other foreign material.
6. The grouting of any section of wall shall be completed in one day with no interruptions greater than one hour.

B. Low-Lift Grouting:

1. Units shall be laid to a maximum height of five feet-four inches before grouting, and all over-hanging mortar and mortar droppings shall be removed.
2. Grouting shall follow each five feet-four inches height of construction laid, and shall be consolidated so as to completely fill all voids and embed all reinforcing steel.
3. High-lift grouting not allowed.

3.8 CONTROL JOINTS

- A. Install resilient control joints in continuous lengths as shown on Drawings.
- B. Size joints in accordance with manufacturer's recommendations for sealant performance.

3.9 BOND BEAMS

- A. Bond beams shall be located where shown and detailed on Drawings, and shall be reinforced as indicated and as hereinafter specified.

3.10 BUILT-IN WORK

- A. Miscellaneous Embedded Items: All items indicated to be embedded in masonry shall be carefully located and anchored to prevent movement during grouting operations. Avoid cutting and patching.
 1. Install all anchor bolts and anchors furnished under other Sections.

3.11 PRECAST CONCRETE [SILLS] [CAPS]

- A. Set units in full bed of mortar with full head joints, unless otherwise indicated.
- B. Set units with joints 1/8 inch wide unless otherwise indicated.
- C. Build anchors and ties into mortar joints as units are set.

3.12 CUTTING AND FITTING

- A. Cutting: Make all unit cuts, including those for bonding, holes, boxes, etc., with motor-driven masonry saws, using either an abrasive or diamond blade. Cut neatly and locate for best appearance.
- B. Cut and fit for weep holes pipes and miscellaneous penetrations. Cooperate with other sections' work to provide correct size, shape and location.
- C. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.13 REPAIR, POINTING AND CLEANING

- A. Remove and replace masonry units which are loose, chipped, broken, stained or otherwise damaged, or if units do not match adjoining units.
- B. Pointing: During the tooling of joints, enlarge any voids or holes and completely fill with mortar.
- C. Dry brush masonry surface after mortar has set, at end of each day's work and after final pointing.
- D. Leave work and surrounding surface clean and free of mortar spots and droppings.
- E. Cleaning:
 - 1. Keep walls clean daily during installation using brushes, rags, and burlap squares. Do not allow excess mortar lumps or smears to harden on the finished surfaces. Remove green mortar with burlap or a dry cloth.
 - 2. Upon completion of masonry installation, repair all holes. Defective joints shall be cut out and rejoined.
- F. Final Cleaning:
 - 1. Just prior to project substantial completion, and prior to the application of water repellent/anti-graffiti coating, clean masonry surfaces.
 - a. Cleaning Product: PROSOCO Sure Klean line of cleaners, product appropriate to installed concrete units, or accepted equal.
 - 1) Run-off from cleaning operations shall be contained, neutralized, and disposed of per State and local regulations. Obtain necessary permits for disposal of run-off.
 - b. Sandblasting is an acceptable alternative means of cleaning, provided that no silica particulates are used.
 - 1) Sandblasting operations shall not generate large quantities of dust. Employ wet sandblasting methods to control dust.
 - 2. Final cleaning and water repellent/anti-graffiti coating application shall not be scheduled until walls have thoroughly dried out and sealants have been installed and cured.

3.14 FIELD QUALITY CONTROL

- A. Owner's Inspector and/or Testing Agency will:
 - 1. Provide the following checks as a minimum:
 - a. Measurement and mixing of field mixed mortar and grout.
 - b. Moisture conditions of masonry units at time of laying.
 - c. Inspection of laying of units with special attention to joints and bonding of units at corners.
 - d. Proper placement of reinforcement including splices, clearances and supports.
 - e. Observation of placement of pipes, conduits, or other weakening elements.
 - f. Inspection of grout spaces immediately prior to grouting for removal of mortar fins, dirt and debris.
 - g. Continuous inspection of grout placement with attention to procedures to avoid segregation and achieve proper consolidation.

- h. Perform or supervise sampling for testing.
- B. Contractor shall be responsible for repair of any damage to work caused by testing.
- C. Contractor shall pay Owner's Testing Agency for all additional testing required, including masonry cores, when laboratory tests of specimens show compressive strengths below specified minimum and judged to be inadequate by Architect.

END OF SECTION

DIVISION 05
METALS

SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structural steel framing and support members.
- B. Base plates and bearing plates.
- C. Grouting under base plates.

1.2 RELATED SECTIONS

- A. Section 03 20 00 – Concrete Reinforcing.
- B. Section 03 30 00 – Cast-In-Place Concrete.
- C. Section 05 31 00 – Steel Decking.
- D. Section 05 40 00 – Cold-Formed Metal Framing.
- E. Section 05 50 00 – Metal Fabrications.
- F. Section 07 81 16 – Cementitious Fireproofing.
- G. Section 09 91 00 – Painting: Paint finish.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AISC 303-05 – Code of Standard Practice for Steel Buildings and Bridges.
 - 2. ANSI B18.22.1 – Plain Washers.
 - 3. ANSI B18.23.1 – Beveled Washers.
 - 4. ASTM A6/A6M – Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
 - 5. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
 - 6. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 7. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - 8. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

- 9. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- 10. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat-Treated, 120/105 ksi Minimum Tensile Strength.
- 11. ASTM A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength.
- 12. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
- 13. ASTM A563 – Standard Specification for Carbons and Alloy Steel Nuts.
- 14. ASTM A572/A572M – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- 15. ASTM A780/A780M – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- 16. ASTM A992 – Standard Specification for Structural Steel Shapes.
- 17. ASTM F436 – Standard Specification for Hardened Steel Washers.
- 18. ASTM F844 – Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
- 19. ASTM F959 – Standard Specification for Compressible-Washer-Type Direct Tension Indicators for Use with Structural Fasteners.
- 20. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- 21. ASTM F1852 – Standard Specification for “Twist Off” Type Tension Control Structural Bolt/Nut/Washer Assemblies, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
- 22. AWS A2.4 – Standard Symbols for Welding, Brazing, and Nondestructive Examination.
- 23. AWS D1.1 – Structural Welding Code – Steel.
- 24. AWS D1.4 – Structural Welding Code – Reinforcing Steel.
- 25. AWS D1.8 – Structural Welding Code – Seismic Supplement.
- 26. AWS D2.0 – Specifications for Welded Highway and Railway Bridges.
- 27. RCSC – Specification for Structural Joints Using High Strength Bolts.
- 28. SSPC – Steel Structures Painting Manual, Volumes 1 and 2.

1.4 SUBMITTALS

A. Submit under provisions of Division 01.

B. Shop Drawings:

- 1. Indicate profiles, sizes, spacing, and locations of structural members, attachments, fasteners, and required connections, including connections not detailed on Drawings.
- 2. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths.
- 3. Clearly distinguish between shop and field bolts and welds.

- C. Manufacturer's Mill Certificate: Submit Manufacturer's Certificates under provisions of Division 01, certifying that steel, fasteners and welding electrodes meet or exceed specified requirements.
- D. Mill Test Reports: Submit Manufacturer's Reports under provisions of Division 01, indicating structural strength, destructive and non-destructive test analysis and ladle analysis.
- E. Submit product data for type of metal primer proposed for use.
- F. Welders' Certificates: Submit certificates under provisions of Division 01, certifying welders employed on the Work, verifying AWS qualifications within the previous twelve months.
 - 1. Welders who have not performed welding for period of three or more months shall be requalified.
 - 2. Welders whose work fails to pass inspection shall be requalified before performing further welding.
 - 3. Contractor shall pay costs of certifying qualifications.
- G. Qualification Data: For qualified Fabricator and Installer.

1.5 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Force-Resisting System: Elements of structural-steel frame designated as "SFRS" or along grid lines designated as "SFRS" on Drawings, including columns, beams, and braces and their connection.
- C. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A6/A6M with flanges thicker than 1-1/2 inches.
 - 2. Welded built-up members with plates thicker than 2 inches.
 - 3. Column base plates thicker than 2 inches.
- D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.
- E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Force-Resisting System and which are indicated as "Demand Critical" on Drawings.

1.6 QUALITY ASSURANCE

- A. Fabricate structural steel members in accordance with the AISC Specification for Structural Steel Buildings, Code of Standard Practice for Steel Buildings and Bridges and Quality Criteria and Inspection Standards.
- B. Fabricator Qualifications: Company specializing in performing the work of this Section with sufficient documented experience.
- C. Installer (Erector) Qualifications: Company specializing in performing the work of this Section.

1.7 REGULATORY REQUIREMENTS

- A. Conform to 2013 California Building Code (CBC), Chapter 16 "Structural Design", Chapter 22 "Steel", and Chapter 17 "Structural Tests and Special Inspections".
- B. Structural Tests and Inspections: Refer to project Enforcement Agency Structural Tests and Inspection Sheet.
- C. Materials:
 - 1. Material identification per CBC Chapter 22, Section 2203, Paragraph 2203.1 "Identification".
 - 2. Protection of structural steel per CBC Chapter 22, Section 2203, Paragraph 2203.2 "Protection".

1.8 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on shop drawings.
- B. Coordinate fabrication and delivery of structural steel items with concrete work and with all other trades to permit such items to be built into the structure without delay.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Delivery of Materials to be Installed Under Other Sections: Anchor bolts and other anchorage devices which are embedded in cast-in-place concrete construction shall be delivered to the project site in time to be installed before start of cast-in-place concrete operations.
- B. Storage of Materials:
 - 1. Structural steel members to be stored at the Project site shall be placed above ground, on platforms, skids or other supports.
 - 2. Steel shall be protected from corrosion.
 - 3. Other materials shall be stored in a watertight, dry place until ready for installation in the Work.
 - 4. Packaged materials shall be stored in their original package or container.
 - 5. Do not store materials on the structure in a manner that might cause distortion or damage to members of supporting structures. Repair or replace damaged materials or structure as directed by Architect.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Structural Steel Members:
 - 1. ASTM A992 Grade 50 for wide flange and WT shapes.
 - 2. ASTM A36/A36M or A572 Grade 50 for plates, as noted on Drawings.
 - 3. ASTM A36/A36M for channels, angles and all other shapes.
- B. HSS:
 - 1. Tubing: ASTM A500, Grade B.

- 2. Round: ASTM A500, Grade B.
- C. Pipe: ASTM A53/A53M, Type E or S, Grade B.
- D. Bolts and Nuts: ASTM A307, Grade A, with ASTM A563, Grade A, hex nuts, ASTM A325N, Type 1, with ASTM A563, Grade C, heavy hex nuts; anchor bolts, ASTM F1554, grade as indicated on Drawings.
- E. High-Strength Bolts, Nuts, and Washers: ASTM A325, Type 1, heavy hex steel structural bolts; ASTM A563 heavy hex carbon-steel nuts.
- F. High-Strength Bolts, Nuts, and Washers: ASTM A490, Type 1, heavy hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A563 heavy hex carbon-steel nuts; and ASTM F436 hardened carbon-steel washers, plain.
- G. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F1852, Type 1, heavy hex head steel structural bolts with splined ends; ASTM A563 heavy hex carbon-steel nuts; and ASTM F436 hardened carbon-steel washers.
- H. Welding Materials: AWS D1.1; type required for materials being welded. Filler metal shall be classified as low hydrogen and shall have a minimum Charpy V-notch toughness of twenty foot-pounds at minus 20 degrees F, as determined by AWS Classification or manufacturer certification.
- I. Circular washers for common bolts: ASTM F844, Type A, and ANSI B18.22.1.
- J. Beveled washers for common bolts: ANSI B18.23.1.
- K. Washers for high strength bolts: Direct tension indicator. ASTM F959 hardened circular, beveled and clipped, ASTM F436.
- L. Sleeve and Wedge Anchors: I.C.C. approved, as indicated and manufactured by Hilti or accepted equal.
- M. Eye Bolts and Nuts: ASTM A108, Grade 1030, cold-finished carbon steel.
- N. Sleeve Nuts: ASTM A108, Grade 1018, cold-finished carbon steel.
- O. Welded Headed Stud Anchors: ASTM A108. Welding, testing and inspection shall be in accordance with AWS D1.1.
- P. Steel Shop and Touch-Up Primer: TNEMEC Series 115 Uni-Bond DF or accepted equal.
- Q. Shop and Touch-Up Zinc Rich Primer for Galvanized Surfaces: ZRC Galviline Galvanizing Repair Compound as manufactured by ZRC Worldwide Company, Phone: (800) 831-3275, or accepted equal.
- R. Weld filler material: All weld filler material shall have a minimum tensile strength of 70 KSI per AWS D1.1, latest edition approved by code enforcement agency.
- S. Drypack: Refer to Section 03 30 00.
- T. Grout: Non-shrink type, pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives, capable of developing a minimum compressive strength of 7,000 psi at 28 days.

U. Reinforcing Steel: Refer to Section 03 20 00.

2.2 FABRICATION

A. General: Fabricate items of structural steel in accordance with AISC specifications and as indicated on Drawings. Properly mark and match-mark all materials for field assembly. Fabricate for delivery sequence which will expedite erection and minimize field handling.

1. Welded splicing of structural members may be done only upon written acceptance by Architect, unless otherwise indicated on Drawings. Splicing shall be thoroughly examined by a nondestructive means at Contractor's expense. Inspection shall be made by a recognized and approved testing laboratory; procedure, technique and standards of acceptance shall conform to Appendix E of AWS Standard D2.0-69. Correct faulty welds and re-examine in a manner specified for original welds.

B. Welded Construction:

1. Weld in accordance with AISC using manual shielded arc method or flux cored arc method in accordance with AWS D1.1 Groove welds shall be complete joint penetration welds, unless specifically designated otherwise on Drawings.
2. Remove back-up plates for complete joint penetration welds when specifically requested by testing laboratory to perform non-destructive testing. Remove at no cost to Owner.
3. Weld reinforcing steel in accordance with AWS D1.4 and using prequalified procedures.

C. Connections:

1. Weld or bolt shop connections as indicated.
2. Bolt field connections except where welded or other connections are indicated. Provide unfinished threaded fasteners only where noted on Drawings and for temporary bracing to facilitate erections.

D. Holes for Other Work: Provide holes required for securing other work to structural steel framing, and for the passage of work through steel framing members as indicated. Provide threaded nuts welded to framing, and other specialty items as shown to receive other work. Cut, drill or punch holes perpendicular to metal surfaces. Do not flame cut holes or enlarge holes by burning. Drill holes in bearing plates.

2.3 FINISH

A. Prepare structural component surfaces in accordance with SSPC SP-2 at concealed locations and SSPC SP-6 at exposed locations. Provide Class "A" (clean mill scale) contact surfaces per RCSC 1985 at high-strength bolted connections.

B. Do not prime surfaces scheduled to receive fireproofing, in direct contact with concrete, where field welding is required, or contact surfaces of steel-to-steel connections. Provide Class "A" or better contact surfaces at steel connections per RCSC Specification for Structural Joints Using High Strength Bolts, latest edition.

C. All exposed interior steel shall be primed with shop primer unless otherwise noted.

1. Primer shall be applied in one coat, to meet or exceed the minimum mil thickness required by the primer manufacturer.

D. All un-exposed, concealed or enclosed interior or exterior steel requires no finish.

- E. All exposed exterior steel shall be galvanized unless otherwise noted.
 - 1. Galvanize in accordance with ASTM A123/A123M, designated steel items. Provide minimum 1.25 ounce per square foot galvanized coating.
 - 2. At galvanized members, touch-up all welds with zinc-rich primer.

2.4 TESTING AND INSPECTION

- A. General: Owner will engage and pay a testing agency to perform the following services:
 - 1. Review manufacturer's certificates and check heat numbers and that the steel is properly identified in accordance with CBC Section 2203 "Identification and Protection of Steel for Structural Purposes".
 - 2. Testing of unidentified materials or as directed by Owner.
 - 3. Provide inspection per CBC Section 1705.2 and 1705.11, Item 1.
 - 4. Provide testing per CBC Section 1705.12, Item 1.
 - 5. In the event an examination discloses faulty welds and additional tests are required to fully examine the welds, the cost of the additional tests shall be paid for by Owner and back-charged to Contractor.
 - 6. All defective welds shall be repaired and tested at no expense to Owner.
 - 7. Perform any physical tests of structural steel as required by Architect. Perform ultrasonic tests on members as determined by Architect to determine if delamination defects in steel members are evident.
 - 8. High-strength bolting testing and inspection shall conform to the following requirements:
 - a. Perform pre-installation verification of pretensioned bolts per RCSC Section 7.1 for the selected pretensioning method.
 - b. Inspect bolted joints per RCSC Section 9 and CBC Section 1705.2.1.
 - c. All fasteners failing to meet the specified tension shall be examined to determine the cause of failure and re-tested.
 - 9. Test post-installed anchors as follows:
 - a. If the design tension is less than 75 pounds, and those anchors are clearly indicated in the Contract Documents, then only ten percent of the anchors shall be tested.
 - b. In the absence of ICC allowable values for a particular anchor, the test load(s) shall be twice the established tension value.
 - c. The test load may be applied by any method that will effectively measure the tension in the anchor, such as direct pull with a hydraulic jack, calibrated spring loading devices, or a calibrated torque wrench, etc. Anchors in which torque is used to expand the anchor without applying tension to the bolt (torque controlled anchor) should not be verified with a torque wrench until there is sufficient data from either the manufacturer or from independent testing to establish appropriate torque values. Examples of these types of anchors are the Hilti HSL, USE Taperbolt, and Lag Shield type anchors.
 - 10. Failure/Acceptance Criteria: The following criteria apply for the acceptance of installed anchors:
 - a. Hydraulic Ram Method: The anchor should have no observable movement at the applicable test load. For wedge and sleeve type anchors, a practical way to determine observable movement is that the washer under the nut becomes loose.

- b. Torque Wrench Method: The applicable test torque must be reached within the following limits:
 - 1) Wedge or Sleeve Type:
 - a) One-half turn of the nut.
 - b) One-quarter turn of the nut for the 3/8 inch sleeve anchor only.
- c. If any anchor fails testing, test all anchors of the same category not previously tested until twenty consecutive pass, then resume the initial testing frequency.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.
- C. Bolts shall be clean and free of grease, oil and all other deleterious substances.

3.2 ERECTION

- A. Allow for erection loads and for sufficient temporary bracing to maintain structure safe, plumb and in true alignment until completion of erection and installation of permanent bracing.
- B. Field weld components indicated on shop drawings.
- C. Do not field cut or alter structural members without acceptance of Architect.
- D. After erection, prime welds, abrasions and surfaces not shop primed, except surfaces to be in contact with concrete.
- E. Setting Base Plates:
 - 1. Clean concrete bearing surfaces and roughen to improve bond. Clean the bottom surface of base plates.
 - 2. Set loose and attached base plates for structural members on adjusting nuts at anchor bolts. All anchor bolts shall have double nuts for adjusting.
 - 3. Tighten anchor bolts after the supported members have been positioned and plumbed. Do not remove adjusting nuts.
 - 4. Place non-shrink grout solidly between surfaces as shown to ensure that no voids remain. Finish exposed surfaces, protect installed materials and allow non-shrink grout to cure.
- F. Structural steel work shall be set accurately at established lines and levels. Steel shall be plumb and level before final bolting or welding is commenced and after complete erection. All cutting, notching, coping, etc., required for proper assembly and fitting of parts and members, shall be done by the steel fabricator. Such workmanship shall be equal in quality to shop work.
 - 1. Coordinate the erection of structural steel with other trades and locate temporary guys, braces, falsework and cribbing as may be necessary for erection so as not to interfere with the progress of other work.

2. At bearing plates 2 inches and thicker, compression joints which depend on contact bearings shall have bearing surfaces milled and truly faced.
 3. Rolled sections, except for minor details, shall not be heated except for welding operations.
 4. Upon acceptance by Architect, gas cutting may be permitted if the metal being cut is not highly stressed during the operation. Stresses shall not be transmitted through a flame cut surface unless such surfaces are cut by a mechanically guided torch. The radius of re-entrant flame cut fillets shall be as large as possible, but not less than 1 inch. To determine the net area of members so cut, 1/8 inch shall be deducted from the flame cut edges not made by a mechanically guided torch. Gas cuts shall be smooth and regular. Holes for bolts shall not be cut with a torch.
 5. All contact surfaces shall be cleaned before assembly.
 6. Provide setting diagrams and templates as required. Placement of beam connectors shall be the responsibility of structural steel fabricator.
 7. Splice members only where indicated.
- G. Connections shall be as specified hereinbefore under "Fabrication." In addition, bolted connections shall conform to the following requirements:
1. Beveled washers shall be used under all bolt heads and nuts where they rest on beveled surfaces.
 2. Connectors shall have hexagon heads and nuts.
 3. Nuts shall be drawn up tight. Check threads of unfinished bolts with chisel or approved self-locking nuts.
 4. Bolts that have been completely tightened shall be marked with identifying symbol.
 5. High-strength bolted construction: Install high-strength threaded fasteners in accordance with RCSC Specification for Structural Joints Using High-Strength Bolts. All high strength bolts shall be pretensioned, unless specifically noted otherwise. Pretensioning shall be by one of the methods permitted in RCSC Section 8.2.
- H. Framing shall be carried up true and plumb. Temporary bracing shall be introduced wherever necessary to take care of all loads to which structure may be subjected, including erection equipment and its operation. Such bracing shall be left in place as long as may be required for safety. It shall finally be removed by Contractor as part of his equipment. As erection progresses, the work shall be securely connected to take care of all dead load, lateral loads and erection stresses. No final bolting or welding shall be done until the structure has been properly aligned.

3.3 ERECTION TOLERANCES

- A. Level and plumb steel within the tolerances defined in the AISC Code of Standard Practice, latest edition.

3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint as specified or according to ASTM A780, and manufacturer's written instructions.

- B. Touchup Painting: After installation, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories, bearing plates, and abutting structural steel.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

3.5 CLEAN-UP

- A. Upon completion of the work of this Section, remove all surplus materials, rubbish and debris from premises.

END OF SECTION

SECTION 05 31 00

STEEL DECKING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel decking and accessories.
- B. Framing for openings up to and including 24 inches.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 05 12 00 – Structural Steel Framing.
- C. Section 05 50 00 – Metal Fabrications.
- D. Section 07 81 16 – Cementitious Fireproofing.
- E. Section 09 91 00 – Painting: Paint finish.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Steel Members.
 - 2. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
 - 3. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 4. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.
 - 5. AWS D1.1 – Structural Welding Code – Steel.
 - 6. AWS D1.3 – Standard Welding Code – Sheet Steel.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate decking plan, dimensions, sizes, support locations, projections, openings and reinforcement, pertinent anchoring details and accessories. Coordinate with other trades in accurately locating and detailing openings and penetrations.

- C. Product Data: Provide deck profile characteristics and dimensions, structural properties, finishes and accessories. Provide product data for acoustic insulation.
- D. Manufacturer's Installation Instructions: Indicate specific installation sequence and special instructions.
- E. Certificates:
 - 1. The manufacturer's certification and fire test reports to show that deck assemblies comply with requirements of this Section.
 - 2. Furnish certification by approved testing agency for each welder employed.

1.5 PERFORMANCE REQUIREMENTS

- A. Steel decking and section properties shall comply with AISI S100.
- B. Profile and design of deck units and accessories shall conform to the details shown on Drawings. Units shall be one piece, unless indicated otherwise.
- C. Steel decking and its installation shall meet the requirements of 2013 California Building Code (CBC).

1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as shown on shop drawings.

1.7 TESTS AND INSPECTIONS

- A. Furnish test specimens of materials when they are requested. Welded decking in place is subject to inspection and testing per CBC Chapter 17 "Structural Tests and Special Inspections", Section 1705 "Required Verification and Inspection".
 - 1. Expense of removing and replacing any portion of decking for testing purposes will be borne by Owner if installation is found to be satisfactory. All portions of the work found to be defective and not in conformity with contract requirements shall be removed and replaced at no cost to Owner.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E329 for testing indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.3.
- C. Installer: Company specializing in performing work of this Section.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.
- C. Store decking on dry wood sleepers; slope for positive drainage. Work showing creases, burrs in cells, deformation, weathering, or other defects affecting its use or appearance in exposed locations will not be accepted.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer:

1. Basis-of-Design: ASC Steel Deck, West Sacramento, CA; 916-372-6851, www.ascsd.com; per evaluation agency reports as follows:
 - a. IAPMO Evaluation Report No. ER-0161 for bare steel deck.
 - b. IAPMO Evaluation Report No. ER-0329 for concrete-filled steel deck.

B. Substitutions: Under provisions of Division 01 with valid Evaluation Agency Report.

1. Substitution requests for steel decking shall consider the vertical and lateral load capacities of final system, including attachments. Provide a comparison summary of proposed and specified deck systems showing that the proposed system has equal or greater vertical and lateral load capacities for all conditions shown on Drawings. Systems with lower load capacities will not be acceptable.
2. Substitution requests will require review by the Structural Engineer of Record and Authority Having Jurisdiction (AHJ). Cost for such reviews shall be borne by Contractor.
3. Do not submit shop drawings with substituted decking manufacturer until decking manufacturer has been accepted via substitution request process.

2.2 MATERIALS

- A. Sheet Steel for Bare Deck: ASTM A653/A653M, SS designation, Grade 40 (minimum yield 38 KSI); zinc coated conforming to ASTM A653/A653M, G60, unless noted otherwise. Refer to Drawings for types and sizes of steel decking.
- B. Sheet Steel for Composite Deck: ASTM A653/A653M, SS designation, Grade 50 (minimum yield 50 KSI) and Grade 40 for 3" Type "W" deck profiles (minimum yield 40 KSI)]; zinc coated conforming to ASTM A653/A653M, G60, unless noted otherwise. Refer to Drawings for types and sizes of steel decking.
- C. Welding Materials: Conform to AWS D1.1 and D1.3, with a minimum 60 KSI filler metal yield strength.
- D. Shop and Touch-Up Zinc Rich Primer for Galvanized Surfaces: ZRC Galviline Galvanizing Repair Compound as manufactured by ZRC Worldwide Company, Marshfield, MA; 800-831-3275, www.zrcworldwide.com, or accepted equal.
- E. Steel Decking and Design: Steel decking shall be metallic coated with interlocking side lap. Deck types and minimum structural properties shall be as indicated on Drawings. Submit Evaluation Agency Reports that demonstrate compliance with design requirements.
 1. Decking shall be vented with factory punched holes where filled with concrete; otherwise provide non-vented decking. Venting is not required at concrete filled deck where underside is permanently exposed or where cellular deck is used.
- F. Welded Headed Studs: ASTM A108. Welding testing and inspection shall be in accordance with AWS D1.1 and CBC Sections 1705.2.2.1 and 1705.12.2.

2.3 FABRICATION

- A. Fabrication: All steel decking units shall be roll-formed to assure uniformity and strength.

- B. Allowable Tolerances: Maximum variation in unit alignment 1/4 inch in 40 feet (1/1920).
- C. Workmanship: All work shall be neat, trim, true to line and upon completion shall present a true finished surface of specified deck profile, free of dents, deformations, creases, weld spatter or other noticeable defects. Steel deck permanently exposed to view shall be manufactured, handled, and transported for "exposed" installation.
- D. Reinforcement: Provide reinforcement for openings, cutouts and free edges of decking as required for strength and stiffness. Provide reinforcement where a cell is cut parallel to rib as necessary to make a tight fit along the cut cell. Such reinforcement shall be in addition to structural supports shown on Drawings and specified in Section 05 12 00.
- E. Miscellaneous Work: Provide all other transition pieces, reinforcement and miscellaneous decking items as detailed and required to provide a complete installation.
- F. Where steel decking is scheduled to receive fireproofing, it shall be provided free of lubricants, oils, passivators, and other substances which would impair the adhesion of the fireproofing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work. Check supporting members for correct layout and alignment. Should layout and alignment be such as to prevent proper bearing of the deck units on supporting members, the deck installer shall bring it to the attention of structural steel installer in writing, with a copy to Architect, for corrective measures and action. Steel decking units shall not be placed until necessary corrections are made.
- B. Beginning of installation means installer accepts existing conditions.

3.2 INSTALLATION

- A. Erect steel decking in accordance with Evaluation Agency Report, manufacturer's instructions and final shop drawings.
- B. Placing and Fastening Deck Units: Place decking in a permanent position with all panels aligned end-to-end so that the fluted portions of the panels align accurately. Panels shall be placed on supporting framework and adjusted in final position before being permanently fastened. Ends shall be over structural supports with positive, complete bearing over full width of panels. Installation shall be accomplished without deformation of units. Decking layout shall be as indicated on Drawings.
 - 1. Carefully check control points, as indicated, for layout of deck flutes. Where required, deck module shall be adjusted to conform to layout indicated.
 - 2. Fasten deck units to structure and to each other as indicated.
 - 3. At galvanized steel decks, deslag, clean, and touch-up all welds with zinc-rich primer, including those at the underside of deck.
 - a. Exception: Do not touch-up welds on top of deck which will be covered with concrete.
 - 4. Complete installation shall conform to manufacturer's specifications and as detailed.

- C. Openings Through Decking: Steel decking fabricator shall cut and reinforce all openings in the metal deck, including framed openings indicated on Drawings. Small miscellaneous openings shall be field-cut by the trade requiring the opening.
 - 1. All cutting of exposed edges shall be square, trim and equal to factory cutting.
 - 2. Steel deck panels and accessories shall be cut and neatly fit around openings and other work projecting through the deck.
 - 3. Openings shall be reinforced as indicated or required to provide a rigid installation.
- D. Steel decking installation shall proceed in accordance with current Cal/OSHA and OSHA regulations including guidelines with respect to fall protection.
- E. Steel decking shall be spread for safety and working platforms.
- F. All steel decking sheets shall be wind tacked and loose bundles of deck shall be wired at the end of each shift.
- G. Provide a membrane barrier between steel deck and preservative treated or fire retardant treated wood.
- H. Concrete Filled Deck Installation:
 - 1. Provide deck accessories required to contain concrete during concrete placement.
 - 2. Concrete fill thicknesses over steel deck indicated on the construction documents are minimum thicknesses. Provide additional concrete fill as required to compensate for framing or deck deflections during placement in order to maintain specified surface tolerances and minimum thicknesses.
 - 3. Place concrete in a manner to avoid excessive deflections or ponding.
 - 4. Place concrete fill on adjacent spans before placement on cantilever conditions.
 - 5. Provide shoring where indicated on drawings and where deck span exceeds manufacturer's listed maximum unshored span. Do not remove forms until concrete fill has reached its minimum compressive strength.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Remove and replace work that does not comply with specified requirements.
 - 1. Additional inspection, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.4 PROTECTION

- A. Do not use steel decking for storage or working platforms until it has been permanently fastened. Storage loads must be supported on wood blocking in the flutes of the deck.
 - 1. Any damaged deck unit shall be repaired or replaced as directed by Architect and at no cost to Owner.
- B. Assure that construction loads do not exceed the carrying capacity of the deck.

3.5 CLEAN-UP

- A. Upon completion of the work of this Section, remove all surplus materials, rubbish and debris from premises.

END OF SECTION

SECTION 05 40 00
COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Load bearing formed steel stud exterior wall framing.
- B. Ceiling joist framing.

1.2 RELATED SECTIONS

- A. Section 05 12 00 – Structural Steel Framing.
- B. Section 05 31 00 – Steel Decking.
- C. Section 05 50 00 – Metal Fabrications.
- D. Section 06 16 00 – Sheathing.
- E. Section 07 21 00 – Thermal Insulation.
- F. Section 07 92 00 – Joint Sealants.
- G. Section 09 22 16 – Non-Structural Metal Framing.
- H. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AISI S100 – North American Specification for the Design of Cold-Formed Steel Structural Steel Members.
 - 2. AISI S200 – North American Standard for Cold-Formed Steel Framing – General Provisions.
 - 3. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
 - 4. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
 - 5. ASTM A1003/ A1003M – Standard Specification for Steel Sheet, Carbon, Metallic and Nonmetallic-Coated for Cold-Formed Framing Members.

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|---------------|---|
| 6. ASTM C645 | – Standard Specification for Nonstructural Steel Framing Members. |
| 7. ASTM C754 | – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products. |
| 8. ASTM C1007 | – Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories. |
| 9. ASTM C1513 | – Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections. |
| 10. AWS D1.1 | – Structural Welding Code – Steel. |
| 11. AWS D1.3 | – Structural Welding Code – Sheet Steel. |
| 12. SFIA | – Technical Guide for Cold-Formed Steel Framing Products. |
| 13. SSMA | – Product Technical Information. |
| 14. SSPC | – Steel Structures Painting Manual. |

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide data on standard framing members; describe materials and finish, product criteria and limitations.
- C. Shop Drawings:
 - 1. Provide shop drawings prepared by cold-formed metal framing manufacturer.
 - 2. Indicate component details, framed openings, bearing, anchorage, loading, welds, type and location of fasteners and accessories or items required of related work.
 - 3. Indicate stud layout.
 - 4. Describe method for securing studs to tracks and for welded framing connections.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Research/Evaluation Reports: For cold-formed metal framing.
 - 1. Metal stud manufacturer shall have a third party evaluation report for its products that are reviewed per the applicable building code.

1.5 QUALITY ASSURANCE

- A. Calculate structural properties of framing members in accordance with American Iron and Steel Institute Cold-Formed Steel Design Manual AISI S100.

1.6 REGULATORY REQUIREMENTS

- A. Conform to 2013 California Building Code (CBC), Chapter 16 "Structural Design", Chapter 17 "Structural Tests and Special Inspections", and Chapter 22 "Steel", as applicable.
- B. Materials:
 - 1. Structural Steel per CBC Chapter 22, Section 2202 "Definitions", and Section 2203 "Identification and Protection of Steel for Structural Purposes".

2. Material Identification per CBC Chapter 22, Section 2203.

C. Inspection: CBC Chapter 17.

1. Welding Inspection per Chapter 17, Section 1705, Paragraph 1705.2.2.1 "Welding".

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section.

B. Installer: Company specializing in performing the work of this Section.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.9 COORDINATION

A. Coordinate work under provisions of Division 01.

B. Coordinate with the placement of components within the stud framing system, specified in Divisions 21-23 and 25-28.

PART 2 PRODUCTS

2.1 METAL FRAMING SYSTEM

A. Acceptable Manufacturers:

1. ClarkDietrich Building Systems, West Chester, OH; 513-870-1100, www.clarkdietrich.com.
2. Marino/Ware, Griffin, GA; 678-688-1312, www.marinoware.com.
3. CEMCO, Pittsburg, CA; 925-473-9340, www.cemcosteel.com.

B. Substitutions: Under provisions of Division 01.

2.2 FRAMING MATERIALS

A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, grade as follows:

1. Grade: ST33H for 18 gauge and lighter, ST50H for 16 gauge and heavier as required by structural performance requirements.

B. Sheet Steel for Vertical Deflection and Drift Clips: ASTM A1003/A1003M and ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50 (340).
2. Coating: G90 (Z275).

C. Studs, Zees, Angles and Plates: ASTM A1003/A1003M Steel sheet formed to channel shape, solid web; sizes and gauges, as indicated on Drawings.

- D. Deflection Track Slotted: Single, deep-leg, U-shaped steel track: punched with vertical slots in both legs. Steel Sheet top runner manufactured to prevent cracking of finishes applied to framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- E. Vertical Deflection Clips: Manufacturer's standard bypass and head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web and capable of resisting forces imposed by the wall system.
- F. Joists: ASTM A1003/ A1003M Grade 50, Class 1 or 2 sheet steel, formed to channel shape, punched web.
- G. Headers and Jambs: Shapes used to form header beams and jambs, columns or posts, of web depths indicated, un-punched, with stiffened flanges.
- H. Channel Bridging or Bracing: U-Channel Assembly: ASTM C645; Base metal thickness of 0.0538 inch, and minimum 1/2 inch wide flanges.
- I. Framing members shall be provided by a member of the Steel Stud Manufacturer's Association (SSMA) or Steel Framing Industry Association (SFIA) and have minimum structural properties indicated on Structural Drawings.

2.3 ACCESSORIES

- A. Bracing, Furring, Bridging: Formed sheet steel, thickness determined for conditions encountered.
- B. Plates, Gussets, Clips: Formed sheet steel, thickness as shown on Drawings.
- C. Shop and Touch-Up Primer: TNEMEC Azeron 88HS red metal primer, unless otherwise required to match shop primer.
- D. Shop and Touch-Up Zinc Rich Primer for Galvanized Surfaces: ZRC Galviline Galvanizing Repair Compound as manufactured by ZRC Worldwide Company, Marshfield, MA; 800-831-3275, www.zrcworldwide.com, or accepted equal.

2.4 FASTENERS

- A. Self-drilling, Self-tapping Screws, Bolts, Nuts and Washers: ASTM C1513, corrosion resistant.
- B. Welding: In conformance with AWS D1.1 and AWS D1.3.
- C. Powder Driven Fasteners: Tempered steel pins with special corrosive-resistant plating or coating. Pins shall have guide washers to accurately control penetration, minimum 1-1/8 inch. Fastening shall be accomplished by low-velocity pistol-driven powder activated tool. Pins and tool shall be as manufactured by Hilti Fastening Systems; Impex Tool Corporation; ITW Ramset/Redhead; or accepted equal. All fasteners shall have ICC ES approval.

2.5 FINISHES

- A. Studs and Joists: Provide galvanized finish as follows:
 - 1. Coating Class: G-60 per ASTM A653.

- B. Tracks and Headers: Provide galvanized finish as follows:
 - 1. Coating Class: G-60 per ASTM A653.
- C. Bracing, Furring, Bridging: ASTM A1003/A1003M, hot dip galvanized to Coating Class G-60 per ASTM A653.
- D. Plates, Gussets, Clips: ASTM A1003/A1003M, hot dip galvanized to Coating Class G-60 per ASTM A653.
- E. No equivalent coatings allowed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify that building framing components are ready to receive work.

3.2 ERECTION OF FRAMING

- A. Install components in accordance with ASTM C754, ASTM C1007, AISI S200, manufacturer's instructions, and as shown on Drawings.
- B. Align floor and ceiling tracks; locate to wall layout. Secure in place by method shown on Drawings. Coordinate installation of sealant with floor tracks and studs attached to masonry or concrete walls.
- C. Place studs at 16 inches on center; not more than 2 inches from abutting walls and at each side of openings. Connect studs to tracks using method shown on Drawings.
- D. Construct corners using minimum three studs. Install double studs at wall openings and door and window jambs unless otherwise shown on Drawings.
- E. Erect load bearing studs one piece full length. Splicing of studs is not permitted.
- F. Erect load bearing studs, brace and reinforce to develop full strength to achieve design requirements.
- G. Install intermediate studs above and below openings to align with wall stud spacing.
- H. Provide deflection allowance in stud track, directly below horizontal building framing at non-load bearing framing.
- I. Attach furring channels to studs for attachment of fixtures anchored to walls.
- J. Install framing between studs for attachment of mechanical and electrical items and to prevent stud rotation.
- K. Touch-up field welds and damaged galvanized surfaces with primer.
- L. Complete framing ready to receive exterior finish system.

3.3 ERECTION OF CEILING JOISTS

- A. Install framing components in accordance with manufacturer's instructions.

- B. Make provisions for erection stresses. Provide temporary alignment and bracing.
- C. Place ceiling joists at 16 inches on center, not more than 2 inches from abutting walls. Connect joists to supports as indicated on Drawings.
- D. Set ceiling joists parallel and level, with lateral bracing and bridging.
- E. Provide joist bridging at mid-point of spans or not to exceed 8 feet on center.
- F. Touch-up field welds and damaged galvanized surfaces with primer.
- G. Complete framing ready to receive ceiling finish.

3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint as specified or according to ASTM A780, and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted joists and accessories and abutting steel.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
 - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

3.5 ERECTION TOLERANCES

- A. Maximum Variation from True Position: 1/8 inch.
- B. Maximum Variation of any Member from Plane: 1/8 inch.

END OF SECTION

SECTION 05 50 00
METAL FABRICATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal fabrications as follows:
 - 1. Metal canopies.
 - 2. Security mesh.
 - 3. Railing assemblies.
 - 4. Elevator pit ladder.
 - 5. Roof access ladders.
 - 6. Rooftop ladder and platform.
 - 7. Stair safety nosings.
 - 8. Miscellaneous metal fabrications.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 05 12 00 – Structural Steel Framing.
- C. Section 05 51 00 – Metal Stairs.
- D. Section 07 72 33 – Roof Hatches.
- E. Section 07 92 00 – Joint Sealants.
- F. Section 09 91 00 – Painting.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ANSI A14.3 – American National Standards for Fixed Ladders & Safety Requirements.
 - 2. ASME A17.1 – Safety Code for Elevators and Escalators.
 - 3. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
 - 4. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

5. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
6. ASTM A283/A283M – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.
7. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
8. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
9. ASTM A513 – Standard Specification for Electric-Resistance-Welded Carbon and Alloy Steel Mechanical Tubing.
10. ASTM A554 – Standard Specification for Welded Stainless Steel Mechanical Tubing.
11. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
12. ASTM D1187 – Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
13. ASTM E488 – Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements.
14. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
15. ASTM F594 – Standard Specification for Stainless Steel Nuts.
16. AWS A2.4 – Standard Symbols for Welding, Brazing, Nondestructive Examination.
17. AWS D1.1 – Structural Welding Code – Steel.
18. AWS D1.3 – Structural Welding Code – Sheet Steel.
19. AWS D1.6 – Structural Welding Code – Stainless Steel.
20. SSPC-Paint 20 – Zinc-Rich Coating, Type I-Inorganic and Type II-Organic.
21. SSPC-Paint 29 – Zinc Dust Sacrificial Primer, Performance-Based.
22. SSPC SP-2 – Hand Tool Cleaning.
23. SSPC SP-6 – Commercial Blast Cleaning.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners and accessories. Include erection drawings, elevations and details where applicable.
- C. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
- D. Submit product data for type of metal primer proposed for use.

- E. Samples: Submit three 12 inch by 12 inch samples of each type of security mesh and perforated panel.

1.5 QUALITY ASSURANCE

- A. Welding: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code - Steel."
 - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."
 - 3. AWS D1.6, "Structural Welding Code – Stainless Steel."
- B. Conform to 2013 California Building Code (CBC), Chapter 17 "Structural Tests and Special Inspections", and Chapter 22 "Steel".
 - 1. Materials:
 - a. Material Identification per CBC Chapter 22, Section 2203.1 "Identification".
 - 2. Inspection and Tests:
 - a. Welding Inspection per CBC Chapter 17, Section 1705, Paragraph 1705.2.2.1 "Welding".
 - b. Non-Destructive Weld Testing per CBC Chapter 17, Section 1705, Paragraph 1705.12.2 "Structural Steel".
- C. Painting: Refer to Section 09 91 00 for field painting.
 - 1. Do not paint galvanized surfaces that are indicated to remain galvanized.

1.6 QUALIFICATIONS

- A. Welders' Certificates: Submit certificates under provisions of Division 01, certifying welders employed on the Work, verifying AWS qualification within the previous twelve months.

1.7 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Steel: Unless otherwise noted, provide steel materials as follows:
 - 1. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
 - 2. Plates: ASTM A283/A283M.
 - 3. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 (Z275) coating designation, structural quality.
 - 4. Pipe: ASTM A53/A53M, Type E or S, Grade B.
 - 5. HSS:
 - a. Tubing: ASTM A500, Grade B.
 - b. Round: ASTM A500, Grade B.
 - 6. Bolts, Nuts and Washers: ASTM A307.

- B. Stainless Steel: Unless otherwise noted, provide stainless steel materials as follows:
 - 1. Tubing: ASTM A554, Grade MT, Type 304.
 - 2. Bolts, Nuts, and Washers: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers. ASTM F593 for bolts and ASTM F594 for nuts, Alloy Group 1.
- C. Anchorage:
 - 1. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E488, conducted by a qualified independent testing agency.
 - 2. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488, conducted by a qualified independent testing agency.
- D. Welding Materials:
 - 1. Steel: AWS D1.1; type as required for materials being welded.
 - 2. Sheet Steel: AWS D1.3; type as required for materials being welded.
 - 3. Stainless Steel: AWS D1.6; type as required for materials being welded.
- E. Weld filler material: All weld filler material shall have a minimum tensile strength of 70 ksi per AWS D1.1, latest edition approved by code enforcement agency.
- F. Steel Shop and Touch-Up Primer: TNEMEC Series 115 Uni-Bond DF or accepted equal.
- G. Shop and Touch-Up Zinc Rich Primer for Galvanized Surfaces: ZRC Galviline Galvanizing Repair Compound as manufactured by ZRC Worldwide Company, Phone: (800) 831-3275, or accepted equal.
- H. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

2.2 METAL CANOPIES

- A. Components:
 - 1. Steel Plates and Sections: Sizes and thicknesses as shown on Drawings.
 - 2. Galvanized Metal Deck: Refer to Section 05 31 00.
 - 3. Finish: Paint finish under provisions of Section 09 91 00.

2.3 SECURITY MESH

- A. Horizontal: Himalayan Foothills as manufactured by The Western Group or accepted equal, with the following characteristics:
 - 1. Material: 9 gauge steel woven wire mesh.
 - 2. Openings: 3/4 inch x 3/4 inch.
 - 3. Finish: Galvanized.
- B. Vertical: Coastal Boardwalk as manufactured by The Western Group or accepted equal, with the following characteristics:
 - 1. Material: 7 gauge steel woven wire mesh.

2. Openings: 3/4 inch x 3 inch L-slotted.
3. Finishes:
 - a. Exterior: Galvanized.
 - b. Interior: Paint finish under provisions of Section 09 91 00.

2.4 RAILING ASSEMBLIES

- A. Steel Railing Assemblies: Fabricated from steel pipe, stainless steel tubing, steel plates and sections; sizes and configurations as shown on Drawings. At exterior locations, hot-dip galvanize steel members in accordance with ASTM A123/A123M, minimum 1.25 ounces per square foot.
1. Steel Pipe: ASTM A53/A53M, Grade A, Schedule 40.
 2. Stainless Steel Tubing: ASTM A554, Grade MT, Type 304, minimum wall thickness 0.156 inch. Finish: No. 4, directional satin finish.
 3. Handrail Brackets: Stainless steel, Model No. MB3301P as manufactured by Wagner or accepted equal.
 4. Infill Panels: Coastal Boardwalk as manufactured by The Western Group or accepted equal, with the following characteristics:
 - a. Material: 9 gauge steel woven wire mesh.
 - b. Openings: 3/4 inch x 3 inch L-slotted.
 - c. Finishes:
 - 1) Exterior: Galvanized.
 - 2) Interior: Paint finish under provisions of Section 09 91 00.
 5. Finish: Paint finish under provisions of Section 09 91 00.
 - a. Do not paint stainless steel components or galvanized surfaces that are indicated to remain galvanized.
- B. Fabrication:
1. Handrail gripping surfaces and any surfaces adjacent to them shall be free of sharp or abrasive elements and shall have rounded edges.
 2. Handrails shall not rotate in their fittings.

2.5 ELEVATOR PIT LADDER

- A. Regulatory Requirements: Conform to ANSI A14.3, OSHA, and UL requirements, as applicable.
1. For elevator pit ladders, comply with ASME A17.1.
- B. Elevator Pit Ladder, General:
1. Space side rails 18 inches apart, unless otherwise indicated.
 2. Support each ladder at top and bottom, and not more than 48 inches on center, with brackets made from same metal as ladder.
 3. Provide brackets and anchorage as indicated on Drawings.

C. Steel Ladders:

1. Side Rails: Continuous, 3/8 inch by 3-1/2 inch steel flat bars, with eased edges, unless otherwise indicated.
2. Rungs: 3/4-inch-diameter steel bars.
3. Fit rungs in centerline of side rails; plug-weld and grind smooth on outer rail faces.
4. Provide non-slip surfaces on top of each rung by coating with abrasive material metallically bonded to rung by a proprietary process. Provide one of the following products:
 - a. W. S. Molnar Company; SlipNOT.
 - b. IKG Industries, a Harsco company; Mebac.

D. Finish: Galvanized in accordance with ASTM A123/A123M, minimum 1.25 ounces per square foot coating.

2.6 ROOF ACCESS LADDERS AND FALL PROTECTION

A. Roof Access Ladders:

1. Regulatory Requirements: Conform to ANSI A14.3, OSHA, and UL requirements, as applicable.
2. Access Ladder, General:
 - a. Space side rails 18 inches apart, unless otherwise indicated.
 - b. Support each ladder at top and bottom, and not more than 48 inches on center, with brackets made from same metal as ladder.
 - c. Provide brackets and anchorage as indicated on Drawings.
3. Aluminum Ladders:
 - a. Manufacturer and Product:
 - 1) Model No. 501 fixed access aluminum ladder as manufactured by O'Keeffe's, Inc. or accepted equal.
 - b. Materials:
 - 1) Side Rails: Continuous 6063-T5 aluminum extrusions, creating a tubular shape. Provide safety cap at top of each siderail.
 - 2) Rungs: 1-1/4 inch square 6061-T6 aluminum extrusion with serrated faces.
 - a) Fit rungs in centerline of side rails and attach rungs to side rails with two self-tapping screws each end.
 - 3) Brackets:
 - a) Floor: 4-1/2 inch x 1-3/8 inch x 3/16 inch x 2 inch long aluminum.
 - b) Intermediate and Top: 3/16 inch aluminum
 - 4) Finish: Mill finish.

2.7 ROOFTOP LADDER AND PLATFORM

A. Refer to Drawings for member sizes and configuration.

B. Materials:

1. HSS Tubing: ASTM A500, Grade B galvanized steel.
2. Pipe: ASTM A53/A53M, Type E or S, Grade B galvanized steel.
3. Angles and Plates: ASTM A36/A36M galvanized steel.
4. Railings: ASTM A53 galvanized steel pipe.
5. Platform and Tread Grating: Galvanized steel bar grating in compliance with ANSI/NAAMM MBG 531.
 - a. Manufacturers:
 - 1) McNichols Co.
 - 2) Grating Pacific, Inc.
 - 3) Ohio Gratings, Inc.
 - 4) Substitutions: Under provisions of Division 01.
 - b. Platform and Tread Nosings: Fiberglass, safety yellow color.

C. Finish: Site paint finish under provisions of Section 09 91 00.

2.8 STAIR SAFETY NOSINGS

A. Safety Nosing: Provide aluminum safety nosing with anti-slip abrasive finish.

1. Basis-of-Design Product: Supergrit® Safety Nosing, Type 231-BF with Sure-hold anchors (for intermediate treads) by Wooster Products Inc., Wooster, OH; 800-321-4936, www.wooster-products.com; or accepted equal.
2. Nosing Materials:
 - a. Type 6063-T5 extruded aluminum, with anti-slip abrasive filler containing approximately 65 percent virgin grain aluminum oxide (Al₂O₃) and silicon carbide abrasive.
 - b. Width: 3 inches.
 - c. Thickness: 1/4 inch.
 - d. Length: Provide nosing for full width of treads less 1/8 inch on either side for clearance.
 - e. The radius of curvature at the leading edge of the nosing shall be no greater than 1/2 inch.
3. Anchorage: Provide integral anchorage in nosing, as standard with manufacturer and acceptable to Architect.
4. Colors: Contrasting colors as selected by Architect.

2.9 MISCELLANEOUS METAL FABRICATIONS

A. Provide miscellaneous metal fabrications as required to complete work under other Sections, but not specified in those Sections.

B. Miscellaneous metal work, including, but not limited to the following items:

1. Steel Framing and Supports For:
 - a. Countertops.

- b. Mechanical and electrical equipment.
- 2. Support angles for elevator door sills.
- 3. Loose bearing and leveling plates.
- 4. Steel weld plates and angles for casting into concrete not specified in other Sections.

2.10 SHOP FABRICATION

- A. Fit and shop assemble in largest practical sections, for delivery to site.
 - 1. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Cut, drill, and punch metals cleanly and accurately. De-burr rough edges and holes.
- E. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- F. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- G. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication except where specifically noted otherwise.
- H. Miter and weld members, welds ground smooth.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.11 FINISHES

- A. Prepare structural component surfaces in accordance with SSPC SP-2 at concealed locations and SSPC SP-6 at exposed locations.
- B. Do not prime surfaces scheduled to receive fireproofing, in direct contact with concrete, where field welding is required, or contact surfaces of steel-to-steel connections.
- C. Shop prime all exposed interior steel with shop primer unless otherwise noted. Apply primer in one coat, to meet or exceed the minimum mil thickness required by the primer manufacturer.
- D. All unexposed, concealed, or enclosed interior or exterior steel requires no finish.
- E. All exposed exterior steel shall be galvanized after fabrication unless otherwise noted.
 - 1. Galvanizing shall be in accordance with ASTM A123/A123M, on designated steel items. Provide minimum 1.25 ounces per square foot galvanized coating.
 - 2. At galvanized members, touch-up all welds with zinc-rich primer.

F. Painting shall conform to applicable requirements of Section 09 91 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions.
- B. Verify structure or substrate is plumb, level, and ready to receive work.
- C. Verify that appropriate backing, blocking, or structural reinforcing is provided at walls.
- D. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, to appropriate Sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Install manufactured items in accordance with manufacturer's printed instructions.
- C. Allow for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Field weld components indicated on shop drawings.
- E. Perform field welding in accordance with AWS D1.1 for structural steel and AWS D1.3 for sheet steel.
- F. Obtain Architect's acceptance prior to site cutting or making adjustments not scheduled.
- G. After erection, prime welds, abrasions and surfaces not shop primed, except surfaces to be in contact with concrete.
- H. Install safety nosing on treads in accordance with manufacturer's printed instructions and as indicated on Drawings. Accurately position and hold securely during placement of concrete. Terminate safety nosing as recommended by manufacturer.
- I. Post Setting in Concrete: Install support posts as indicated on Drawings.
 - 1. Cast-In Posts: Set cast-in support posts in concrete footing with smooth top, shaped to shed water. Protect portion of posts above footing from concrete splatter. Verify that posts are set plumb or at correct angle and are aligned and at correct height and spacing. Hold posts in position during placement and finishing operations until concrete is sufficiently cured.

2. Posts Set into Voids in Concrete: Form or core-drill holes for installing posts in concrete to depth recommended in writing by manufacturer of site furnishings and 3/4 inch larger than outside diameter of post. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions. In exterior locations top shall be smoothed and shaped to shed water.
3. Pipe Sleeves: Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with non-shrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions. In exterior locations, top shall be smoothed and shaped to shed water.

3.4 CLEANING

- A. Inspect components after completing installation. Remove dirt and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION

SECTION 05 51 00

METAL STAIRS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Steel stair frame of structural sections.
- B. Treads, landings, and closed risers.
- C. Railing assemblies.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 05 12 00 – Structural Steel Framing.
- C. Section 05 50 00 – Metal Fabrications: Railing assemblies and stair nosings.
- D. Section 09 91 00 – Painting.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
 - 2. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 4. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 - 5. AWS A2.0 – Standard Welding Symbols.
 - 6. AWS D1.1 – Structural Welding Code – Steel.
 - 7. SSPC-Paint 20 – Zinc-Rich Coating, Type I-Inorganic and Type II-Organic.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.

- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, accessories and interfaces with adjacent building elements.
 - 1. Include erection drawings, elevations and details where applicable.
 - 2. Indicate welded connections using standard AWS A2.0 welding symbols. Indicate net weld length.
 - 3. Stair fabricator shall not add any structural elements to the stair that would affect the design of adjacent building elements.
- C. Templates: Furnish templates and other devices as necessary for presetting bolts and anchors to accurate conditions.
- D. Descriptive Data: Submit complete data for manufactured items.

1.5 QUALITY ASSURANCE

- A. Conform to CBC Chapters 17 and 22.
 - 1. Materials:
 - a. Structural Steel, Cold Formed Steel as per CBC Section 2205.
 - b. Material Identification as per CBC Section 2203.1.
 - 2. Inspection and Tests:
 - a. Test of High Strength Bolts, Nuts, Washers as per CBC Section 2212.6.1.
 - b. Welding Inspection as per CBC Section 1705.2.2.1.
 - c. High Strength Bolt Inspection as per CBC Section 1705A.2.1 and Table 1705A.2.1.
 - d. Non-Destructive Weld Testing as per CBC Section 1705.12.2.

1.6 QUALIFICATIONS

- A. Fabricator/Installer: For the fabrication and installation of steel stairs, use only personnel who are trained and experienced in the products involved and in the recommended methods for their installation.
- B. Welders' Certificates: Submit under provisions of Division 01, certifying welders employed on the Work, verifying AWS qualification within the previous twelve months.

1.7 FIELD MEASUREMENTS

- A. Take field measurements prior to the preparation of shop drawings and fabrication where possible.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Coordinate all fabrication and delivery of steel stairs with all related trades to permit stair installation into the structure without delay.
- B. Deliver all parts ready for erection; store on clean concrete surface or raised platforms under cover.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces: For fabrication of steel stair work which will be exposed to view, use only materials which are smooth and free of surface blemishes including pitting, seam marks, roller marks, rolled trade names and roughness. Remove blemishes by grinding and/or welding and grinding prior to cleaning, treating and application of surface finish.
- B. Structural Steel Plates, Shapes and Bars: ASTM A36/A36M.
- C. Hot-Rolled Carbon Steel Sheets and Strips: ASTM A1011/A1011M.
- D. Sheet Steel: ASTM A653/A653M, Grade B Structural Quality.
- E. Steel Pipe: ASTM A53/A53M, Type S, Grade A and ASTM A500 Grade B.
- F. Hollow Structural Sections: ASTM A500 Grade B.
- G. Welding Materials: AWS D1.1, type required for materials being welded.
- H. Bolts, Nuts and Washers: Manufacturer's standard.
- A. Steel Shop and Touch-Up Primer: Ferrous metal primers as specified in Section 09 91 00 or accepted equal.

2.2 FABRICATION

- A. Size members as required for job conditions. Fit and shop assemble in largest practical sections, for delivery to site.
- B. Stringers and Headers: Minimum 7 gauge steel plate.
- C. Treads:
 - 1. Interior Locations: Provide 14 gauge minimum structural steel form to receive concrete fill as specified in Section 03 30 00. Provide support/retainer with steel angles side-supported brackets shop welded to stringers.
 - 2. Exterior Locations: Provide galvanized steel grip strut treads.
- D. Metal Risers:
 - 1. 11 gauge perforated steel plate with 3/4 inch diameter holes at 1 inch staggered centers as manufactured by McNichols or accepted equal.
 - 2. Finishes:
 - a. Interior Locations: Paint finish under provisions of Section 09 91 00.
 - b. Exterior Locations: Galvanized.
- E. Landings: Construct platforms of loose structural steel channel side-supported headers and miscellaneous framing members independent of stair stringers as shown.
 - 1. Interior Locations: Provide minimum 14 gauge steel sub-deck complete with shop welded #5 reinforcing rods at 14 inches on center each way. Concrete fill as specified in Section 03 30 00.
 - 2. Exterior Locations: Provide galvanized steel grip strut planks.

- F. Form stringers with rolled steel channels, 12 inches deep minimum; prime paint finish.
- G. Fabricate stairs and landings with closed risers.
- H. Secure tread pans and grip strut treads to stringers with clip angles; welded in place.
- I. Form stringers with rolled steel channels, 12 inches deep; prime paint finish.
- J. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- K. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.
- L. Accurately form components required for anchorage of stairs and landings and railings to each other and to building structure.
- M. All stair fasteners shall be provided and installed by stair fabricator.
- N. Form work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to radius of approximately 1/32 inch. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- O. Weld corners and seams in accordance with recommendations of AWS. Grind these exposed welds to match and blend with adjoining surfaces.
- P. Join rails and corners by mitered and welded joints made by fitting top rail and intermediate rails in a unit and bracketed, or weld to posts as indicated. Butt railing splices and reinforce by a tight fitting interior sleeve. Plumb posts in each direction. Secure posts by welding direct to stair stringers.
- Q. Remove scale, rust and other deleterious materials before applying shop primer. Apply one shop coat of metal primer to all fabricated metal items.
- R. Clean surfaces of rust, scale, grease and foreign matter prior to finishing.
- S. Do not prime surfaces in direct contact with concrete or where field welding is required.
- T. Prime paint items with one coat of metal primer.
- U. Clean and strip primed steel items to bare metal where site welding is required.
- V. Fit and shop-assemble in largest practical sections, for delivery to site.
- W. Fabricate components with joints tightly fitted and secured.
- X. Continuously seal jointed pieces by continuous welds.
- Y. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush and hairline. Ease exposed edges to small uniform radius.

2.3 RAILING ASSEMBLIES

- A. Refer to Section 05 50 00.

- B. Wall Railings: Install with specified brackets spaced and anchored as indicated. Return handrails to wall. Provide welded steel end caps at returns.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.
- B. Beginning of installation means erector accepts existing conditions.
- C. Verify alignment with adjacent construction. Coordinate related work.

3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete and/or embedded in masonry with setting templates, to appropriate Sections.

3.3 INSTALLATION

- A. Erect stairs, landings and railings as shown on approved shop drawings, level and plumb, accurately fitted, free from distortion or defects detrimental to appearance or performance.
- B. Provide anchors, plates, angles, hangers and struts required for connecting stairs to structure.
- C. Allow for erection loads and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Field-weld components indicated on shop drawings. Perform field welding in accordance with AWS D1.1.
- E. Field-bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.
- F. Mechanically fasten joints butted tight, flush and hairline. Grind welds smooth and flush.
- G. Obtain Architect acceptance prior to site cutting or making adjustments not scheduled.
- H. After erection, prime welds, abrasions and surfaces not shop primed, except surfaces to be in contact with concrete and surfaces damaged during construction. Touch-up shall be with same paint as prime coat.
- I. Railings:
 - 1. Standing Railing: Position standing rail on stringers as indicated on Drawings and clamp in desired alignment. Finish weld railing posts and railing ends in place.
 - 2. Wall Railings: Install with specified brackets spaced and anchored as indicated on Drawings. Return handrails to wall.

3.4 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset from True Alignment: 1/4 inch.

END OF SECTION

DIVISION 06
WOOD, PLASTICS AND COMPOSITES

SECTION 06 16 00

SHEATHING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Structural wall sheathing.
- B. Exterior gypsum sheathing.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 07 21 00 – Thermal Insulation.
- C. Section 07 25 00 – Weather Barriers.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AATCC Test Method 127 – Water Resistance: Hydrostatic Pressure Test.
 - 2. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
 - 3. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 4. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
 - 5. ASTM C834 – Standard Specification for Latex Sealants.
 - 6. ASTM C954 – Standard Specification for Steel Drill Screws for the application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - 7. ASTM C1002 – Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
 - 8. ASTM C1177/C1177M – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

- 9. ASTM C1278 – Standard Specification for Fiber-Reinforced Gypsum Panel.
- 10. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- 11. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
- 12. ASTM F1667 – Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.
- 13. GA-253 – Application of Gypsum Sheathing.
- 14. UL Fire Resistance Directory.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01
- B. Product Data: Submit manufacturer's descriptive literature and product specification for each product.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum five years' experience.
 - 2. Installer Qualifications: Firm specializing in installing work specified in this Section acceptable to manufacturer with experience on at least five projects of similar nature in past three years.
- B. Regulatory Requirements: Comply with requirements of 2013 California Building Code (CBC).
 - 1. Fastener Requirements: Refer to Section 2304, Article 2304.9, "Connections and Fasteners," and Table 2304.9.1, "Fastening Schedule".
- C. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Storage and Protection:
 - 1. Store materials in a dry secure place; neatly stacked to prevent sagging or damage to edges, ends, and surfaces. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage.
 - 2. Stack panels flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

PART 2 PRODUCTS

2.1 STRUCTURAL WALL SHEATHING

A. Metal-Clad Gypsum Wall Sheathing (Shear Panels):

1. Construction: Exterior gypsum sheathing board laminated to sheet steel, galvanized.
 - a. Panel Size: As indicated on Drawings
 - b. Gypsum Sheathing: As specified in Section 09 29 00.
 - c. Steel Sheet: ASTM A653, Grade 33, 22 gauge, hot-dip galvanized.
2. Fasteners: As recommended by shear panel manufacturer. Fastener spacing as indicated on Drawings.
3. Basis-of-Design Product: Sure-Board® 200, by International Materials Inc., Costa Mesa, CA, www.sureboard.com and distributed by CEMCO, City of Industry, CA, 800-775-2362, www.cemcosteel.com, or accepted equal.

2.2 EXTERIOR GYPSUM SHEATHING

A. ASTM C1177/C1177M, glass mat-faced; or ASTM C1278/C1278M, fiber reinforced; water-resistant treated gypsum core; 5/8-inch thick Type X.

1. Acceptable Products:
 - a. DensGlass Fireguard Sheathing manufactured by GP-Gypsum,
 - b. SecuRock Sheathing manufactured by USG,
 - c. Gold Bond Brand e²XP Extended Exposure Sheathing manufactured by National Gypsum Co.,
 - d. or accepted equal.

2.3 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.

1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

B. Nails, Brads, and Staples: ASTM F1667.

C. Power-Driven Fasteners: NES NER-272.

D. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B117.

1. For steel framing less than 0.0329 inches thick, attach sheathing to comply with ASTM C1002.
2. For steel framing from 0.033 to 0.112 inches thick, attach sheathing to comply with ASTM C954.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sealant for Glass-Mat Gypsum Sheathing Board: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated, and complying with requirements for elastomeric sealants specified in Section 07 92 00 "Joint Sealants."
- B. Sealant for Glass-Mat Gypsum Sheathing Board: Silicone emulsion sealant complying with ASTM C834, compatible with sheathing tape and sheathing, and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.
- C. Sheathing Tape for Glass-Mat Gypsum Sheathing Board: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing board and with a history of successful in-service use.
- D. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions.
- B. Verify framing for acceptable placement, spacing, and tolerance (alignment and plumb).
- C. Verify that framing and furring are securely attached.
- D. Verify that all blocking, headers, and supports are in place to support plumbing fixtures, grab bars, towel racks, shelves, and similar items.
- E. Verify that insulation is secured.
- F. Verify that surfaces to be bonded with an adhesive are free of dust, dirt, grease, and any other foreign matter.
- G. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections.

- D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.3 SHEATHING INSTALLATION

- A. Install gypsum sheathing in accordance with GA-253 and manufacturer's instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
- B. Structural Wall Sheathing (Shear Panels): Install in accordance with panel manufacturer's printed instructions and as indicated on Drawings.
- C. End joints, if required, shall be offset; joints to fit snugly, and flashing to be installed around all openings.
- D. Install maximum lengths possible to minimize number of joints. Edge joints shall be located parallel to and with vertical orientation on framing. End joints of adjacent lengths of sheathing shall be staggered.
- E. Drive fasteners so as to bear tight against and flush with surface of sheathing. Do not countersink fasteners. Fasteners must be located at least 3/8 inch from edges and ends of sheathing panels.
- F. Do not leave exposed surfaces of gypsum sheathing unprotected beyond the manufacturer's recommendation without a weather barrier cladding.

3.4 SHEATHING JOINT-AND-PENETRATION TREATMENT

- A. Seal sheathing joints according to sheathing manufacturer's written instructions.
 - 1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient quantity of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
 - 2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing board joints, and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so that fasteners are completely covered. Seal other penetrations and openings.
 - 3. Apply sheathing tape to joints between foam-plastic sheathing panels and at items penetrating sheathing. Apply at upstanding flashing to overlap both flashing and sheathing.

3.5 TOLERANCES

- A. Maximum variation from true flatness: 1/4 inch in 10 feet in any direction.

3.6 CLEANING AND PROTECTION

- A. Cleaning and Repair: Clean surfaces that have been spotted or soiled during sheathing application.
- B. Defective Work: Remove and replace defective work that cannot be satisfactorily repaired, at the direction of Architect, at no cost to Owner.
- C. Protection: Protect installed work against damage from other construction work.
- D. Upon completion of the work of this Section, remove all surplus material, rubbish and debris from the premises and leave floors broom clean.

END OF SECTION

SECTION 06 20 00
FINISH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Finish Carpentry Items, Other Than Shop Fabricated Casework.
- B. Hardware and Attachment Accessories.

1.2 RELATED SECTIONS

- A. Section 09 22 16 – Non-Structural Metal Framing.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. WI/AWI Architectural Woodwork Standards, including Supplemental Text.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Shop drawings shall include details and erection data associated with the work of other trades; location; materials, species of wood; quality grade; type of finish; profiles, dimensions; fastenings and clearances. Detail drawings shall be either full size or 3 inches = 1 foot.
 - 1. The mill shall take and be responsible for all field measurements required for the proper fabrication and installation of the work. Show all field dimensions beyond control of mill.
 - a. Report any major discrepancy between the Drawings and the field dimensions to the Architect before fabrication of the work.
- C. Samples: Submit samples of all interior and exterior trim materials. Samples shall be finished as specified and submitted for color and material approval prior to delivery and installation.

1.5 QUALITY ASSURANCE

- A. Standards of Construction: All work shall be manufactured in accordance with WI/AWI Architectural Woodwork Standards, all supplements, and in the grades hereinafter specified.
- B. Installer's Qualifications: Use only journeymen finish carpenters who are thoroughly trained and experienced in the skills required for the cutting and fitting of trim and finish materials.

- C. Installation Acceptance: All rejected work shall be removed and replaced with no additional cost to the Owner.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Do not deliver to the job site until suitable storage space is available.
- B. Storage, Handling and Protection: Provide all work or materials necessary to store, cover and protect all materials specified to be furnished and installed under this Section. Store all materials under cover in a well-ventilated enclosure and protect against extreme changes in temperature and humidity. Avoid any marring and keep the materials clean during handling and installation operations. Protect exposed finish work and materials after their erection from damage of any character. Work damaged shall be repaired or replaced by the Contractor without additional cost to the Owner.

PART 2 PRODUCTS

2.1 MATERIALS

- A. All Material Grades and Construction shall be WI Custom Grade, including all supplements, unless specified or indicated otherwise. Semi-exposed and other components shall be as permitted by WI standards for construction quality specified herein except as otherwise detailed or specified. Moisture content shall be in accordance with WI/AWI Architectural Woodwork Standards.
- B. Architectural Wall Panel System: MAP System 30 (Architectural System 3) as manufactured by Marlite or accepted equal. System shall consist of the following components:
 - 1. Panels: Class II flamespread. Panels shall be 1/4 inch thickness by custom size as indicated on the Drawings.
 - a. High Pressure Plastic Laminate Finish: Refer to Drawings for manufacturers, products, and colors.
 - 2. Joinery: All edges shall be square cut with face edges beveled. All edges shall be sealed.
 - 3. Trim: 1/4 inch Narrow main rail and 1/4 inch Narrow cross spline horizontal and vertical aluminum channel reveals with horizontal edges square cut and vertical edges kerfed to accept cross splines. Shadowline decorative trim at perimeter conditions. All trim shall have a clear anodized finish.
- C. Interior Plywood:
 - 1. Plywood backing for electrical, telephone and similar types of wall mounted equipment shall be provided hereunder where required. Plywood shall be 3/4" thick A-C EXT-APA Douglas Fir with "A" face exposed.
- D. Adhesives:
 - 1. For Architectural Wall Surfacing System: Marlite C-109 or accepted equal.
 - 2. Adhesives shall meet VOC requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168; VOC not to exceed 50 g/L.

PART 3 EXECUTION

3.1 CONDITIONS OF SURFACES

- A. Examine all framing, grounds, stripping and blocking to secure finish carpentry and trim. Do not install finish carpentry and trim until all defects are corrected.

3.2 INSTALLATION

- A. Workmanship Quality: All wood finishes shall be installed level, plumb and true, with members neatly and accurately scribed in place. All trim shall be applied in lengths as long as practicable. Butt joints shall be beveled together, exterior angles mitered and interior angles coped, unless shown otherwise. All exposed nails and screws shall be set for putty unless indicated or specified otherwise.
- B. Architectural Wall Surfacing System: System shall be installed per manufacturer's recommendations and as follows:
 - 1. Provide a smooth, straight, solid and clean wall surface.
 - 2. Install system level, plumb and true.
 - 3. Verify with drawings the proper panel location and layout, and for treatment of all perimeter conditions.
 - 4. Install trim as shown and as required for a complete, finished system.

3.3 CLEAN-UP

- A. General: Keep the premises in a neat, safe and orderly condition at all times during execution of this portion of the work, free of accumulations of sawdust, cut-ends and debris.
- B. Clean-up: Upon completion of the work of this Section, remove all surplus materials, rubbish and debris from the premises and leave "broom clean."

END OF SECTION

SECTION 06 41 00
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Custom fabricated casework.
- B. Countertops.
- C. Cabinet hardware.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 05 40 00 – Cold-Formed Metal Framing.
- D. Section 07 92 00 – Joint Sealants.
- E. Section 09 22 16 – Non-Structural Metal Framing.
- F. Section 09 29 00 – Gypsum Board.
- G. Divisions 21-23 – Mechanical.
- H. Divisions 25-28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ANSI 135.4 – Basic Hardboard Standard.
 - 2. ANSI A208.1 – Particleboard Standard.
 - 3. ANSI A208.2 – Standard for Medium Density Fiberboard for Interior Applications.
 - 4. ANSI/BHMA 156.9 – Cabinet Hardware.
 - 5. ASTM D1037 – Standard Test Methods for Evaluating Properties of Wood-Base Fiber and Particle Panel Materials.
 - 6. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 7. NEMA LD3 – High-Pressure Decorative Laminates.

- 8. PS 1 – Construction and Industrial Plywood.
- 9. PS 20 – American Softwood Lumber Standard.
- 10. WI/AWI – Architectural Woodwork Standards, including WI Supplemental Text.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01. Begin fabrication only after required approvals have been obtained.
- B. Shop Drawings: Comply with Section 1 of WI/AWI Architectural Woodwork Standards – Basic Requirements for Architectural Millwork Shop Drawings. Submit as follows:
 - 1. Submit two copies of shop drawings (11 inch by 17 inch minimum size).
 - 2. Architect furnished Drawings indicate form and profile concept only. Submit shop drawings to illustrate Fabricator's understanding of Architect's Drawings and to show intended fabrication details. Photocopies, traced copies, or other reproduction of Architectural Drawings will not be acceptable.
 - 3. Prepare shop drawings using field verified dimensions. Report any major discrepancies between Architect's Drawings and field dimensions before work fabrication.
 - 4. Indicate casework conditions, identified with location, grade, type of finish, and wood species.
 - 5. Show casework in relation to adjacent construction with sectional drawings at full size or at 3 inch to 1 foot scale.
 - 6. Coordinate dimensions of built-in equipment and fixtures. Show casework hardware indicating brand name and model used.
 - 7. Show special accessory components not included in manufacturer's product data.
 - 8. Show anchoring and attachment method. Show seismic restraint in accordance with CBC. Show method of scribing.
 - 9. Furnish a WI Certified Compliance Label on shop drawings as specified in this Section.
- C. Samples: Submit finish samples as follows:
 - 1. Two 6 inch by 12 inch samples of each cut and species of lumber and plywood.
 - 2. Two 6 inch by 12 inch samples of each type of countertop finish.
 - 3. Two samples of each high pressure plastic laminate type and color specified.
 - 4. One sample of each type of cabinet hardware.
- D. Quality Assurance/Control Submittals: Submit the following in accordance with appropriate provisions of this Section:
 - 1. Manufacturer qualifications.
 - 2. Installer qualifications.
 - 3. WI Compliance Certification.

1.5 SYSTEM DESCRIPTION

- A. Casework design and construction shall be in accordance with WI/AWI Architectural Woodwork Standards as follows:
1. Grade: Custom.
 2. Construction Style: A – Frameless.
 3. Construction Type: Type I – Multiple Self Supporting Units.
 4. Door and Drawer Front Style: Flush overlay.
 5. Shelves: Conform to WI requirements subject to a fifty pounds per square foot uniformly spaced load not to exceed 200 pounds per shelf.
 6. Provide seismic anchorage in accordance with CBC.
 7. Non-housing casework will not be permitted.

1.6 QUALITY ASSURANCE

- A. Qualifications:
1. Fabricator/Installer Qualifications: Firm specializing in fabricating and installing products specified in this Section with a minimum five years experience. Fabricator/Installer shall be a WI Accredited Millwork Company.
- B. Certification Requirements:
1. WI Compliance Certification: Submit a certification stating that millwork products furnished and installed meet all the requirements of the WI Grade or Grades specified.
 2. WI Certified Compliance Label: Show WI Certified Compliance Label on the first page of each set of shop drawings.
 3. WI Certified Seismic Installation Program: Submit a certification stating that millwork products meet the seismic installation requirements in the State of California including, but not limited to, wall backing/blocking and fastener size, frequency, and location.
- C. Pre-Installation Meetings:
1. Conduct pre-installation meeting in accordance with Division 01.
 2. Convene pre-installation meeting prior to commencing work of this Section.
 3. Coordinate work in this Section with work in related Sections. Coordinate work with plumbing and electrical rough-in. Ensure orderly and efficient sequencing of installation of interdependent trades, construction elements, and include provisions for future work.

1.7 REGULATORY REQUIREMENTS

- A. Composite wood products shall comply with the requirements of 2013 California Green Building Standards Code Section 5.504.4.5 and Table 5.504.4.5.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver materials and manufactured products only when the area is ready for installation, broom clean, totally enclosed, and the relative humidity is fifty percent or less at 70 degrees F. Allow casework to acclimate to above conditions for 72 hours minimum prior to installation.

- C. Storage and Protection: Store materials in a dry secure place. Protect from weather, surface contaminants, construction traffic, and other potential damage.

1.9 MAINTENANCE DATA

- A. Submit in accordance with Division 01.
- B. Provide cleaning and maintenance information. Include hardware adjustment information.

PART 2 PRODUCTS

2.1 SPECIAL ENVIRONMENTAL REQUIREMENTS

- A. Provide composite wood products whose bonding agents contain no urea-formaldehyde.

2.2 LUMBER

- A. Lumber: Conform to PS 20; Premium Grade in accordance with WIAWI Architectural Woodwork Standards, Section 3. Dimensions as shown on Drawings. Properties as follows:
1. Moisture Content: Kiln dried; moisture content six percent to twelve percent.
 2. Wood Species:

Use	Species
Framing, internal construction.	Douglas Fir

2.3 WOOD BASED PANELS

- A. Formaldehyde emissions of wood-based panels shall not exceed limits established by the Department of Housing and Urban Development (HUD) and 24 CFR, Section 3208.308. Products containing urea-formaldehyde resins shall not be allowed.
- B. Softwood Plywood: Veneer-core plywood; conforming to PS 1, Exposure 1, Grade A-A, Group 1. Nominal thickness shall be as indicated in this Section and as shown on Drawings.
- C. Particleboard: Meets or exceeds ANSI A208.1, Class M-2, minimum 45 pounds per cubic foot density. At wet areas, meet moisture resistant specifications for ANSI MR-10 per ASTM D1037 for 24 hour water absorption.
1. Product: FreeForm as manufactured by Collins Pine or accepted equal.
- D. Medium Density Fiberboard (MDF): Meets or exceeds ANSI A208.2, Class SDF, minimum 45 pounds per cubic foot density. At wet areas, meet moisture resistant specifications for ANSI Grade 130 MR-50 per ASTM D1037 for 24 hour water absorption.
1. Products:
 - a. Standard MDF: Medite II as manufactured by Sierra Pine or accepted equal.
 - b. Moisture-Resistant MDF: Medex as manufactured by Sierra Pine or accepted equal.
- E. Hardboard: ANSI 135.4, Class 1 – Tempered; smooth-one-side (S1S), minimum sixty pounds per cubic foot density.

- F. Thermally Fused Melamine: Thermoset decorative overlays pre-laminated to substrate (hardboard, particleboard, or MDF as specified in this Section) by thermal fusion; performance characteristics equal to a general purpose grade or liner grade high pressure laminate as per NEMA LD3.

2.4 PLASTIC LAMINATE

A. Manufacturers:

1. Acceptable Manufacturers:

- a. Wilsonart International, Temple, TX; 800-433-3222; www.wilsonart.com.
- b. Nevamar Decorative Surfaces, Odenton, MD; 800-638-4380; www.nevamar.com.
- c. Formica Corporation, Cincinnati, OH; 800-729-8956; www.formica.com.
- d. Pionite Decorative Surfaces, Auburn, ME; 800-746-6483; www.pionite.com.
- e. Lamin-Art, Inc., Schaumburg, IL; 847-860-4300, www.laminart.com.
- f. Abet Laminati, Richmond, CA; 510-478-1011; www.abetlaminati.com.

2. Substitutions: Under provisions of Division 01.

B. High-Pressure Decorative Laminates: NEMA LD3; grades and thickness as follows:

Use/Application	NEMA LD3 Grade	Min. Thickness
Horizontal surface where postforming is not required.	HGS or HGL	0.048 inch ± 0.005 inch
Exposed vertical surfaces of casework components where postforming is not required.	VGS	0.028 inch ± 0.004 inch
Cabinet liner.	CLS	0.020 inch
Backing sheet. Provide at backside of plastic laminated panel substrates to enhance dimensional stability where laminate finish is applied to only one surface.	BK	0.020 inch

C. Colors as indicated on Drawings.

2.5 SOLID SURFACING

A. Manufacturers and Products:

1. Acceptable Manufacturers and Products:

- a. Corian Solid Surfaces / DuPont, Wilmington, DE; 800-426-7426, www.corian.com. Product: Corian.
- b. LG Hausys, Atlanta, GA; 678-486-8255, www.lgsurfaces.com. Product: Hi-Macs.
- c. Aristech Acrylics LLC, Belen, NM; 800-428-6648, www.avonite.com. Product: Avonite Solid Surfacing.
- d. Wilsonart International, Temple, TX; 800-433-3222, www.wilsonart.com. Product: Gibraltar Solid Surface.

2. Substitutions: Under provisions of Division 01.
- B. Solid Surfacing: Non-porous homogeneous blend of acrylic or polyester alloys and fillers creating a solid surfacing material. Color and pattern shall extend throughout the material.
 1. Thickness: 1/2 inch, unless otherwise indicated on Drawings.
 2. Color: As indicated on Drawings, if not indicated, to be selected by Architect from manufacturer's full range of colors.
- C. Solid Surfacing Accessories:
 1. Joint Adhesive: Manufacturer's standard two-part adhesive kit to create inconspicuous non-porous joints, with a chemical bond.
 2. Panel Adhesive: Manufacturer's standard neoprene-based panel adhesive.
 3. Sealant: Manufacturer's standard mildew resistant, FDA and UL recognized silicone sealant in color matching or clear formulations.

2.6 ACCESSORIES

- A. Edge Banding: PVC vinyl; 0.125 inch thick by 15/16 inch wide. Color and pattern shall closely match exposed door and drawer front laminate color and pattern as accepted by Architect.
- B. Vinyl Countertop Edge: PVC vinyl; 0.125 inch thick. Color and pattern shall closely match countertop laminate color and pattern as accepted by Architect.
- C. Fasteners: Nails, screws, and other fasteners of size and type best suitable for the purpose. Staples, screws or T-nails not permitted at exposed surfaces. Staples and nails not permitted in casework joinery.
- D. Adhesives, Caulks, and Sealants:
 1. Comply with provisions of Division 01. Adhesives shall meet VOC requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168. Sealants and fillers shall meet or exceed VOC limits of Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 51.
 2. Adhesives and sealants shall meet VOC requirements of local Air Quality Management District.
 3. Adhesives shall be selected for their ability to provide a durable, permanent bond and shall take into consideration such factors as materials to be bonded, expansion and contraction, bond strength, fire rating, and moisture resistance.
 4. Wood Joinery: CS 35-61 Type II (water-resistant). Shall withstand cold-soak tests specified in PS 51-71.
 5. Laminate Adhesive: Water-based contact adhesive, type recommended by plastic laminate manufacturer.
 6. Caulk: Clear, 100 percent silicone – use to fill voids and joints between laminated components and adjacent surfaces.
 7. Sealant: Mold and mildew resistant; type and composition recommended by substrate manufacturer to provide a moisture barrier at sink cutouts and other locations where unfinished substrate edges may be subjected to moisture.

2.7 CABINET HARDWARE

- A. Hardware shall be furnished and installed as required to provide for a complete and operable casework installation. All hardware shall conform to ANSI/BHMA 156.9 Grade 2, except where a higher grade is specified.
- B. Manufacturers:
1. Acceptable Manufacturers:
 - a. Accuride International, Inc., Santa Fe Springs, CA; 562-903-0200, www accuride.com.
 - b. Amerock Corp., Rockford, IL; 800-618-9559; www.amerock.com.
 - c. Blum Inc, Stanley, NC; 800-438-6788; www.blum.com.
 - d. Doug Mockett & Co., Inc., Manhattan Beach, CA; 800-523-1269, www.mockett.com.
 - e. EPCO – The Engineered Products Co., Flint, MI; 810-767-2050 www.epcohardware.com.
 - f. Grass America, Inc., Kernersville, NC; 800-334-3512, www.grassusa.com.
 - g. Häfele America Co., Archdale, NC; 336-889-2322, www.haefele.com.
 - h. Hettich America L.P., Alpharetta, GA; 800-438-8424, www.hettichamerica.com.
 - i. Knappe & Vogt Mfg. Co., Grand Rapids, MI; 800-253-1561, www.knappeandvogt.com.
 - j. National Cabinet Lock / CompX International Inc., Mauldin, SC; 864-297-6655, www.nclnet.com/ncl.html.
 - k. Olympus Lock, Inc., Seattle, WA; 800-525-0954, www.olympus-lock.com.
 - l. RPC – Rockford Process Control, Rockford, IL; 815-966-2000, www.rockfordprocess.com.
 - m. Terry Hinge & Hardware, Rockford, IL; 800-228-3779, www.terryhinge.com.
 2. Substitutions: Under provisions of Division 01.
- C. Overlay Institutional Hinges: ANSI/BHMA 156.9 Grade 1.
1. Five-knuckle type; 26D Dull Chrome finish. Products: RPC Part No. 456, Terry H08-99, Häfele Cat. No. 354.65.400, or accepted equal.
- D. Wire Pulls: 4 inch x 1-3/8 inch x 5/16 inch diameter steel handle; nickel matt finish. Product: Häfele Cat. No. 116.09.617, Epco Cat. No. MC401-4-DC, or accepted equal.
- E. Drawer Slides:
1. Pencil drawers: Full extension; steel ball bearings; hold-in detent; silenced in and out; low profile; 1/2 inch side space; minimum 50 pounds rated load. Product: Accuride Model No. 2632, Knappe & Vogt Model No. 8400, or accepted equal.
 2. Box drawers: Full extension; steel ball bearings; hold-in detent; progressive movement; 1/2 inch side space; 100 pounds rated load. Product: Accuride Model No. 3832, Knappe & Vogt Model No. 8405, or accepted equal.
 3. File drawers (up to 24 inches wide): Minimum 1 inch over travel; steel ball bearings; hold-in detent; progressive movement; 1/2 inch side space; 150 pounds rated load. Product: Accuride Model No. 4034, Knappe & Vogt Model No. 8505, or accepted equal.

- F. Adjustable Shelf Supports: ANSI/BHMA 156.9 Grade 1; nickel plated zinc die-cast shelf supports, 5 mm pin diameter with additional pin for shelf. Product: Hettich Sekura 6 Cat. No. 79707, Häfele Cat. No. 282.24.720, or accepted equal.
- G. Elbow Catch: Heavy duty solid brass. Product: Amerock Cat. No. B238-14A, Epco Part No. 1018-N, or accepted equal.
- H. Cabinet Locks:
 - 1. Single: Deadbolt locks with 90 degree turn; key removable in both locked and unlocked positions. Provide two keys per lock. Provide strike bars at doors and angle strikes at drawers. Cylinder lengths: 7/8 inch at doors and 1-3/8 inch at drawers. Finish: US26D, satin chrome. Products:
 - a. Doors: CompX National C8173, Olympus 100DR, or accepted equal.
 - b. Drawers: CompX National C8179, Olympus 200DW, or accepted equal.
 - 2. All casework locks and keying shall match facility's casework needs and keying system. Locks shall be keyed in groups per functional operations.
- I. Cable Grommets: 2-1/2 inch diameter plastic grommet; black color. Product: Doug Mockett & Co. Model EDP (flip-top tab), Häfele Cat. No. 429.99.324 (spring-loaded rotating segment in cover), or accepted equal.

2.8 FABRICATION

- A. Fabricate and assemble casework components at the shop site to the maximum extent possible. Construction and fabrication of cabinets and their components shall meet or exceed WI grade requirements as indicated in this Section.
- B. Closely fit casework at site. Provide filler inserts and trim where necessary, scribe for a tight fit.
- C. Provide cutouts for inserts, grommets, and fittings. Install grommets where indicated on the drawings after site verification of locations and dimensions. Seal surfaces of cut edges.
- D. Plastic Laminates:
 - 1. Apply plastic laminate in full uninterrupted sheets, consistent with manufactured sizes.
 - 2. Fit corners and joints hairline. Slightly bevel arises.
 - 3. Secure plastic laminated panels with concealed fasteners.
 - 4. Apply laminate backing sheets to reverse side of panels with high-pressure decorative laminates on one face.

E. Sheet Materials Application:

Use/Application	Thickness	Wood-Based Panel
Casework carcass.	Min. 3/4 inch	Plywood, Particleboard, or MDF
Doors and drawer false fronts.	3/4 inch	Particleboard or MDF
Drawer box. Sides, backs, and subfronts. Bottom.	Min. 1/2 inch, Max. 5/8 inch	Plywood, Particleboard, or MDF
	Min. 1/4 inch	Hardboard or MDF
Cabinet backs.	Min. 1/4 inch	Hardboard or MDF
Laminate clad countertops.	Min. 3/4 inch	Plywood, Particleboard, or MDF
Shelves: up to 32 inch span.	Min. 3/4 inch	Plywood, Particleboard, or MDF
Shelves: 32 inch up to 49 inch span.	Min. 1 inch	Plywood

F. Casework Carcass:

1. Glue frame components together. Brace top corners, bottom corners and cabinet bottoms with hardwood blocks, or metal or plastic braces.
2. Joinery Method: Acceptable joinery methods shall be as follows:
 - a. Tops, exposed ends, and bottoms:
 - 1) Steel European assembly fasteners 1-1/2 inch from end, 5 inches on center. Fasteners shall not be visible on exposed parts.
 - 2) Doweled and glued under pressure – approximately four dowels per 12 inches of joint.
 - 3) Stop dado, glued under pressure, and either nailed or screwed. Fasteners shall not be visible on exposed parts.
 - 4) Spline or biscuit and glued under pressure.
 - b. Cabinet backs (wall hung cabinets):
 - 1) Wall hung cabinet backs must not be relied upon to support the full weight of the cabinet and its anticipated load for hanging/mounting purposes. Method of back joinery and hanging/mounting mechanism should transfer the load to case body members.
 - 2) Fabrication method: Full bound, capture in grooves on cabinet sides, top, and bottom. Cabinet backs for floor standing cabinets shall be side bound, captured in grooves, glued and fastened to top and bottom.

G. Drawer Assembly:

1. Drawer box with drawer false front.

2. Acceptable joinery methods:
 - a. Multiple dovetail (all corners) or French dovetail front/dadoed back, glued under pressure.
 - b. Doweled, glued under pressure.
 - c. Lock shoulder, glued and pin nailed.
 - d. Bottoms shall be set into sides, front, and back, 1/4 inch deep groove, with a minimum 3/8 inch standing shoulder.
3. File Drawers: Unless otherwise indicated, direction of file folders shall be parallel to drawer door. Provide adequate, clear inside dimensions for hanging file folders. Minimum clear inside drawer dimensions shall be as follows:
 - a. Letter size file folders: Minimum 13-1/4 inch wide by 10-1/2 inch high.
 - b. Legal size file folders: Minimum 16-1/4 inch wide by 10-1/2 inch high.

H. Shelving:

1. Fixed shelves: Dadoed or doweled into cabinet sides.
2. Adjustable shelves: 0.197 inch bore holes at 1-1/4 inch on center.

I. Laminate Countertops and Backsplash:

1. Edge Style: As indicated on Drawings.
2. Mechanically fasten back splash to countertops at minimum 16 inches on center.
3. Substrate shall be moisture-resistant where countertops receive sinks, lavatories, or are subject to liquids.

2.9 FINISH

A. Finish – Laminated Casework:

1. Drawer box: Thermally fused melamine.
2. Semi-exposed surfaces, as defined in WI/AWI Architectural Woodwork Standards Section 10:
 - a. Cabinet with doors: Thermally fused melamine.
 - b. Cabinets with open shelves: High-pressure decorative laminate.
3. Exposed surfaces, as defined in WI/AWI Architectural Woodwork Standards Section 10: High-pressure decorative laminate with PVC edge banding.
4. Doors and drawer false fronts: High-pressure decorative laminate with PVC edge banding.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify field measurements, dimensions, location and layout.
- B. Verify location and sizes of utility rough-in associated with work of this Section.
- C. Verify adequacy of backing and support framing.

- D. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Install in accordance with accepted shop drawings and with applicable WI grade requirements as indicated in this Section.
- B. Install fabricated assemblies, level, plumb, square, and true to line, in locations as shown on Drawings. Attach and anchor securely to the floor and walls with mechanical fasteners appropriate for the substrate.
- C. Use concealed fasteners to attach and secure casework components, countertops, and plumbing fixtures.
- D. Carefully scribe casework abutting other components with a maximum gap of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Install solid surfacing per manufacturer's instructions.
- F. Install cable grommets in countertops at all casework knee-spaces and where shown on Drawings.

3.3 ADJUSTING

- A. Adjust moving or operating parts for smooth, uniform operation.
- B. Drawer slides shall be adjusted such that the drawer does not act as the stop.

3.4 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction.

END OF SECTION

DIVISION 07
THERMAL AND MOISTURE PROTECTION

SECTION 07 13 26

SELF-ADHERING SHEET WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Self-adhesive elastomeric sheet membrane waterproofing for:
 - 1. Installation at below grade vertical and horizontal surfaces.
 - a. Drainage composite and protection board.
- B. Accessories.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM C836 – Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.
 - 2. ASTM D412 – Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - 3. ASTM D570 – Standard Test Method for Water Absorption of Plastics.
 - 4. ASTM D882 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 5. ASTM D903 – Standard Test Method for Peel or Stripping Strength of Adhesive Bonds.
 - 6. ASTM D1876 – Standard Test Method for Peel Resistance of Adhesives.
 - 7. ASTM D3767 – Standard Practice for Rubber-Measurement of Dimensions.
 - 8. ASTM D5385 – Standard Test Method for Hydrostatic Pressure Resistance of Waterproofing Membranes.
 - 9. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
 - 10. ASTM D6135 – Standard Practice for Application of Self-Adhering Modified Bituminous Waterproofing.

11. ASTM G90 – Standard Practice for Performing Accelerated Outdoor Weathering of Nonmetallic Materials using Concentrated Natural Sunlight - EMMAqua test.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Samples: Samples of materials or a written statement shall be submitted to the Architect within thirty days after the award of contract outlining the waterproofing system materials to be used.
- C. Manufacturer's Instructions: Furnish manufacturer's printed instructions for the installation of membranes, including procedures and materials for splicing and bonding.
- D. Certificates: Submit manufacturer's certificate of compliance.

1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Application shall be done only by an application firm normally engaged in this business and approved by the material manufacturers. All work shall be performed by qualified applicators working under an experienced supervisor.
- B. Manufacturer's Representation During Installation: A qualified representative of the membrane manufacturer shall be present periodically during the work on the waterproof membrane system to assure compliance with the specifications and recommendations of the manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to the job site in original unbroken packages bearing the manufacturer's label. Material shall be stored above the ground in a dry location. Containers shall be stored in such a manner as to prevent damage.
- B. Cover materials and store in dry condition between temperatures of 40 degrees F and 90 degrees F. Install within one year of date of manufacture. Do not store at elevated temperatures which will reduce the shelf life of the product.

1.7 JOB AND ENVIRONMENTAL CONDITIONS

- A. Job Conditions: The Membrane Waterproofing Contractor shall acquaint himself with all conditions, general construction methods, and sequence to be employed. No extras will be permitted for his failure to do so.
- B. Environmental Conditions:
 - 1. Temperature: Surface temperature shall not be higher than 90 degrees F and no lower than 40 degrees F during application of membrane.
 - 2. Weather: Do not apply during periods of precipitation or when rain is expected for period of application, and for at least three hours following application.
 - 3. Ventilation: Provide positive ventilation to all areas not subject to natural ventilation during application and curing periods.

1.8 WARRANTY

- A. Membrane waterproofing shall be warrantied for two years from the date of filing Notice of Completion against all defects in materials and workmanship. Warranty shall also cover damage due to leaks, defective materials, and installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Grace Construction Products, Products:
 - 1. Below Grade Vertical Surfaces: Bituthene 3000.
 - 2. Below Grade Horizontal Surfaces: Preprufe 300R Plus.
 - 3. Primer: WB Primer.
- B. Carlisle. Product:
 - 1. Below Grade Vertical Surfaces: CCW MiraDRI 860/861.
- C. W. R. Meadows. Product:
 - 1. Below Grade Vertical Surfaces: MEL-ROL.
- D. Substitutions: Under provisions of Division 01.

2.2 MATERIALS – BELOW GRADE VERTICAL SURFACES

- A. Elastic Sheet Membrane Waterproofing: 1.5 mm thick composite of rubberized asphalt and cross-laminated high density polyethylene carrier film.
- B. Surface Conditioner: Water based latex surface treatment, V.O.C. compliant.
- C. Cant Strips: Formed from Bituthene Liquid Membrane.
- D. Protection Board: 1/4 inch thick, bitumen and mineral core between two reinforcing liners as manufactured by Grace Construction Products or accepted equal.
- E. Protection Board Adhesive: Bituthene protection board adhesive, fast-drying rubber-based cement.
- F. Prefabricated Drainage Composite: Hydroduct 220 for vertical applications as manufactured by Grace Construction Products or accepted equal.
- G. Mastic Joint Sealant: Bituthene mastic, black rubberized asphalt mastic.
- H. Adhesive Tape: Bitustik Tape; aggressive two-sided adhesive tape used for adhering prefabricated drainage composites to waterproofing membranes.

2.3 MATERIALS – BELOW GRADE HORIZONTAL SURFACES

- A. Elastic Sheet Membrane Waterproofing: 1.2 mm thick multilayered composite of heavy duty HDPE film, synthetic pressure sensitive adhesive, weather-resistant protective coating, and an adhesive-to-adhesive seam overlap.

- B. Accessories: Membrane manufacturer's tape and liquid membrane specifically designed for use with horizontal waterproofing membrane.

PART 3 EXECUTION

3.1 INSPECTION

- A. Examine surfaces to receive membrane waterproofing to assure that they are smooth, dry and free of foreign material, moisture and unevenness which would prevent the execution and quality of application of the membrane waterproofing as specified.
- B. Do not proceed with application of waterproofing systems until defects are corrected.
- C. Verify that the joints at concrete masonry walls scheduled to receive sheet waterproofing are struck flush.

3.2 PREPARATION OF SURFACES - GENERAL

- A. Surfaces shall be dry, clean, smooth and free from projections or holes that may cause puncture of membrane. Substrate shall be absolutely surface dry for proper adhesion of membrane. Minimum curing time for concrete shall be seven days prior to membrane installation.
- B. Cleaning: Clean surfaces to remove all curing compounds, loose dirt, moisture, grease, dust and other foreign material. Sweep or vacuum surface clean prior to membrane installation.

3.3 PREPARATION OF BELOW GRADE VERTICAL SURFACES

- A. Concrete Construction Joints and Wall Cracks Over 1/16 Inch in Width: Fill with joint filler and sealant as required.
 - 1. Prestrip all wall cracks over 1/16 inch wide and all construction and control joints with 12 inch wide sheet membrane strip.
 - 2. Fill form tie rod holes with concrete and finish flush with surrounding surface.
 - 3. Repair bugholes over 1/2 inch in length and 1/4 inch deep and finish flush with surrounding surface.
 - 4. Remove scaling to sound, unaffected concrete and repair exposed area.
 - 5. Grind irregular construction joints to suitable flush surface.

3.4 PREPARATION OF BELOW GRADE HORIZONTAL SURFACES

- A. Substrate shall be regular and smooth with no gaps or voids greater than 1/2 inch.
- B. Substrate shall be free of loose aggregate and sharp projections.
- C. Remove any standing water.

3.5 APPLICATION OF PRIMER

- A. Apply primer over concrete masonry substrate per manufacturer's recommendations.
- B. Allow primer to fully dry prior to start of membrane installation.

3.6 APPLICATION OF MEMBRANE AT BELOW GRADE VERTICAL SURFACES

- A. Install membrane per ASTM D6135 and manufacturer's recommendations.
 - 1. Apply surface conditioner at rate recommended by manufacturer. Recoat areas not waterproofed if contaminated by dust. Mask and protect adjoining exposed finish surfaces to protect those surfaces from excessive application of surface conditioner.
 - 2. Delay application of membrane until surface conditioner is completely dry. Dry time will vary with weather conditions.
 - 3. Seal daily terminations with troweled bead of mastic.
 - 4. Install drainage composite, protection board, and related materials in accordance with manufacturer's recommendations.
 - 5. The waterproofing membrane shall be covered as soon as possible after installation.

3.7 APPLICATION OF MEMBRANE AT BELOW GRADE HORIZONTAL SURFACES

- A. Install membrane per ASTM D6135 and manufacturer's recommendations.
 - 1. Place the membrane HDPE film side to the prepared soil, with the clear plastic release liner facing towards the concrete pour.
 - 2. End laps shall be staggered to avoid a build-up of layers. Leave plastic release liner in position until overlap procedure is completed.
 - 3. Accurately position succeeding sheets to overlap the previous sheet 3 inches along the marked, self-adhesive selvedge. Ensure the underside of the succeeding sheet is clean, dry, and free from contamination before attempting to overlap. Peel back the plastic release liner from between the overlaps as the two layers are bonded together. Ensure a continuous bond is achieved without creases and roll firmly with a heavy roller.
 - 4. Overlap the ends of the membrane 3 inches and remove the release liner from both sheets. Apply tape centered over the end lap and edges of membrane not sealed by selvedge. Roll firmly with a heavy roller to form a tight seal. Remove release liner from tape.
 - 5. Completely remove the plastic liner to expose the protective coating.

3.8 CLEAN-UP

- A. At the completion of the work of this Section, all surfaces and areas adjoining the membrane shall be left in a clean condition. All cartons, pails and equipment shall be removed from the premises.
- B. Clean any stains on materials that would be exposed in the completed work.

END OF SECTION

SECTION 07 19 19
SILICONE WATER REPELLENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Room temperature vulcanizing (RTV) silicone rubber water repellent and anti-graffiti coatings.

1.2 RELATED SECTIONS

- A. Section 03 45 00 – Precast Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM C793 – Standard Test Method for Effects of Laboratory Accelerated Weathering on Elastomeric Joint Sealants.
 - 2. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
 - 3. ASTM D746 – Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
 - 4. ASTM D2240 – Standard Test Method for Rubber Property – Durometer Hardness.
 - 5. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit the following:
 - 1. Manufacturer's descriptive literature and product data sheets.
 - 2. MSDS.
- C. Quality Assurance/Control Submittals:
 - 1. Submit manufacturer qualifications information.
 - 2. Submit applicator qualifications information.
 - 3. VOC content limits certification.
 - 4. Provide narrative description of protection of surrounding areas and non-masonry/concrete surfaces, surface preparation, application, and final cleaning.

5. Manufacturer's application instructions.
6. Manufacturer's field reports.

D. Closeout Submittals:

1. Manufacturer's warranty certificate.
2. Cleaning and maintenance data.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum ten years experience.
2. Applicator Qualifications: Firm specializing in installing work specified in this Section acceptable to manufacturer with experience on at least five projects of similar nature in the past three years of similar nature. Provide a complete list of completed projects, including project name and location, names of Owner and Architect including contact information, and description of products, substrates, and method of application.

B. Regulatory Requirements:

1. Comply with the local Air Quality Management District's (AQMD) rules and regulations.
2. Provide products that meet requirements of local AQMDs for volatile organic compounds (VOC).

C. Certifications:

1. VOC Content Limits Certification: Submit certification that coating product complies with local air quality management district's regulations and prescribed requirements for volatile organic compounds (VOC).

D. Field Sample (Test Panel):

1. Before full-scale application, review manufacturer's product data sheets to determine the suitability of each product for the specific surfaces. Apply coating to test panels to determine appropriate strength, coverage rates, compatibility, effectiveness, surface preparation, application procedures and desired results.
2. Apply coating to test panels as directed by Architect, minimum 48 inches wide by 48 inches high for each type of substrate, in accordance with manufacturer's written instructions. Allow 24 hours or until panels are thoroughly cured before evaluating final appearance and results. Do not begin full-scale application until test panels are reviewed and accepted by the Architect.
3. Allow coating to cure at least seven days prior to testing using low-pressure tube test (RILEM) or masonry absorption test (MAT) methods.

E. Tests:

1. Perform tests in accordance with Division 01.
2. Test Panel: Owner appointed testing laboratory shall perform tests on test panels using low-pressure tube test (RILEM) or masonry absorption test (MAT) methods.
3. Executed Work: Owner appointed testing laboratory shall perform two tests for each type of substrate on executed work at randomly selected areas designated by Architect.

4. Owner shall pay for these tests; however, retesting required because of non-conformance shall be paid for by the Contractor.

F. Pre-Installation Meetings:

1. Conduct pre-installation meeting in accordance with Division 01.
2. Convene pre-installation meeting prior to commencing work of this Section. Require attendance of parties directly affecting work of this Section including Contractor, Architect, applicator, and manufacturer's representative. Review environmental requirements, test panel procedures, protection of surrounding areas and non-masonry surfaces, surface preparation, application, field quality control, final cleaning, coordination with other work, and extended warranty requirements.
3. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Storage and Protection: Store containers in a cool, dry place. Keep away from sparks and open flame. Store and handle materials in accordance with manufacturer's written instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Temperature: Water repellent product may be applied at any temperature, providing that there is no frozen moisture present in the substrate. When applied at temperatures below 40 degrees F, the product may cure at a slower rate. Optimal ambient temperature for applying product is 40 degrees F to 95 degrees F.
- B. Do not apply material if the substrate is wet or contains frozen moisture. Allow substrate to dry for a minimum of 48 hours after rain or power washing.
- C. Do not apply material during inclement weather or if precipitation is expected within 12 hours.
- D. Do not use spray methods of application under windy conditions.

1.8 WARRANTY

- A. Comply with provisions of Division 01.
- B. Provide manufacturer's extended warranty – Five years horizontal and ten years vertical warranty.
- C. Prior to applying coating, review and comply with manufacturer's warranty processing requirements – do not proceed until warranty processing requirements have been met.

1.9 OPERATIONS AND MAINTENANCE DATA

- A. Submit under provisions of Division 01.
- B. Provide cleaning and maintenance data.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products:

1. Professional Products of Kansas, Inc., Wichita, KS 67216; toll free: 800.676.7346; phone: 316.522.9300; fax: 316.522.9346; URL: <http://www.watersealant.com> . Products:
 - a. Professional Water Sealant Super Strength (15 percent Silicone Rubber). Provide one coat where water repellent coating is required and two coats where anti-graffiti coating is required. Refer to Drawings for locations.
2. or accepted equal.

B. Substitutions: Under provisions of Division 01.

2.2 WATER REPELLENT/ANTI-GRAFFITI COATING

A. Penetrating sealer formulated using RTV silicone rubber. Penetrates without altering the natural appearance of the substrate. Inorganic; not affected by ultraviolet rays, ozone, salt spray, and acid rain. Breathable; allows moisture-vapor to escape while preventing liquid penetration. Flexible; bridges hairline cracks and allows for building movement.

B. Properties:

1. Perm Rate (ASTM E96, Method B): 7.06.
2. Durometer Hardness (ASTM D2240, Shore A): 27.
3. Tensile Strength (ASTM D412): 320 MPa.
4. Elongation (ASTM D412): 400 percent.
5. Brittle Point (ASTM D746): -100 degrees F.
6. Accelerated Weathering (ASTM C793): No change after 4000 hours.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate conditions to determine that conditions are acceptable to receive coating. Verify the following:

1. The required joint sealants have been installed.
2. Masonry and mortar has cured a minimum of 28 days.
3. Surface to be treated is clean, dry, and contains no frozen moisture.
4. Environmental conditions are appropriate for application.

B. Report unacceptable conditions to the Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 PREPARATION

A. Protection

1. Protect surrounding areas such as but not limited to glass, landscaping, building occupants, pedestrians, vehicles, and non-masonry surfaces during the work from contact with coatings.
2. Take special precautions to prohibit fumes from entering the building being treated. Cover and turn-off ventilation systems and fresh air intakes.

B. Surface Preparation

1. Clean all dirt, oil, grease, mold, mildew, efflorescence, or any other coating or material from surfaces that could interfere with penetration, performance, adhesion, or aesthetics of coatings per coating manufacturer's recommendations. Allow surfaces to dry completely before application of coatings.
2. Repair, patch, and fill all cracks, voids, defects, and damaged areas in surface as accepted by Architect. Allow repair materials to cure completely before application of coatings.
3. Seal all open joints.
4. Allow masonry and concrete surfaces to cure for a minimum of 28 days before application of coatings.

3.3 APPLICATION

- A. Apply coating to substrates in accordance with manufacturer's written instructions, environmental requirements, and application procedures determined from test panel results accepted by Architect.
- B. Apply to clean, dry, cured, and properly prepared surfaces.
- C. Apply coating after sealants have fully cured. Coordinate with Section 07 92 00.
- D. Apply material as shipped by manufacturer – do not dilute.
- E. Apply material using a high-volume, low pressure, pump-up sprayer (between 40-50 psi), with solvent resistant fittings, foam roller, or brush of natural bristle, or foam. Where anti-graffiti protection is required, allow first coat to dry to the touch before applying second coat.
 1. Vertical applications: apply in a flood coat, from top to bottom, being sure to obtain a 4 inch to 6 inch rundown of product from the point where the spray makes contact with the surface. Work all the way down the building covering the rundown as you go. Avoid excessive overlapping.
 2. Horizontal applications: If surface pooling or puddling occurs, back-roll, brush, or broom away excess material. Complete penetration must occur. Avoid excessive overlapping. Material curing on surface may cause whitening or slickness.

3.4 FIELD QUALITY CONTROL

- A. General: Comply with requirements of Division 01.
- B. Coating work shall be inspected by Owner's representative, Architect, Project Inspector, and manufacturer's representative; and compared with accepted test panel.

- C. Manufacturer's Field Services: Provide services of manufacturer's authorized field representative to verify specified products are used; protection, surface preparation, and application of water repellents are in accordance with manufacturer's written instructions; and the test panel is accepted by Architect.

3.5 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction.
- B. Upon completion of coating application, remove all equipment, materials and debris, leaving the area in an undamaged and acceptable condition. Dispose of coating containers according to state and local environmental regulations.
- C. Clean, repair, restore, or replace to the satisfaction of the Architect, all materials, landscaping, and all non-masonry surfaces damaged by exposure to coatings at no additional cost to Owner.

END OF SECTION

SECTION 07 21 00
THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Thermal insulation in exterior wall construction.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 09 29 00 – Gypsum Board.
- C. Section 09 81 00 – Acoustic Insulation.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM C665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 2. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation.
 - 3. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.
 - 5. UL 723 – Test for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide data on product characteristics, performance criteria, and limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed California Quality Standards.

1.5 SYSTEM DESCRIPTION

- A. Materials of this Section: Provide continuity of thermal barrier at building enclosure elements.

1.6 COORDINATION

- A. Coordinate work with other trades under provisions of Division 01.

PART 2 PRODUCTS

2.1 GLASS FIBER INSULATION

A. Acceptable Manufacturers:

1. EcoBatt by Knauf Insulation, Shelbyville, IN; 317-398-4434, www.knaufusa.com.
2. Owens-Corning, Toledo, OH; 800-438-7465, www.owenscorning.com.
3. Certainteed Corp., Insulation Group, Valley Forge, PA; 800-233-8990, www.certainteed.com.
4. Johns Manville, Denver, CO; 800-654-3103, www.specJM.com.
5. Thermafiber, Inc., Wabash, IN; 888-834-2371, www.thermafiber.com.
6. Substitutions: Under provisions of Division 01.

B. Batt Insulation: Preformed glass fiber batt in accordance with 2013 CBC Section 720, California Referenced Standards Code Chapter 12-13, ASTM E84, and UL 723, conforming to the following:

1. Facings:
 - a. Faced on one side with foil reinforced kraft (FSK) face; Type III, Class A per ASTM C665; flame spread 25 and smoke developed 50 per ASTM E84.
2. Provide formaldehyde-free thermal insulation products.
3. Recycled Content: Minimum 30 percent post-consumer.

C. Accessories:

1. Tape: Polyester self-adhering type, mesh reinforced, 2 inches wide.

PART 3 EXECUTION

3.1 EXAMINATION

- #### A. Verify existing site conditions.
- #### B. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.

3.2 INSTALLATION – BATT INSULATION.

- #### A. Install insulation in accordance with insulation manufacturer's instructions and with the flame spread rating and smoke density requirements of CBC Section 720, ASTM E84, and UL 723.
- #### B. Install in exterior walls full width, depth, and height of cavity, without gaps or voids. Do not compress insulation.
- #### C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- #### D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
- #### E. Install with factory applied vapor retarder membrane facing interior side of building spaces. Lap ends and side flanges of membrane over framing members.

- F. Securely fasten and anchor insulation in place to prevent displacement or sagging of material in all areas.
 - 1. At metal stud walls, the insulation shall be wired in place with two #14 spring steel wires, one within 12 inches of the top and one at the mid-point of each stud bay.
- G. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

END OF SECTION

SECTION 07 25 00
WEATHER BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Weather barrier membrane.
- B. Seam tape.
- C. Flexible flashings.
- D. Fasteners.
- E. Accessories.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 07 42 16 – Insulated-Core Metal Wall Panels.
- C. Section 08 11 13 – Hollow Metal Doors and Frames.
- D. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.
- E. Section 08 44 13 – Glazed Aluminum Curtain Walls.
- F. Section 08 91 19 – Fixed Louvers.
- G. Section 09 24 00 – Portland Cement Plastering.
- H. Section 09 29 00 – Gypsum Board: Mat-Faced Gypsum Sheathing.

1.3 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 - 2. ASTM C1193 – Standard Guide for Use of Joint Sealants.
 - 3. ASTM D882 – Test Method for Tensile Properties of Thin Plastic Sheeting.
 - 4. ASTM D1117 – Standard Guide for Evaluating Non-Woven Fabrics.
 - 5. ASTM E84 – Test Method for Surface Burning Characteristics of Building Materials.
 - 6. ASTM E96 – Test Method for Water Vapor Transmission of Materials.

7. ASTM E1677 – Specification for Air Retarder Material or System for Framed Building Walls.
8. ASTM E2178 – Test Method for Air Permeance of Building Materials.
9. ASTM E2357 – Test Method for Determining Air Leakage of Air Barrier Assemblies.
10. AATCC Test Method 127 – Water Resistance: Hydrostatic Pressure Test.
11. TAPPI Test Method T-410 – Grams of Paper and Paperboard (Weight per Unit Area).
12. TAPPI Test Method T-460 – Air Resistance of Paper (Gurley Hill Method).

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Submit manufacturer current technical literature for each component specified in this Section.
- C. Samples: Two each of weather barrier membrane and flashings, minimum 8-1/2 inches by 11 inch.
- D. Quality Assurance Submittals:
 1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with indicated requirements.
 2. Manufacturer Instructions: Provide manufacturer's written installation instructions and details.
 3. Manufacturer's Field Service Reports: Provide site reports from authorized field service representative, indicating observation of weather barrier assembly installation.
- E. Closeout Submittals:
 1. Submit under provisions of Division 01.
 2. Weather Barrier Warranty: Manufacturer's executed warranty form with authorized signatures and endorsements indicating date of Substantial Completion.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 1. Installer shall have experience with installation of specified weather barrier and flexible flashing assemblies under similar conditions.
 2. Installation shall be in accordance with weather barrier manufacturer's installation guidelines and recommendations.
- B. Single Source Responsibility: Provide building wrap, flashings, and accessory materials from a single manufacturer to ensure system compatibility and quality, and to comply with manufacturer's warranty requirements.
- C. Mock-up:
 1. Install mock-up using approved weather barrier assembly including fasteners, flashing, tape and related accessories per manufacturer's current printed instructions and recommendations.
 - a. Mock-up size: Ten feet by ten feet, including one window opening.

- b. Mock-up Substrate: Match wall assembly construction, including window opening.
- c. If acceptable, mock-up may remain as part of the work.
- 2. Contact manufacturer's designated representative prior to weather barrier assembly installation, to perform required mock-up visual inspection and analysis as required for warranty.

D. Pre-installation Meeting:

- 1. Conduct pre-installation meeting in accordance with provisions of Division 01.
- 2. Hold a pre-installation conference, two weeks prior to start of weather barrier installation. Attendees shall include Contractor, Architect, installer, Owner's Representative, and weather barrier manufacturer's designated representative.
- 3. Review all related project requirements and submittals, status of substrate work and preparation, areas of potential conflict and interface, availability of weather barrier assembly materials and components, installer's training requirements, equipment, facilities and scaffolding, and coordinate methods, procedures and sequencing requirements for full and proper installation, integration and protection.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, and handle products and materials under provisions of Division 01.
- B. Deliver weather barrier materials and components in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Store weather barrier materials as recommended by weather barrier manufacturer.

1.7 SCHEDULING

- A. Review requirements for sequencing of installation of weather barrier assembly with installation of windows, doors, louvers, and flashings to provide a weather-tight barrier assembly.
- B. Schedule installation of weather barrier materials and exterior cladding within nine months of weather barrier assembly installation.

1.8 WARRANTY

- A. Product and Labor Warranty: Weather barrier manufacturer shall warranty weather barrier assemblies for a period of ten years from date of Project Completion.
 - 1. Weather barrier manufacturer's approval for warranty is required prior to assembly installation.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Basis-of-Design Products: DuPont™ Building Innovations™; 4417 Lancaster Pike, Chestnut Run Plaza 728, Wilmington, DE 19805; 1.800.44TYVEK (8-9835); <http://construction.tyvek.com>.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Building Wrap: High-performance, flash spun-bonded olefin, non-woven, non-perforated, secondary weather barrier is based upon DuPont™ Tyvek® CommercialWrap D® and related assembly components or accepted equal.
- B. Performance Characteristics:
 - 1. Air Penetration Resistance: <0.04 cfm/ft² at 1.57 psf, when tested in accordance with ASTM E2357. Type 1 per ASTM E1677.
 - 2. Water Vapor Transmission: 30 perms, when tested in accordance with ASTM E96, Method B.
 - 3. Water Penetration Resistance: Minimum 235 cm when tested in accordance with AATCC Test Method 127.
 - 4. Basis Weight: Minimum 2.4 ounces per square yard, when tested in accordance with TAPPI Test Method T-410.
 - 5. Air Penetration Resistance: >750 seconds/100cc, when tested in accordance with TAPPI Test Method T-460.
 - 6. Breaking Strength: Minimum 33/41 lbs/in., when tested in accordance with ASTM D882.
 - 7. Tear Resistance: 6/9 pounds, when tested in accordance with ASTM D1117.
 - 8. Surface Burning Characteristics: Class A, when tested in accordance with ASTM E84. Flame Spread: 15, Smoke Developed: 25.

2.3 FLEXIBLE FLASHINGS

- A. DuPont™ FlexWrap™, as manufactured by DuPont™ Building Innovations™.
 - 1. Flexible membrane flashing materials for openings and penetrations.
- B. DuPont™ StraightFlash™, as manufactured by DuPont™ Building Innovations™.
 - 1. Straight flashing membrane materials for flashing window, door, and louver openings and sealing penetrations.

2.4 ACCESSORIES

- A. Seam Tape: DuPont™ Tyvek® Tape, three inches wide, as manufactured by DuPont™ Building Innovations™.
- B. Fasteners: Tyvek® Wrap Cap Screws, as manufactured by DuPont™ Building Innovations™.
 - 1. 1-5/8 inch rust resistant screw with 2-inch diameter plastic cap fasteners.
- C. Sealants:
 - 1. Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions. All sealants shall be VOC compliant.
 - 2. Acceptable Products:
 - a. Dow Corning® 756.
 - b. Tremco 830.
 - c. Tremco Butyl.

- d. Other sealants recommended by the weather barrier manufacturer.
- D. Adhesives:
 - 1. Provide adhesive recommended by weather barrier manufacturer. All adhesives shall be VOC compliant.
 - 2. Acceptable Products:
 - a. SIA 655.
 - b. Other adhesives recommend by the weather barrier manufacturer.
- E. Primers:
 - 1. Provide flashing manufacturer recommended primer to assist in adhesion between substrate and flashing. All primers shall be VOC compliant.
 - 2. Acceptable Products:
 - a. SIA 655.
 - b. Other primers recommended by the flashing manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrate and surface conditions are in accordance with weather barrier manufacturer recommended tolerances prior to installation of weather barrier and accessories.

3.2 INSTALLATION - WEATHER BARRIER

- A. Install weather barrier over exterior face of exterior wall substrate in accordance with manufacturer recommendations
- B. Install weather barrier prior to installation of windows, doors, louvers, and exterior cladding materials.
- C. Start weather barrier installation at a building corner, leaving 6 inches to 12 inches of weather barrier extended beyond corner to over lap.
- D. Install weather barrier in a horizontal manner starting at the lower portion of the wall surface with subsequent layers installed in a shingling manner to overlap lower layers. Maintain weather barrier plumb and level.
- E. Sill Plate Interface: Extend lower edge of weather barrier over sill plate interface 6 inches. Secure to foundation with elastomeric sealant as recommended by weather barrier manufacturer.
- F. Window, Door, and Louver Openings: Extend weather barrier completely over openings.
- G. Overlap weather barrier:
 - 1. Exterior Corners: Minimum 12 inches.
 - 2. Seams: Minimum 6 inches.

H. Weather Barrier Attachment:

1. Attach weather barrier to steel studs through exterior sheathing. Secure using weather barrier manufacturer recommend fasteners, space 6 inches to 18 inches vertically on center along stud line, and 24 inches on center, maximum horizontally.
- I. Apply 4 inch by 7 inch piece of DuPont™ StraightFlash™ to weather barrier membrane prior to the installation cladding anchors.

3.3 SEAMING

- A. Seal seams of weather barrier with seam tape at all vertical and horizontal overlapping seams.
- B. Seal any tears or cuts as recommended by weather barrier manufacturer.

3.4 OPENING PREPARATION

- A. Flush cut weather barrier at edge of sheathing around full perimeter of opening.
- B. Cut a head flap at 45-degree angle in the weather barrier at opening head to expose 8 inches of sheathing. Temporarily secure weather barrier flap away from sheathing with tape.

3.5 FLEXIBLE FLASHINGS

- A. Cut wide DuPont™ FlexWrap™ a minimum of 4 inches wider than stud depth and 12 inches longer than length of sill rough opening.
- B. Cover horizontal sill by aligning DuPont™ FlexWrap™ edge with inside edge of sill. Adhere to rough opening across sill and up jambs a minimum of 6 inches. Secure flashing tightly into corners by working in along the sill before adhering up the jambs.
- C. Fan DuPont™ FlexWrap™ at bottom corners onto face of wall. Firmly press in place. Mechanically fasten fanned edges.
- D. Apply 9 inch wide strips of DuPont™ StraightFlash™ at jambs. Align flashing with interior edge of jamb framing. Start StraightFlash™ at head of opening and lap sill flashing down to the sill.
- E. Spray-apply primer to top 6 inches of jambs and exposed sheathing.
- F. Install DuPont™ FlexWrap™ at opening head using same installation procedures used at sill. Overlap jamb flashing a minimum of 2 inches.
- G. Coordinate flashing with window, door, and louver installation.
- H. On exterior, install backer-rod in joint between window, door, and louver frames and flashed rough framing. Apply sealant at jambs and head, leaving sill unsealed. Apply sealants in accordance with sealant manufacturer's instructions and ASTM C1193.
- I. Position weather barrier head flap across head flashing. Adhere using 4 inch wide DuPont™ StraightFlash™ over the 45-degree seams.
- J. Tape top of opening in accordance with manufacturer recommendations.

- K. On interior, install backer rod in joint between frame of window, door, and louver, and flashed rough framing. Apply sealant around entire opening to create air seal. Apply sealant in accordance with sealant manufacturer's instructions and ASTM C1193.

3.6 FIELD QUALITY CONTROL

- A. Notify manufacturer's designated representative to obtain required periodic observations of weather barrier assembly installation.

3.7 PROTECTION

- A. Protect installed weather barrier from damage.

END OF SECTION

SECTION 07 26 50
VAPOR EMISSION CONTROL SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Vapor emission control system for application over concrete slabs indicated to receive finished floor coverings.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 09 65 00 – Resilient Flooring.
- C. Section 09 68 13 – Tile Carpeting.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - 2. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials, Wet Method net perm rate (grains h-1 ft-2 in Hg-1).
 - 3. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 4. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
 - 5. ASTM F2420 – Standard Test Method for Determining Relative Humidity on the Surface of Concrete Floor Slabs Using Relative Humidity Probe Measurement and Insulated Hood.
 - 6. ASTM F3010 – Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.

1.4 SUBMITTALS

- A. General: Submit under provisions of Division 01.
- B. Submittal Requirements: Submit product data, test reports, certificates, and manufacturer's standard warranty.

- C. Submit concrete slab relative humidity and pH test results, performed and certified by a qualified independent testing agency.
- D. Submit manufacturer's Certificate of Conformance stating that, per independent third party verification, the System installed on this project meets or exceeds all aspects of the standards set forth in ASTM F3010. Certificate shall be on manufacturer's letterhead and shall be signed by manufacturer.

1.5 DEFINITIONS

- A. The System: Vapor emission control system specified in this Section referred to as "System" or "the System" in this Section for brevity.

1.6 QUALITY ASSURANCE

A. Qualifications:

1. Installer Qualifications:

- a. Installer shall be either manufacturer's trained personnel; or manufacturer's factory-trained and certified installer.
- b. Installer shall have a minimum of five years experience in the installation of specified vapor emission control system and shall have worked on a minimum of five installations using the same system.

2. Manufacturer Qualifications:

- a. Minimum ten years experience in manufacturing water vapor emission control systems, specifically formulated and used for reducing water vapor emissions, and alkalinity control in concrete slabs, without change of system formulation for a minimum period of five years at the time of application.
- b. Experience in product application in similar projects requiring vapor emission control at new and existing concrete slabs.
 - 1) Similar projects shall have documented success of system being installed at in-situ relative humidity of 98 percent or greater, when tested according to ASTM F2170.
- c. Manufacturer shall provide independent laboratory test reports documenting performance of the System as follows:
 - 1) Water Vapor Transmission (Water Method), ASTM E96: Performance of the System shall be documented by an independent testing laboratory. Test net perm rate results shall not exceed 0.11 grains h-1 ft-2 in Hg-1.
 - 2) Alkalinity Test, ASTM D1308: Insensitivity to alkaline environment up to pH 14 in a 14-day test with no effect or degradation of sample.
- 3. Testing Agency Qualifications: Qualified and experienced independent testing agency or International Concrete Repair Institute (ICRI) accredited individual to perform relative humidity (RH) and pH tests, as specified in this Section.
- 4. System Qualifications: The System shall meet or exceed all aspects of the standards set forth in ASTM F3010.

- B. Environmental Requirements: The System shall meet applicable VOC requirements of authorities having jurisdiction at Project site.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to the job site in manufacturer's original unopened containers, clearly labeled with the manufacturer's name and brand designation.
- B. Store products in a ventilated dry area, protected from dampness, freezing, and direct sunlight. Products shall not be stored in areas with temperatures in excess of 90 degrees F or below 50 degrees F, or with humidity in excess of 80 percent.

1.8 SITE CONDITIONS

- A. Concrete Curing: The System shall be capable of being successfully installed on new concrete with a minimum curing period of seven days.
- B. Enclosures and Environmental Limitations:
 - 1. Prior to testing concrete slabs for vapor emission rates, building shall be fully enclosed, and weather-tight. Interior wet work shall be completed and nominally dry, and work above ceilings completed. Test sites shall be maintained at the same temperature and humidity expected during normal building use.
 - 2. Concrete slabs shall be fully protected, with no water accumulation on the surface.
 - 3. Do not apply the System when ambient temperature is lower than 50 degrees F or higher than 90 degrees F, or expected to fall below 50 degrees F or rise above 90 degrees F within 24 hours of the System application, or when ambient humidity level is above 80 percent. In addition, the surface temperature of the concrete shall be a minimum of 5 degrees F removed from dewpoint and rising.

1.9 WARRANTY

- A. Provide manufacturer's written warranty for the System, covering system materials, testing, surface preparation, and installation. Additionally, warranty shall cover the cost of cementitious underlayment and floor covering repair or replacement, as acceptable to Owner and Architect, including, but not limited to, removal work, surface preparation, underlayment, floor covering materials, primers, adhesives, and associated installation work.
 - 1. Warranty Period: Fifteen years, minimum, or the life of finished floor covering, whichever comes first.
 - 2. Replacement Cost: In the event of failure of the System during warranty period, manufacturer's warranty shall cover all costs for removal and replacement work including the System and floor covering, up to \$5,000,000 per occurrence.
- B. Manufacturer's warranty exclusion shall be limited to the following:
 - 1. System failure due to topical intrusion of water due to plumbing failure, or other substances entering from the surface.
 - 2. Seismic damage occurring after installation.
 - 3. Water intrusion including, but not limited to, plumbing or flooding leaks below the slab.
 - 4. Damage due to removal and demolition work necessitated by replacement of installed floor covering during warranty period.
- C. Warranty shall not exclude cracks visible at the time of installation or improper System installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Vapor Emission Control System:

1. Acceptable Manufacturers and Products:

- a. Koester American Corporation, Virginia Beach, VA; phone: 757-425-1206; www.koesterusa.com. Products:
 - 1) Vap I® 2000 Zero VOC.
 - 2) SL Premium Self Leveling Underlayment.
 - 3) SC skim coat finish.
 - 4) Vap 06 Primer.
- b. Ardex Engineered Cements, Aliquippa, PA; phone: 724-203-5000; www.ardex.com. Products:
 - 1) MC Rapid.
 - 2) Ardex cementitious underlayment products.
- c. Substitutions: Under provisions of Division 01.

B. Relative Humidity and pH Testing Supplies:

1. Provide digital RH meter by one of the following or accepted equal:
 - a. Rapid RH 4.0 Easy Reader with Smart Sensors by Wagner Electronics, Rogue River, OR; 800-634-9961, www.wagnermeters.com.
 - b. Hygromaster with HygroStik by GE Sensing, Goleta, CA; 800-472-6075, www.gesensing.com.
 - c. TotalCheck RH Tester by Delmhorst Instrument Co., Towaco, NJ; 877-335-6467, www.delmhorst.com.
 - d. Digital RH Meter: Relative Humidity Meter with probes and sleeves by American Moisture Test, Tustin, CA; 866-670-9700, americanmoisturetest.com.
2. Provide digital pH meter by one of the following or accepted equal:
 - a. Model PH100 ExStik® pH Meter by Extech Instruments Corporation, Nashua, NH; 877-239-8324, www.extech.com.
 - b. Model #PH100 by Taylor Tools, Denver, CO; 303-371-7667, www.taylortools.com.
 - c. AMT Concrete Digital Alkalinity-pH Meter by American Moisture Test, Tustin, CA; 866-670-9700, americanmoisturetest.com.
3. Substitutions: Under provisions of Division 01.

2.2 SYSTEM DESCRIPTION

- #### A. General: Vapor emission control system shall be warranted to control concrete slab relative humidity up to 100 percent as determined by:
1. Site conditions.
 2. Concrete mix design.
 3. Age of concrete substrate.
 4. Relative humidity in the concrete slab.

5. pH test results.
 6. Compatibility with finished floor covering products.
- B. System Performance: Installed system shall bring pH levels within the range of 8-9, as determined by pH testing, in one or two coats at all areas indicated to receive a finished floor covering or finish coating.
1. Water Vapor Transmission: ASTM E96 (Water Method); performance of the System shall be documented by an independent testing laboratory. Net perm rate results shall not exceed 0.11 grains h-1 ft-2 in Hg-1.
 2. Relative Humidity Testing: ASTM F2170; the System shall perform as specified with relative humidity test results of 100 percent or less.
 3. Alkaline Exposure Testing: ASTM D1308; insensitivity to alkaline environment up to pH 14 in a 14-day test.
 4. Certified acceptance of exposure to continuous topical water exposure after final curing of the System.
 5. Vapor emission control system shall be applied in one or two coats as required for full performance of System, and shall include a cementitious underlayment over the System for subsequent adhesion of floor covering.
- C. System Materials: Two-component epoxy resin system, 100 percent solids, zero VOCs, containing specifically formulated chemicals and resins to provide the characteristics and properties specified in this Section. Epoxy systems containing water are not allowed.
- D. Accessories: Concrete repair materials, underlayment, and primers used in conjunction with vapor emission control system shall be as recommended by or acceptable to the System manufacturer. Underlayment used over the System shall be acceptable to vapor emission control system, flooring adhesive, and floor covering manufacturers. Underlayment shall attain minimum 5,000 psi compressive strength at 28 days.

2.3 MIXING

- A. Use clean containers and mix System components thoroughly, in accordance with manufacturer's printed instructions, to obtain a homogeneous mixture.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements and for other conditions affecting performance of the System.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance.
- C. Do not begin installation of the System until minimum seven day concrete curing and drying period has passed, after unsatisfactory conditions have been corrected, and after surfaces are dry.

3.2 CONCRETE SLAB TESTING

- A. Testing Schedule: Testing shall be performed prior to application of the System.
 - 1. Conduct tests at the same temperature and humidity expected during normal facility use. If this is not possible, the test conditions shall be 75 degrees F \pm 10 degrees F and 50 percent \pm 10 percent relative humidity. Maintain these conditions 48 hours prior to and during tests.
 - 2. All relative humidity and pH test results shall be distributed to Contractor, Architect, and Owner.
- B. Pre-Installation Testing: Perform pre-installation testing of concrete slab using relative humidity and pH tests prior to surface preparation for application of the System. Testing shall be performed by ICRI certified independent testing personnel and testing agency.
- C. Installation contractor shall submit pre-installation checklist to the System manufacturer and written confirmation that the warranty will be enforced prior to beginning installation.
 - 1. Concrete Testing: At new concrete slabs, confirm that proposed concrete curing methods are acceptable to System manufacturer prior to beginning curing procedures. Silicate based curing compounds are not allowed.
 - 2. Relative Humidity Testing: Perform tests for relative humidity in the concrete slab per ASTM F2170. Perform three tests for the first 1,000 square feet and one test for each 1,000 square feet thereafter.
 - 3. pH Testing: Perform three pH tests for the first 1,000 square feet and one test for each 1,000 square feet thereafter.
- D. Post-Installation Testing:
 - 1. After the System is installed, Owner may engage a testing agency to perform additional testing at Owner's cost before installation of floor covering. Coordinate and schedule testing work with Owner's testing agency. Number of tests shall be determined by the testing agency. Provide testing surfaces as required by Owner's testing agency using ASTM E-96 wet method test for net perms (grains h-1 ft-2 in Hg-1).
 - a. Test floors for moisture by using the test method described in ASTM E96. Results shall be submitted to Architect for evaluation. When test results are above the allowable moisture emission specified for the intended floor covering materials, resolve the condition prior to installation of floor covering. Environment of all tests shall be the same during testing.
 - 2. Adhesion Test: Perform adhesion compatibility test for flooring adhesives, coatings, and leveling compounds over completed vapor emission control system, as acceptable to Architect and Owner. Document and submit all adhesion test results to Architect and Owner.

3.3 PREPARATION

- A. Prior to installation of System, all walls shall be masked or otherwise protected from the effects of scarification and System application.
- B. Clean and prepare substrates according to the System manufacturer's written recommendations to produce clean, dust-free, dry substrate for the System application.
- C. Remove silicate based floor hardeners or curing compounds from concrete slabs as recommended by the System manufacturer.

- D. Remove defective materials, and foreign matter, such as, dust, adhesives, paint, dirt, floor hardeners, bond breakers, oil, grease, curing agents, form release agents, efflorescence, and laitance.
- E. Cracks, control joints, and cold joints shall be prepared and treated in accordance with the System manufacturer's recommendations.
- F. Clean and fill chips, voids and other surface irregularities with water resistant repair materials as recommended by System manufacturer.
- G. Acid etching is not permitted.
- H. Shot blast concrete surface to profile recommended by System manufacturer to ensure bonding of the System to concrete.
- I. Concrete slabs to receive finished floor coverings shall conform to applicable requirements of ASTM F710.
- J. Before application of the System, prepared surfaces shall be inspected by and acceptable to the System manufacturer's technical representative.

3.4 INSTALLATION

- A. Install vapor emission control system in strict accordance with manufacturer's written instructions.
- B. A leveling or trowel grade cementitious underlayment is required over completed vapor emission control system. Apply appropriate primer to the cured vapor emission control system, as recommended by the System manufacturer. Underlayment shall have adequate thickness to absorb any residual water from the flooring adhesive; thickness as recommended by the flooring/adhesive manufacturer.

3.5 FIELD QUALITY CONTROL

- A. Any product testing to verify conformance to manufacturer's specifications shall be performed by taking unopened containers of product to an independent laboratory, with testing performed in accordance with the methods provided in manufacturer's technical literature.

3.6 CLEANING

- A. Remove all debris resulting from the System installation from Project site.

3.7 PROTECTION

- A. Protect installed vapor emission control system during curing period and prior to finished flooring installation from traffic, topical water, and surface contaminants.

END OF SECTION

SECTION 07 42 16
INSULATED-CORE METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Foamed-insulation-core metal wall panel system.
- B. Integrated window system.

1.2 RELATED SECTIONS

- A. Section 03 45 00 – Precast Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 05 12 00 – Structural Steel Framing.
- D. Section 05 40 00 – Cold-Formed Metal Framing.
- E. Section 07 21 00 – Thermal Insulation.
- F. Section 07 25 00 – Weather Barriers.
- G. Section 07 62 00 – Sheet Metal Flashing and Trim.
- H. Section 07 92 00 – Joint Sealants.
- I. Section 08 81 00 – Glass Glazing.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AAMA 501.1 – Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure.
 - 2. AAMA 501.2 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
 - 3. AAMA 621 – Voluntary Specifications for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates.
 - 4. ASTM A641/A641M – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 5. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

- 6. ASTM A755/A755M – Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
- 7. ASTM C645 – Standard Specification for Nonstructural Steel Framing Members.
- 8. ASTM C754 – Specifications for Installation of Steel Framing Members to Receive Screw Attached Gypsum Panel Products.
- 9. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
- 10. ASTM C1311 – Standard Specification for Solvent Release Sealants.
- 11. ASTM D6226 – Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
- 12. ASTM E72 – Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
- 13. ASTM E84 – Test Methods for Surface Burning Characteristics of Building Materials.
- 14. ASTM E283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- 15. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- 16. NAAMM – Metal Finishes Manual for Architectural and Metal Products.
- 17. NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
- 18. NFRC 100 – Procedure for Determining Fenestration Product U-Factors.
- 19. NFRC 200 – Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
- 20. SMACNA – Architectural Sheet Metal Manual.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: For each type of product indicated, including construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.
- C. Shop Drawings: Show fabrication and installation plan, section and elevation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, gaskets, and accessories, integrated window system, and special details. Distinguish between factory-, shop-, and field-assembled work.
- D. Manufacturer's Data: Manufacturer's descriptive data and specifications; include recommended installation and maintenance procedures.
- E. Samples: Two 12-inch by 12-inch samples of each material, finish, and color specified.
- F. Certificates: Manufacturer's certificates that materials meet specification requirements.

1.5 PERFORMANCE REQUIREMENTS

- A. Comply with 2013 California Building Code requirements.
- B. Movement: Accommodate movement within systems without damage to components or deterioration of seals; movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; deflection of structural support framing.
 - 1. Metal wall panel system to withstand wind and other loads as indicated on Drawings.
 - 2. Structural performance of the wall panels shall be derived from ASTM E72 Chamber Method with a deflection limit of 1/175 applied to positive load, with no evidence of failure.
- C. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel systems.
- D. Thermal: Provide continuity of thermal barrier at building closure elements in conjunction with thermal insulating materials.
- E. Air Infiltration: Air leakage through assembly shall not exceed 0.06 cfm/square foot of wall area when tested according to ASTM E283 at static-air-pressure difference of 6.24 lbf/square foot using test panel that includes horizontal and vertical joints.
- F. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at a minimum static differential pressure of 15 lbf/square foot using test panel that includes horizontal and vertical joints.
- G. Water Penetration under Dynamic Pressure: No water penetration when tested according to AAMA501.1 at a minimum static differential pressure of 15 lbf/square foot using test panel that includes horizontal and vertical joints.
- H. Seismic Performance: Comply with 2013 CBC requirements.
 - 1. Insulated-core metal wall panel system shall withstand the effects of earthquake motions determined according to CBC Chapter 16.

1.6 REGULATORY REQUIREMENTS

- A. Window systems shall be certified under provisions of the 2013 California Energy Code, Section 116.
 - 1. A fenestration product's U-factor shall be rated in accordance with NFRC 100, using the specific glazing and window system to be installed on the project.
 - a. If there is less than 10,000 square feet of site-built fenestration on the project, the default U-factor may be calculated as set forth in Reference Nonresidential Appendix NA6.
 - 2. A fenestration product's Solar Heat Gain Coefficient (SHGC) shall be rated in accordance with NFRC 200, using the specific glazing and window system assemblies to be installed on the project.
 - a. If there is less than 10,000 square feet of site-built fenestration on the project, the default SHGC may be calculated as set forth in Reference Nonresidential Appendix NA6.

3. Provide label certificate for each type of window product indicating compliance with the U-factors listed in Table 116-A, SHGC values listed in Table 116-B, and air leakage requirements specified in this Section. Field-fabricated fenestration may only be installed when documentation indicating compliance with the above has been provided.
4. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the fenestration product meets the acceptance requirements.

1.7 QUALITY ASSURANCE

- A. Installer's Qualifications: Installers shall be trained and approved by panel system manufacturer. Installation shall be by experienced mechanics directly employed by metal wall panel manufacturer or by erector currently licensed or franchised by panel manufacturer to erect projects of similar or greater complexity.
- B. Source Limitations: Provide metal wall panel system from single source and a single manufacturer.
- C. Requirements of Regulatory Agencies: Comply with requirements of 2013 California Building Code (CBC).
- D. Fire-Test-Response Characteristics:
 1. Flame Spread Index: 25 or less per ASTM E84.
 2. Smoke Developed Index: 450 or less per ASTM E84.
 3. Intermediate Scale Multistory Fire Test: Representative mockup tested per NFPA 285.
- E. FMG Listing: Class 1 Insulating Wall per ANSI/FMG 4880.

1.8 MOCKUPS

- A. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Build mockup of typical wall panel, minimum ten feet x ten feet in size, by full thickness, including insulation, weather barriers, supports, attachments, integrated window system, and accessories.
 2. Accepted mockups may become part of the completed Work if undisturbed and undamaged at the time of Substantial Completion.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products under provisions of Division 01.
- B. Provide adequate protection so material is not exposed to weather or moisture prior to erection.
- C. Units of panels that become deformed or damaged from any cause whatsoever, to the extent that they are weakened or unsuitable for use as part of the finish surface, shall be replaced unless they can be repaired to the satisfaction of Architect.
- D. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- E. Store pre-finished material off the ground, protected from weather to prevent twisting, bending or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

F. Prevent contact with materials capable of causing discoloration or staining.

1.10 WARRANTIES

A. Warranties for the following items shall cover the entire wall panel system, including integral sun screens. Warranty shall cover the repair, restoration or replacement of any element of the wall panel system with no limit to the cost of materials and installation required. The installer shall have warranty responsibility for the first two years plus any applicable extensions thereafter. The manufacturer shall have sole liability for the remainder of the warranty period.

1. Finish: Ten years.
2. Structural Defects: Ten years.
3. Weathertightness, including flashings: Ten years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. CENTRIA Architectural Systems, Moon Township, PA; 800-759-7474; www.centria.com.
Products:

1. Formawall Dimension Series wall panels.
2. Formavue FV-400A integrated window system.

B. Kingspan Benchmark, Greenfield, Holywell, Flintshire; +44 (0)1352 716100;
www.kingspanbenchmark.com.

C. Substitutions: Under provisions of Division 01.

2.2 WALL PANEL MATERIALS

A. Metallic-Coated Steel Sheet: Restricted flatness steel sheet metallic coated by the hot-dip process and prepainted by the coil-coating process to comply with ASTM A755/A755M.

1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation; structural quality.
2. Surface: Smooth finish.
3. Exposed Coil-Coated Finish: Metallic fluoropolymer, AAMA 621, three-coat fluoropolymer finish with suspended metallic flakes containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
4. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.7 mil.
5. Panel Sealants:
 - a. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, non-staining tape 1/2-inch wide and 1/8-inch thick.

- b. Joint Sealant: ASTM C920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
- c. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.3 INSULATION

- A. Provide foamed-in-place insulation core of urethane-modified isocyanurate with density of 2.7 pounds per cubic foot and minimum compressive strength of 20 pounds per square inch.
 - 1. Insulation shall have a maximum flame-spread index of 25 and smoke-developed index of 450.
 - 2. Closed-Cell Content: 90 percent when tested according to ASTM D6226.

2.4 METAL FRAMING

- A. Metal Framing, General: ASTM C645, Grade 50 cold-formed metallic-coated steel sheet, ASTM A653/A653M, G90 hot-dip galvanized.
- B. Subgirts: Manufacturer's standard C- or Z-shaped sections, 0.064-inch minimum nominal thickness.
- C. Zee Clips: 0.079-inch minimum nominal thickness.
- D. Base or Sill Angles or Channels: 0.079-inch minimum nominal thickness.
- E. Hat-Shaped, Rigid Furring Channels: As required to meet performance requirements, thickness 0.064 inch, minimum; depth as indicated.
- F. Cold-Rolled Furring Channels: As required to meet performance requirements, thickness 0.064 inch, minimum; depth as indicated; minimum 1/2-inch wide flange.
 - 1. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch diameter wire, or double strand of 0.048-inch diameter wire.
- G. Fasteners for Miscellaneous Metal Framing: Type, material, size, corrosion resistance, holding power, and other properties as required to fasten miscellaneous metal framing members to substrates.

2.5 MISCELLANEOUS MATERIALS

- A. Panel Fasteners: Self-tapping screws; bolts and nuts; self-locking rivets and bolts; end-welded studs; and other suitable fasteners designed to withstand design loads.

2.6 FOAMED-INSULATION-CORE METAL WALL PANELS

- A. General: Provide factory-formed and -assembled metal wall panels fabricated from two metal facing sheets and insulation core foamed in place during fabrication, and with joints between panels designed to form weathertight seals. Include accessories required for weathertight installation.

- B. Concealed-Fastener, Foamed-Insulation-Core Metal Wall Panels: Formed with tongue-and-groove panel edges with pressure-equalized horizontal joint; designed for sequential installation by interlocking panel edges and mechanically attaching panels to supports using concealed clips or fasteners.
1. Facings: Fabricate panel with exterior and interior facings of same material and thickness. Provide zinc-coated (galvanized) steel sheet, 0.030-inch (22 gauge) nominal thickness.
 2. Panel Coverage: As indicated on Drawings.
 3. Panel Thickness: 2 inches.
 4. Thermal-Resistance Value (R-Value): 14.
 5. Finishes:
 - a. Comply with requirements of AAMA 621.
 - b. Exposed Face Finish: Three-coat, 70 percent minimum fluoropolymer resin coating system; color as indicated on Drawings.
 - 1) Primer: 0.2 mil minimum dry film thickness.
 - 2) Color Coat: 0.8 mil minimum dry film thickness.
 - 3) Clear Coat: 0.5 mil minimum dry film thickness.
 - c. Concealed Face Finish: Manufacturer's standard siliconized polyester coating.
 - 1) Primer: 0.2 mil minimum dry film thickness.
 - 2) Color Coat (Acrylic): 0.5 mil minimum dry film thickness.

2.7 ACCESSORIES

- A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material, finish, and color of metal wall panels unless otherwise indicated.
- B. Flashing and Trim: Formed from 0.018-inch minimum thickness, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet prepainted with coil coating. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.
- C. Panel Attachment Clips: Concealed G-90 galvanized steel clips configured to prevent overdriving of fastener and crushing of foam core, with panel fasteners engaging both face and liner elements and mechanically attaching to panel supports.

2.8 INTEGRATED WINDOW SYSTEM

- A. Thermally-improved fixed aluminum window units designed to integrate with metal wall panel profile and secondary support system without receptor channels or other flashing. Integrated window system shall be provided by metal wall panel manufacturer.

B. Window Characteristics:

1. Framing: Thermally-improved 6063-T5 or 6560-T5 aluminum extrusion, outside glazed. Frames shall accept 1 inch thick insulated glass units as specified in Section 08 81 00.
2. Frame Depth: 2-1/2 inches.
3. Sightlines:
 - a. Head: 2-1/2 inches.
 - b. Sill: 2-1/2 inches.
 - c. Mullions: 2-1/2 inches.
4. Configuration Strip window.
5. Finish:
 - a. Interior: Match wall panel finish.
 - b. Exterior: Match wall panel finish.
6. Exterior pressure bar glazing with snap-on cover.
7. Internal gutter at window head and panel base.

2.9 FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Horizontal Joints: Horizontal joints with positive drip edge, sloped drain shelf and integral venting to the exterior along the panel length to permit moisture drainage and to allow air to enter the pressure equalization chamber. Joint shall have a 2-3/8-inch baffle interlock to provide effective rain screen and pressure equalized performance as demonstrated by testing specified Part 1 of this Section.
- E. Vertical Joints: Vertical joints for insulated metal panels shall be gasketed, exposed wet seals are not permitted. Outer wings of gasket shall compress against the metal return flange (trimless end) of the panel face. Include an integrated, insulated metal vertical joint spline. The insulated vertical reveal shall be recessed 1-3/16 inches deep and be 5/8 inch wide. The insulated metal vertical joint shall not add exterior sightlines, expose metal edges or exposed wet seals. The joint spline shall include polyisocyanurate foam insulation adhered to a metal face of the same material and gauge as the face of the panel. The vertical joint shall be designed to allow moisture to be drained from the panel's horizontal joint. No end dam sealant shall be applied to the ends of the horizontal joint at the vertical joint location. A continuous back-up flash behind the vertical joint is required with two beads of field applied non-curing butyl sealant between the panel and back up flashing for each panel.

- F. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
- G. Windows shall be designed for fixed glazing, include a thermal barrier and be designed to be fully compatible with the panel joinery and secondary support system.
 - 1. Head and sill shall be designed to achieve the same rain screen and pressure equalization performance as the horizontal panel system and shall one-piece designs integrating directly with the panel joinery without the use of receptor extrusions.
 - 2. Minimum extrusion thickness shall be 1/16 inch for trim, stops and appendages and 3/32 inch for structural components.
 - 3. Design shall provide for cladding of any secondary structural elements that pass through the window area.
 - 4. Where required, the window system shall allow up to 1/4 inch of differential floor movement.
 - 5. Glazing gaskets, sealants, fasteners, setting and splice blocks shall be included as required for a complete window system.
 - 6. Units shall be re-glazeable without dismantling the system.
 - 7. Head, sill and jamb extrusion shall be one piece, maintain the liner sealant plane and be installed without the use of exposed wet seals.
 - 8. Head, sill and jamb extrusions shall be thermally broken or isolated from concealed and exposed interior surfaces. Where extrusions are not so designed, provision shall be made for directing condensation to the exterior.

2.10 FINISH, GENERAL REQUIREMENTS

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

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Verify supporting substrate surfaces are ready to receive panel system. Surfaces in contact with panels shall be free from debris or objects that may damage panels.
- B. Do not proceed with installation until all conditions are satisfactory.

3.2 INSTALLATION

- A. Install metal framing and other metal panel supports per manufacturer's recommendations, ASTM C754, and approved shop drawings.

- B. Install metal wall panels according to manufacturer's printed instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated on Drawings. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
- C. Workmanship: All work shall be neat, trim, true to line and, upon completion, shall present a true finished surface of the specified profile, free of dents, deformations, creases or other noticeable defects.
- D. Fasten metal wall panels to supports with concealed clips at each joint at location and spacing and with fasteners recommended by manufacturer. Fully engage tongue and groove of adjacent panels.

3.3 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's printed installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.

3.4 INTEGRATED WINDOW SYSTEM INSTALLATION

- A. Install integrated window system in accordance with manufacturer's recommendations and approved shop drawings. Anchor supports to structure with approved stainless steel anchors. Assemble wall components using gaskets, fasteners, and trim supplied by metal wall panel manufacturer. Separate dissimilar metals with bituminous coating acceptable to wall panel manufacturer. Windows shall be glazed in accordance with the approved shop and erection drawings and the Flat Glass Manufacturers Association standards.

3.5 ERECTION TOLERANCES

- A. Maximum offset from indicated alignment between adjacent members butting or in line: 1/16-inch, non-cumulative.
- B. Maximum variation from plane or location indicated on the Drawings: 1/4-inch.

3.6 FIELD QUALITY CONTROL

- A. General: Comply with requirements of Division 01.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections specified in this Article, and prepare test and inspection reports; all costs to borne by Contractor.
- C. Water-Spray Test: After completing the installation of 75-foot by-two story minimum area of metal wall panel assembly, test assembly for water penetration according to AAMA 501.2 in a two-bay area as directed by Architect.
 - 1. Perform a minimum of two tests.

- D. Manufacturer's Field Service: Upon the Owner's Request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.
- E. Defective Work: Work will be considered defective when tests and inspections indicate that completed work does not conform to specified requirements. Repair or replace defective work as required, at no cost to the Owner. If repair is deemed unacceptable by Architect or the Owner, replace defective work with new components.
- F. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING

- A. Clean work under provisions of Division 01.
- B. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed unless otherwise indicated in manufacturer's printed installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer. Maintain in a clean condition during construction.
- C. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- D. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.8 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Division 01.
- B. Protect installed product's finish surfaces from damage during construction. Provide protective covering as required to ensure installed panels will not be damaged by work of other trades.

END OF SECTION

SECTION 07 54 23.13

ADHERED THERMOPLASTIC-POLYOLEFIN ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Adhered thermoplastic polyolefin (TPO) roofing membrane system.
- B. Gypsum roof cover board.
- C. Roof insulation.
- D. Walkway membrane (Traffic Pads).
- E. Roofing accessories.

1.2 RELATED SECTIONS

- A. Section 03 45 00 – Precast Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 07 54 23.16 – Mechanically Fastened Thermoplastic-Polyolefin Roofing.
- D. Section 07 62 00 – Sheet Metal Flashing and Trim.
- E. Section 07 72 13 – Manufactured Curbs.
- F. Section 07 72 33 – Roof Hatches.
- G. Divisions 21-23 – Mechanical.
- H. Divisions 25-28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards and Manuals:
 - 1. ASTM C203 – Standard Test Method for Breaking Load and Flexural Properties of Block Type Thermal Insulation.
 - 2. ASTM C272 – Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
 - 3. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

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| 4. ASTM C578 | – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation. |
| 5. ASTM C1177/C1177M | – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing. |
| 6. ASTM C1371 | – Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers. |
| 7. ASTM C1549 | – Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer. |
| 8. ASTM D471 | – Standard Test Method for Rubber Property – Effects of Liquids. |
| 9. ASTM D751 | – Standard Test Methods for Coated Fabrics. |
| 10. ASTM D1204 | – Standard Test Method for Linear Dimensional Changes of Non-Rigid Thermoplastic Sheathing or Film at Elevated Temperature. |
| 11. ASTM D1621 | – Standard Test Method for Compressive Properties of Rigid Cellular Plastics. |
| 12. ASTM D1622 | – Standard Test Method for Apparent Density of Rigid Cellular Plastics. |
| 13. ASTM D2126 | – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging. |
| 14. ASTM D5884 | – Standard Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes. |
| 15. ASTM E84 | – Standard Test Method for Surface Burning Characteristics of Building Materials. |
| 16. ASTM E96 | – Standard Test Method for Water Vapor Transmission of Materials. |
| 17. ASTM E108 | – Standard Test Methods for Fire Tests of Roof Coverings. |
| 18. ASTM E408 | – Standard Test Method for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques. |
| 19. ASTM E1980 | – Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces. |
| 20. Factory Mutual Global (FMG) Approval Guide. | |
| 21. NRCA | – National Roofing Contractors Association. |
| 22. UL 790 | – Standard Test Methods for Fire Tests of Roof Coverings. |

1.4 SUBMITTALS

A. General: Submit in accordance with Division 01.

B. Product Data:

1. Submit manufacturer's descriptive literature, product specification, and installation instructions for each product.
2. Material Safety and Data Sheet (MSDS) for each product.

C. Shop Drawings:

1. Insulation Setting Plan.
 - a. Include layout of regular and tapered rigid insulation system showing identification of each insulation board, sequence of laying boards, all roof slopes, and thickness of insulation.
 - b. For mechanically fastened board – fastener type, size, and spacing to meet wind uplift requirements.
2. Single-Ply Roofing Membrane Setting Plan: Include layout of membrane, location of flashings and accessories.
3. Detail Drawings: Include joint or termination detail conditions, such as junction at deck and wall, curb flashing, roof drain, pre-molded pipe flashing, field fabricated pipe flashing, field fabricated hot pipe flashing, parapet flashing, inside corner and outside corner flashing, and sealant pockets.

D. Samples:

1. 48 inch by 96 inch roofing assembly illustrating roofing membrane, cover board, rigid insulation, roof deck substrate, and fastening/adhesion system.
2. Walkway pads.

E. Quality Assurance Submittals:

1. ICC ES Report.
2. Manufacturer's Field Reports: Submit under provisions of Division 01.
3. Manufacturer Certifications.
4. Installer Certifications.

F. Closeout Submittals:

1. Warranty certificate.

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide insulation, cover board, membrane, and accessory materials from a single manufacturer to ensure system compatibility and quality, and to comply with manufacturer's warranty requirements.
- B. Qualifications:
 1. Manufacturer Qualifications:
 - a. Firm specializing in roofing systems specified in this Section with a minimum ten years documented experience.
 - b. Furnish qualification documentation including a complete list of all projects (minimum of ten) within a 100-mile radius from project site, with the same climate zone, using the same roofing system, and single-ply membrane formulation/ingredients. Include information on project location, size (square feet), date of installation, and contact information.
 - c. Private-labeled single-ply membrane products are not acceptable.

2. Installer Qualifications:

- a. Firm specializing and certified by roofing system manufacturer. Submit manufacturer's certification at time of bid.
- b. Minimum of three years' experience in single-ply roofing installation.
- c. State Contractor's License: Class C-39.

C. Regulatory Requirements:

1. Conform to the 2013 CBC, Section 1505 for roof assembly fire classification requirements.
2. Roof Assembly Fire Hazard Classification: UL Class A per ASTM E108 or UL 790.
3. All roof surfaces shall have positive roof drainage per definition in CBC Section 1502 and shall meet or exceed the minimum slope of 1/4 inch per foot as described in CBC Section 1507.13.1. Refer to Drawings for roof slopes and drainage patterns.

D. Certifications:

1. Manufacturer Certification: Certify that the specified or proposed roofing system including type of deck, insulation, gypsum roof cover board, membrane type, attachment or adherence of components, perimeter attachment details, and all system component details are acceptable to meet warranty requirements and, when installed as per FMG Approval Guide, it will meet or exceed Factory Mutual System Approval and UL Classification Requirements as per UL RMSD.
2. Manufacturer's Acceptance of Roofing Installer: Certify that the roofing installer's qualifications have been reviewed, meet requirements of this Section, and is accepted by the roofing manufacturer.

E. Pre-Installation Meetings:

1. Conduct pre-installation meeting in accordance with Division 01.
2. Convene pre-installation meeting at the site at least one week prior to commencing work on this Section.
 - a. Attendees:
 - 1) Owner's representative, preferably including Owner's Facilities Manager and Maintenance Foreman.
 - 2) Architect.
 - 3) Contractor.
 - 4) Roofing installer.
 - 5) Related trades sub-contractors.
 - 6) Manufacturer Technical Representative/Inspector.
 - b. Agenda:
 - 1) Review roof design (roof substrate, roofing system, flashings, etc.), shop drawings, and submittals.
 - 2) Review manufacturer's installation and technical information and provisions of this Section.
 - 3) Review substrate requirements including substrate preparation and procedures for inspection and handover to roofing installer.

- 4) Review and coordinate schedule and site conditions related to project and work of this Section.
 - 5) Conduct a roofing substrate walk-through.
3. Contractor shall give a minimum one-week notice to pre-installation meeting participants.
- F. Coordination: Coordinate the work in this Section with work in related Sections particularly roof substrate work. Convene a coordination meeting at least one week before roof substrate work with roof system manufacturer's representative attending and in accordance with Division 01.

1.6 SUSTAINABLE BUILDING DESIGN REQUIREMENTS

- A. Provide highly reflective Energy Star® compliant roofing system with emissivity of at least 0.9 when tested in accordance with ASTM E408 for a minimum of 75 percent of the roof surface.
1. Thermal Emissivity shall be measured in accordance with ASTM C1371.
 2. Solar Reflectivity shall be measured in accordance with ASTM C1549.
 3. Solar Reflectance Index shall be measured in accordance with ASTM E1980.
- B. Provide insulation products manufactured free from environment-harmful blowing agents chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC).

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Store products in weather protected environment, clear of ground and moisture.
- D. Store insulation and cover board dry and protected from the elements. Store insulation on pallets and completely cover with a breathable material such as tarp or canvas. Remove or slit temporary factory-applied packaging to prevent accumulation of condensation. Do not use wet or damaged insulation.
- E. Store roofing membrane in the original undisturbed plastic wrap.
- F. Store adhesives, sealants, and other curable materials in cool and dry location with temperatures between 60 degrees F and 90 degrees F. Do not store adhesive containers with opened lids due to the loss of solvent which occur from flash off.

1.8 PROJECT/SITE CONDITIONS

- A. Do not apply roofing system during inclement weather.
- B. Do not apply roofing system to damp or frozen substrate.
- C. Take precautions to prevent wind blow-off or wind damage during the course of the roofing application.
- D. Substrates to receive roofing system shall be thoroughly dry. Provide drying equipment should moisture occur.

1.9 WARRANTY

- A. Comply with provisions of Division 01.
- B. Warranty installed membrane roofing system including labor and materials and loss of water-tightness caused by defective materials (including accessories) or workmanship, with no dollar limit, for twenty years. Effective warranty start date shall be at the time of final acceptance by Owner.
- C. Warranty shall provide for the removal, replacement, repair, and making good without cost to Owner, of defects due to defective materials or workmanship.
- D. Repairs under warranty shall be made within three days after receiving notice of need for repairs from Owner, weather permitting.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

- A. Acceptable Manufacturers and Products:
 - 1. TPO Roofing Membrane System:
 - a. Carlisle Syntec Inc.: Sure-Weld FleeceBACK 115 system.
 - b. Firestone Building Products Co.
 - c. GAF Materials Corp.
 - 2. Gypsum Cover Board: Provided by roof system manufacturer.
 - 3. Roof Insulation: Provided by roof system manufacturer.
- B. Substitutions: Under provisions of Division 01.

2.2 TPO ROOFING MEMBRANE

- A. Ultraviolet resistant thermoplastic polyolefin membrane reinforced with polyester fabric.
- B. Properties:
 - 1. Membrane Composition and Thickness (ASTM D751): 60 mil TPO membrane laminated to 55 mil non-woven polyester fleece backing; total thickness of 115 mils.
 - 2. Tolerance on nominal thickness: ± 10 percent.
 - 3. Minimum breaking strength (ASTM D751): 400 lbf.
 - 4. Elongation at break of fabric (ASTM D751): 25 percent.
 - 5. Minimum tearing strength (ASTM D751): 130 lbf.
 - 6. Dimensional stability (ASTM D1204): ± 0.2 percent.
 - 7. Water absorption (ASTM D471): ± 2 percent.
 - 8. Color: White.
 - a. Initial Solar Reflectance: 0.79.
 - b. Initial Thermal Emittance: 0.90.
 - c. Solar Reflectance Index: 99.

2.3 GYPSUM ROOF COVER BOARD

- A. Glass mat-faced, noncombustible, moisture-resistant treated gypsum core panel specifically designed for roofing applications, 1/2 inch thick, square edges, factory primed, conforming to ASTM C1177.
- B. Do not use products intended for use as exterior wall sheathing.

2.4 ROOF INSULATION

- A. Rigid, closed cell expanded polystyrene thermal insulation with square edges. Comply with ASTM C578, Type VIII; ICC ES Listed; UL Listed.
 - 1. Properties:
 - a. Compressive strength (ASTM D1621): 20 psi minimum.
 - b. Product density (ASTM D1622): 1.25 pounds per cubic foot minimum.
 - c. Water absorption (ASTM C272): 3.0 percent by volume, maximum.
 - d. Surface burning characteristics (ASTM E84):
 - 1) Flame spread: Less than 20.
 - 2) Smoke developed: 150-300.
 - e. Thermal resistance value (ASTM C518): Minimum 3.92 Ft²·Hr·°F/BTU / inch at 75 degrees F.
 - f. Water vapor permeance (ASTM E96): 3.5 perms maximum, 1 inch.
 - g. Flexural strength (ASTM C203): 30 psi minimum.
 - h. Dimensional stability (ASTM D2126): 2.0 percent linear change maximum.
 - i. Thickness: As indicated on Drawings
 - B. Place insulation over entire area scheduled to receive single ply roofing.
 - 1. Crickets shall be fabricated from expanded polystyrene insulation; tapered.
 - C. Insulation shall be tapered where indicated on Drawings.

2.5 ACCESSORIES

- A. Non-Reinforced or Reinforced TPO Flashing, Pipe Boot and Flashings, Clamping Rings: Use roofing membrane provided and recommended by manufacturer.
- B. Flashing Metal: 0.023 inch thick galvanized steel laminated to 0.020 inch thick roofing membrane in white color used for flashing and edge metal detailing as furnished by the membrane manufacturer.
- C. Fasteners and Disks: Use mechanical fasteners and disks approved by roofing system manufacturer and cover board manufacturers.
- D. Membrane Bonding Adhesive: Manufacturer approved two-component urethane, low-rise, low VOC bonding adhesive to meet California Air Resources Board or local Air Pollution Control/Air Quality Management District regulations.
- E. Adhesive for Insulation and Gypsum Roof Cover Board Attachment for Adhered Single-Ply Roofing System: Two-component urethane, low-rise adhesive approved by roofing system manufacturer and cover board and insulation manufacturers.

- F. Termination Bar: Extruded Aluminum bar 0.08 inch thick by 1 inch wide.
- G. Membrane Cleaning Solution: Manufacturer approved or recommended.
- H. Air and Vapor Barrier: Roofing manufacturer's 40 mil composite air and vapor barrier consisting of 35 mils of self-adhering rubberized asphalt laminated to a 5 mil polyolefin film with a siliconized one piece release liner. Permeability: 0.05 perms per ASTM D1970.
 - 1. Primer: Type as manufactured and recommended by roofing manufacturer, appropriate to substrate.
- I. Sealants: Refer to Section 07 92 00. Solvent-based ethylene propylene seam caulk approved by roofing system manufacturer.
- J. All-Purpose Sealant: Single component, high-solids content, and gun grade, approved by membrane manufacturer.
- K. Walkway Rolls: 34 inches wide, 180 mils thick heat-weldable TPO material as supplied by membrane manufacturer, color: white. Verify manufacturer's standards for walkway pad design and slip-resistance with Architect prior to procurement of pads and prior to submittal of shop drawings.
- L. Safety Zone Markings: Roofing manufacturer's 12 inch wide yellow coverstrip consisting of 30 mil thick non-reinforced TPO flashing laminated to a nominal 30 mil thick, fully cured synthetic rubber pressure sensitive adhesive.
- M. Wood Nailers: Fire retardant treated.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected and only when substrate is inspected and accepted by roofing installer and roofing system manufacturer.
- B. Verify that surfaces and site conditions are ready to receive work.
- C. Verify that deck is structurally sound to secure adhered single ply roofing system. Inspect roof deck for corrosion, rotting, warping, concrete spalling, etc. Repair or replace defective roof deck prior to installing the roofing system.
- D. Verify that deck surfaces are dry to the touch and free of snow or ice.
- E. Verify that deck is clean and smooth, free of noticeable high spots or depressions.
- F. Verify that roof openings, curbs, pipes, sleeves, ducts, vents, etc. through roof are solidly set. Verify and ensure that all roof drain lines are clear.
- G. Verify that the joints at concrete masonry walls scheduled to receive roofing membrane are struck flush.

3.2 PREPARATION - GENERAL

- A. Protection: Protect roofing surface and adjacent work against damage to roofing work.

B. Review Material Safety Data Sheet and safety regulations recommended by OSHA.

C. Wood Nailers:

1. Install pressure treated wood nailers in appropriate size and location when required by the membrane manufacturer for a warrantable system.
2. Anchor to the roof deck at two feet on center maximum to resist a pullout force of 175 pounds per foot in any direction. Install fasteners within 6 inch of each end. Spacing and fastener embedment shall conform to Factory Mutual Loss Prevention Data Sheet 1-49.
3. Top of nailers shall be flush to the roof insulation.

D. Preparation Of Substrate:

1. General: To prevent delays or interruptions, coordinate with other work to ensure that components to be incorporated into the roofing system are available as the work progresses. Examine substrates to which the roofing materials are to be applied to ensure that their condition is satisfactory for the roofing systems application. Do not permit voids greater than 1/4 inch width in the substrate. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges and debris. Inspect substrates and correct defects before application of roofing membrane.
2. Determine the condition of the structural substrate. Areas with deteriorated or damaged decking or other materials shall have those affected materials removed and replaced.
3. Provide temporary water cut-offs at the end of each day. Maintain watertight condition of roof to prevent water intrusion. Install only that amount of roofing and flashing that can be made watertight with new materials in a one-day period or prior to the onset of inclement weather. Remove cut-off before resuming roofing.
4. Cover existing decking with rigid insulation and cover board, applied in accordance with manufacturer's instructions and as required resulting in a UL Class A roof system.

3.3 INSULATION INSTALLATION

- A. Place insulation over clean roof deck where indicated on Drawings in accordance with manufacturer's instructions.
- B. Install insulation in thickness to meet specified minimum total R-value. Install additional thickness as required to meet requirements indicated on Drawings.
- C. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- D. Apply no more insulation than can be covered with cover board and membrane in same day.
- E. Tape joints of insulation in accordance with insulation manufacturer's instructions.
- F. Stagger all joints when multiple layers or types of insulation are being installed.
- G. Apply adhesive for adhered single-ply roofing system according to adhesive manufacturer's instructions.

3.4 GYPSUM ROOF COVER BOARD INSTALLATION

- A. Place cover board over clean insulation.
- B. Stagger all joints a minimum of 6 inches from underlying insulation joints.

C. Apply adhesive for adhered single-ply roofing system according to adhesive manufacturer's instructions.

1. Where board is placed directly on bare metal deck, fasten with disk-type fasteners as recommended by cover board manufacturer.

3.5 AIR AND VAPOR BARRIER INSTALLATION

A. Prepare surfaces and install primer and air and vapor barrier per manufacturer's recommendations.

1. Surfaces shall be clean, dry, smooth, and free of voids, spalled areas, sharp protrusions, loose aggregate, laitance, and curing and form release compounds.
2. Concrete shall be in place for 28 days minimum prior to barrier installation.

B. Install air and vapor barrier at all roof penetrations and deck to wall intersections.

3.6 ROOFING MEMBRANE PLACEMENT, ATTACHMENT, AND HOT AIR WELDING

A. General: Install membrane in accordance with manufacturer's instructions.

B. Sweep substrate of all loose debris before laying membrane.

C. Adhered Single-Ply Roofing System:

1. Apply bonding adhesive to the exposed underside of the membrane and the corresponding substrate area. Do not apply adhesive along the splice edge of the membrane to be hot air welded over adjoining sheet.
2. Apply adhesive evenly, without puddles using a plastic core medium nap roller to achieve continuous coating of both surfaces at a coverage rate recommended by adhesive manufacturer.
3. Due to solvent flash-off, condensation may form on freshly applied bonding adhesive when the ambient temperature is near the dew point. If condensation develops, possible surface contamination may occur and the application of bonding adhesive must be discontinued. Allow the surface to dry and apply a thin freshener coat to the previously coated surface when conditions allow for continuing.
4. Allow adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
5. Roll the coated membrane into the coated substrate while avoiding wrinkles.
6. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
7. Fold back the unbonded half of the sheet in the same manner, overlapping edges a minimum of 2 inches to provide for a minimum of 1-1/2 inch hot air weld.
8. Install adjoining membrane sheets in the same manner, overlapping a minimum of 2 inches to provide a minimum of 1-1/2 inch hot air weld.
9. Protect completed sections of the roof so bonding adhesive will not discolor the membrane surface. Do not place bonding adhesive containers or their lids directly on the surface of the membrane.

10. Install additional membrane securement at the perimeter of each roof level, roof section, curb, interior wall, penthouse, etc. at any inside angle change where slope exceeds 2 inches in one horizontal foot. Use manufacturer approved fasteners and standard seam fastening plates installed horizontally or vertically at the base of the walls, curbs, etc., spaced a minimum of 12 inches on center and flashed as recommended by roofing system manufacturer.

D. Welding of Laps:

1. General:
 - a. Roofing membrane connection shall be hot air welded only.
 - b. Surfaces to be welded shall be clean and dry.
2. Hot Air Welding:
 - a. Hot air weld the membrane sheets with an automatic hot air welding machine. Follow hot air welding machine manufacturer's instructions for use.
 - b. Where use of automatic hot air welding machines is not practical, use a hand-held hot air welding machine. Preheat the nozzle tip and apply over the overlap area until the material reaches required temperature, immediately follow with a hand roller to press the heated membrane surfaces together with slow, even movements. Keep the roller within one inch of the nozzle tip. Seam strength may be tested when cool. For best results, test seams 8 hours after hot air welding.
3. Quality Control of Seams: After seaming, check welded seams for continuity and integrity. Repair openings or "fishmouths" with a hand-held hot air tool fitted with a narrow nozzle tip and with a roller.
4. Membrane lap edges that have been exposed to the elements for approximately seven days or longer must be prepared with manufacturer-approved membrane cleaner. Prepare the surface where the cleaner has been applied as per manufacturer's instructions prior to hot air welding.

3.7 MEMBRANE FLASHING

- A. Flash all vertical surfaces with reinforced membrane. Use non-reinforced membrane only at inside and outside corners, field fabricated pipe seals, scuppers, and sealant pockets where the use of premolded accessories are not practical. Terminate the flashing in accordance with manufacturer-approved detail.
- B. Use bonding adhesive on vertical surfaces more than 12 inches high such as walls, curbs, and pipes. Bonding adhesive is not required for vertical surfaces terminated under a metal counter flashing less than 12 inches high. Bonding adhesive may be eliminated for flashing heights 18 inches or less when a coping or termination bar is used for vertical terminations.

3.8 OTHER RELATED WORK

- A. Walkways: Install walkway pads per manufacturer's recommendations in the locations indicated on Drawings. Position the walkway material. Cut the walkway rolls into maximum 10-foot lengths and position with a minimum 1-inch gap between adjacent pieces to allow for water drainage. Cut the walkway so a 4-inch minimum gap is created over any field membrane seams/splices.

- B. Safety Zone Markings: Install safety zone markings as recommended by the manufacturer in the locations indicated on Drawings.
 - 1. Clean roofing membrane with manufacturer's membrane cleaner.
 - 2. Roller apply manufacturer's low-VOC TPO primer. Install coverstrip immediately after primer flashes off.
 - 3. Peel off a length of protective release liner from coverstrip. Position coverstrip and press down using firm, even hand pressure across the entire area.
 - 4. Immediately roll coverstrip with silicone or steel roller using positive pressure. Roll across coverstrip edge, not parallel to the length.
- C. Copings, Counterflashing, and Other Metal Work: Refer to Section 07 62 00. Fasten flashing to prevent metal from pulling free or buckling. Seal to prevent moisture from entering the roofing system or building.

3.9 FIELD QUALITY CONTROL

- A. General: Comply with requirements of Division 01.
- B. The manufacturer's representative shall observe, conduct tests, and prepare test reports in accordance with the provisions of this Section at predetermined periods before, during, and after installation of the work – specifically at critical periods identified by roofing system manufacturer to ensure a completely warranted system.
- C. The manufacturer's representative and the testing agency shall conduct final roof inspection on completion of the work in this Section and submit report to Architect and Owner. Notify Architect and Owner 48 hours in advance of date and time of inspection.

3.10 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.
- B. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION

SECTION 07 54 23.16

MECHANICALLY FASTENED THERMOPLASTIC-POLYOLEFIN ROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Mechanically fastened thermoplastic polyolefin (TPO) roofing membrane system.
- B. Gypsum roof cover board.
- C. Roof insulation.
- D. Walkway membrane (Traffic Pads).
- E. Roofing accessories.

1.2 RELATED SECTIONS

- A. Section 05 31 00 – Steel Decking.
- B. Section 07 54 23.13 – Adhered Thermoplastic-Polyolefin Roofing.
- C. Section 07 62 00 – Sheet Metal Flashing and Trim.
- D. Section 07 72 33 – Roof Hatches.
- E. Section 07 72 56 – Fall Protection Devices.
- F. Section 07 95 00 – Expansion Control.
- G. Divisions 21-23 – Mechanical.
- H. Divisions 25-28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes in effect as of the date of issue of this Project Manual, unless indicated otherwise in CBC Chapter 35 and CFC Chapter 80.
- C. Referenced Standards and Manuals:
 - 1. ASTM C203 – Standard Test Method for Breaking Load and Flexural Properties of Block Type Thermal Insulation.
 - 2. ASTM C272 – Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
 - 3. ASTM C518 – Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

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|---|--|
| 4. ASTM C578 | – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation. |
| 5. ASTM C1177/C1177M | – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing. |
| 6. ASTM C1371 | – Standard Test Method for Determination of Emittance of Materials Near Room Temperature Using Portable Emissometers. |
| 7. ASTM C1549 | – Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer. |
| 8. ASTM D471 | – Standard Test Method for Rubber Property – Effects of Liquids. |
| 9. ASTM D751 | – Standard Test Methods for Coated Fabrics. |
| 10. ASTM D1204 | – Standard Test Method for Linear Dimensional Changes of Non-Rigid Thermoplastic Sheathing or Film at Elevated Temperature. |
| 11. ASTM D1621 | – Standard Test Method for Compressive Properties of Rigid Cellular Plastics. |
| 12. ASTM D1622 | – Standard Test Method for Apparent Density of Rigid Cellular Plastics. |
| 13. ASTM D2126 | – Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging. |
| 14. ASTM D5884 | – Standard Test Method for Determining Tearing Strength of Internally Reinforced Geomembranes. |
| 15. ASTM E84 | – Standard Test Method for Surface Burning Characteristics of Building Materials. |
| 16. ASTM E96 | – Standard Test Method for Water Vapor Transmission of Materials. |
| 17. ASTM E108 | – Standard Test Methods for Fire Tests of Roof Coverings. |
| 18. ASTM E408 | – Standard Test Method for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques. |
| 19. ASTM E1980 | – Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces. |
| 20. Factory Mutual Global (FMG) Approval Guide. | |
| 21. NRCA | – National Roofing Contractors Association. |
| 22. UL 790 | – Standard Test Methods for Fire Tests of Roof Coverings. |

1.4 SUBMITTALS

A. General: Submit in accordance with Division 01.

B. Product Data:

1. Submit manufacturer's descriptive literature, product specification, and installation instructions for each product.
2. Material Safety and Data Sheet (MSDS) for each product.

C. Shop Drawings:

1. Insulation Setting Plan.
 - a. Include layout of regular and tapered rigid insulation system showing identification of each insulation board, sequence of laying boards, all roof slopes, and thickness of insulation.
 - b. For mechanically fastened single-ply membrane system – fastener type, size, and spacing to meet wind uplift requirements.
2. Single-Ply Roofing Membrane Setting Plan: Include layout of membrane, location of flashings and accessories.
3. Detail Drawings: Include joint or termination detail conditions, such as junction at deck and wall, curb flashing, roof drain, pre-molded pipe flashing, field fabricated pipe flashing, field fabricated hot pipe flashing, parapet flashing, inside corner and outside corner flashing, and sealant pockets.

D. Samples:

1. 24 inch by 24 inch roofing assembly illustrating roofing membrane, cover board, rigid insulation, roof deck substrate, and fastening system.
2. Expansion joints.
3. Walkway pads.

E. Quality Assurance Submittals:

1. ICC ES Report.
2. Manufacturer's Field Reports: Submit under provisions of Division 01.
3. Manufacturer Certifications.
4. Installer Certifications.

F. Closeout Submittals:

1. Warranty certificate.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility: Provide insulation, cover board, membrane, and accessory materials from a single manufacturer to ensure system compatibility and quality, and to comply with manufacturer's warranty requirements.

B. Qualifications:

1. Manufacturer Qualifications:
 - a. Firm specializing in roofing systems specified in this Section with a minimum ten years documented experience.
 - b. Furnish qualification documentation including a complete list of all projects (minimum of ten) within a 100-mile radius from project site, with the same climate zone, using the same roofing system, and single-ply membrane formulation/ingredients. Include information on project location, size (square feet), date of installation, and contact information.
 - c. Private-labeled single-ply membrane products are not acceptable.

2. Installer Qualifications:
 - a. Firm specializing and certified by roofing system manufacturer. Submit manufacturer's certification at time of bid.
 - b. Minimum of three years experience in single-ply roofing installation.
 - c. State Contractor's License: Class C-39.
- C. Regulatory Requirements:
 1. Conform to the 2013 CBC, Section 1505 for roof assembly fire classification requirements.
 2. Roof Assembly Fire Hazard Classification: UL Class A per ASTM E108 or UL 790.
 3. All roof surfaces shall have positive roof drainage per definition in CBC Section 1502 and shall meet or exceed the minimum slope of 1/4 inch per foot as described in CBC Section 1507.13.1. Refer to Drawings for roof slopes and drainage patterns.
- D. Certifications:
 1. Manufacturer Certification: Certify that the specified or proposed roofing system including type of deck, insulation, gypsum roof cover board, membrane type, attachment or adherence of components, perimeter attachment details, and all system component details are acceptable to meet warranty requirements and, when installed as per FMG Approval Guide, it will meet or exceed Factory Mutual System Approval and UL Classification Requirements as per UL RMSD.
 2. Manufacturer's Acceptance of Roofing Installer: Certify that the roofing installer's qualifications have been reviewed, meet requirements of this Section, and is accepted by the roofing manufacturer.
- E. Pre-Installation Meetings:
 1. Conduct pre-installation meeting in accordance with Division 01.
 2. Convene pre-installation meeting at the site at least one week prior to commencing work on this Section.
 - a. Attendees:
 - 1) Owner's representative, preferably including Owner's Facilities Manager and Maintenance Foreman.
 - 2) Architect.
 - 3) Contractor.
 - 4) Roofing installer.
 - 5) Related trades sub-contractors.
 - 6) Manufacturer Technical Representative/Inspector.
 - b. Agenda:
 - 1) Review roof design (roof substrate, roofing system, flashings, gutters, etc.), shop drawings, and submittals.
 - 2) Review manufacturer's installation and technical information and provisions of this Section.
 - 3) Review substrate requirements including substrate preparation and procedures for inspection and handover to roofing installer.

- 4) Review and coordinate schedule and site conditions related to project and work of this Section.
 - 5) Conduct a roofing substrate walk-through.
3. Contractor shall give a minimum one-week notice to pre-installation meeting participants.
- F. Coordination: Coordinate the work in this Section with work in related Sections particularly roof substrate work. Convene a coordination meeting at least one week before roof substrate work with roof system manufacturer's representative attending and in accordance with Division 01.

1.6 SUSTAINABLE BUILDING DESIGN REQUIREMENTS

- A. Provide highly reflective Energy Star® compliant roofing system with emissivity of at least 0.9 when tested in accordance with ASTM E408 for a minimum of 75 percent of the roof surface.
1. Thermal Emissivity shall be measured in accordance with ASTM C1371.
 2. Solar Reflectivity shall be measured in accordance with ASTM C1549.
 3. Solar Reflectance Index shall be measured in accordance with ASTM E1980.
- B. Provide insulation products manufactured free from environment-harmful blowing agents chlorofluorocarbon (CFC) and hydrochlorofluorocarbon (HCFC).

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Store products in weather protected environment, clear of ground and moisture.
- D. Store insulation and cover board dry and protected from the elements. Store insulation on pallets and completely cover with a breathable material such as tarp or canvas. Remove or slit temporary factory-applied packaging to prevent accumulation of condensation. Do not use wet or damaged insulation.
- E. Store roofing membrane in the original undisturbed plastic wrap.
- F. Store adhesives, sealants, and other curable materials in cool and dry location with temperatures between 60 degrees F and 90 degrees F. Do not store adhesive containers with opened lids due to the loss of solvent which occur from flash off.

1.8 PROJECT/SITE CONDITIONS

- A. Do not apply roofing system during inclement weather.
- B. Do not apply roofing system to damp or frozen substrate.
- C. Take precautions to prevent wind blow-off or wind damage during the course of the roofing application.
- D. Substrates to receive roofing system shall be thoroughly dry. Provide drying equipment should moisture occur.

1.9 WARRANTY

- A. Comply with provisions of Division 01.
- B. Warranty installed membrane roofing system including labor and materials for loss of water-tightness caused by defective materials (including accessories) or workmanship, with no dollar limit, for twenty years. Effective warranty start date shall be at the time of final acceptance by Owner.
- C. Warranty shall provide for the removal, replacement, repair, and making good without cost to Owner, of defects due to defective materials or workmanship.
- D. Repairs under warranty shall be made within three days after receiving notice of need for repairs from Owner, weather permitting.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

- A. Acceptable Manufacturers and Products:
 - 1. TPO Roofing Membrane System:
 - a. Carlisle Syntec Inc.: Sure-Weld 60.
 - b. Firestone Building Products Co.: UltraPly TPO 60.
 - c. GAF Materials Corp.: EverGuard TPO 60.
 - d. Johns Manville: JM TPO Roofing Membrane - 60 mil.
 - 2. Gypsum Cover Board: Provided by roof system manufacturer.
 - 3. Roof Insulation: Provided by roof system manufacturer.
- B. Substitutions: Under provisions of Division 01.

2.2 TPO ROOFING MEMBRANE

- A. Ultraviolet resistant thermoplastic polyolefin membrane reinforced with polyester fabric.
- B. Properties:
 - 1. Thickness (ASTM D751): 60 mils nominal.
 - 2. Thickness over scrim: 15 mils nominal.
 - 3. Tolerance on nominal thickness: ± 10 percent.
 - 4. Minimum breaking strength (ASTM D751): 320 lbf/in.
 - 5. Elongation at break of fabric (ASTM D751): 28 percent.
 - 6. Tearing strength (ASTM D5884): 86 lbf.
 - 7. Dimensional stability (ASTM D1204): ± 1 percent.
 - 8. Water absorption (ASTM D471): ± 1 percent.
 - 9. Color: White.
 - a. Initial Solar Reflectance: 0.79.
 - b. Initial Thermal Emittance: 0.90.

- c. Solar Reflectance Index: 99.

2.3 GYPSUM ROOF COVER BOARD

- A. Glass mat-faced, noncombustible, moisture-resistant treated gypsum core panel specifically designed for roofing applications, 1/2 inch thick and 5/8 inch thick Type X where indicated on Drawings, square edges, conforming to ASTM C1177.
 - 1. Where membrane is attached to gypsum roof cover board with adhesive (such as at vertical surfaces), cover board shall be factory primed and 5/8 inch thick. Do not use products intended for use as exterior wall sheathing.

2.4 ROOF INSULATION

- A. Rigid, closed cell expanded polystyrene thermal insulation with square edges. Comply with ASTM C578, Type VIII; ICC ES Listed; UL Listed.
 - 1. Properties:
 - a. Compressive strength (ASTM D1621): 20 psi minimum.
 - b. Product density (ASTM D1622): 1.25 pounds per cubic foot minimum.
 - c. Water absorption (ASTM C272): 3.0 percent by volume, maximum.
 - d. Surface burning characteristics (ASTM E84):
 - 1) Flame spread: Less than 20.
 - 2) Smoke developed: 150-300.
 - e. Thermal resistance value (ASTM C518): Minimum 3.92 Ft²·Hr·°F/BTU / inch at 75 degrees F.
 - f. Water vapor permeance (ASTM E96): 3.5 perms maximum, 1 inch.
 - g. Flexural strength (ASTM C203): 30 psi minimum.
 - h. Dimensional stability (ASTM D2126): 2.0 percent linear change maximum.
 - i. Thickness: As indicated on Drawings

- B. Place insulation over entire area scheduled to receive single ply roofing.
 - 1. Crickets shall be fabricated from expanded polystyrene insulation; tapered.

- C. Insulation shall be tapered where indicated on Drawings.

2.5 ACCESSORIES

- A. Non-Reinforced or Reinforced TPO Flashing, Pipe Boot and Flashings, Clamping Rings: Use roofing membrane provided and recommended by manufacturer.
- B. Flashing Metal: 0.023 inch thick galvanized steel laminated to 0.020 inch thick roofing membrane in white color used for flashing and edge metal detailing as furnished by the membrane manufacturer.
- C. Membrane Fasteners and Disks: Use mechanical fasteners and disks approved by roofing system manufacturer and cover board and insulation manufacturers.
- D. Membrane Bonding Adhesive at Vertical Surfaces: Manufacturer approved two-component urethane, low-rise, low VOC bonding adhesive to meet California Air Resources Board or local Air Pollution Control/Air Quality Management District regulations.

- E. Termination Bar: Extruded Aluminum bar 0.08 inch thick by 1 inch wide.
- F. Membrane Cleaning Solution: Manufacturer approved or recommended.
- G. Sealants: Refer to Section 07 92 00. Solvent-based ethylene propylene seam caulk approved by roofing system manufacturer.
- H. All-Purpose Sealant: Single component, high-solids content, and gun grade, approved by membrane manufacturer.
- I. Walkway Rolls: 34 inches wide, 180 mils thick heat-weldable TPO material as supplied by membrane manufacturer, color: white. Verify manufacturer's standards for walkway pad design and slip-resistance with Architect prior to procurement of pads and prior to submittal of shop drawings.
- J. Safety Zone Markings: Roofing manufacturer's 12 inch wide yellow coverstrip consisting of 30 mil thick non-reinforced TPO flashing laminated to a nominal 30 mil thick, fully cured synthetic rubber pressure sensitive adhesive.
- K. Exposed Fastener Cover: Heat-shrink tubing, thin-wall, flexible, polyolefin tubing.
- L. Wood Nailers: Fire retardant treated.
- M. Expansion Joints: Refer to Section 07 95 00.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected and only when substrate is inspected and accepted by roofing installer and roofing system manufacturer.
- B. Verify that surfaces and site conditions are ready to receive work.
- C. Verify that deck is structurally sound to secure mechanical fastened single ply roofing system. Inspect roof deck for corrosion, rotting, warping, concrete spalling, etc. Repair or replace defective roof deck prior to installing the roofing system.
- D. Verify that deck surfaces are dry to the touch and free of snow or ice.
- E. Verify that deck is clean and smooth, free of noticeable high spots or depressions, and has a positive slope to drains or valleys.
- F. Verify that roof openings, curbs, pipes, sleeves, ducts, vents, etc. through roof are solidly set. Verify and ensure that all roof drain lines are clear.

3.2 PREPARATION - GENERAL

- A. Protection: Protect roofing surface and adjacent work against damage to roofing work.
- B. Review Material Safety Data Sheet and safety regulations recommended by OSHA.

C. Wood Nailers:

1. Install pressure treated wood nailers in appropriate size and location when required by the membrane manufacturer for a warrantable system.
2. Anchor to the roof deck at two feet on center maximum to resist a pullout force of 175 pounds per foot in any direction. Install fasteners within 6 inch of each end. Spacing and fastener embedment shall conform to Factory Mutual Loss Prevention Data Sheet 1-49.
3. Top of nailers shall be flush top of roof insulation.

D. Preparation Of Substrate:

1. General: To prevent delays or interruptions, coordinate with other work to ensure that components to be incorporated into the roofing system are available as the work progresses. Examine substrates to which the roofing materials are to be applied to ensure that their condition is satisfactory for the roofing systems application. Do not permit voids greater than 1/4 inch width in the substrate. Substrates for roofing materials shall be dry and free of oil, dirt, grease, sharp edges and debris. Inspect substrates and correct defects before application of roofing membrane.
2. Determine the condition of the structural substrate. Areas with deteriorated or damaged decking or other materials shall have those affected materials removed and replaced.
3. Provide temporary water cut-offs at the end of each day. Maintain watertight condition of roof to prevent water intrusion. Install only that amount of roofing and flashing that can be made watertight with new materials in a one-day period or prior to the onset of inclement weather. Remove cut-off before resuming roofing.
4. Cover existing decking with rigid insulation and cover board, applied in accordance with manufacturer's instructions and as required resulting in a UL Class A roof system.

3.3 INSULATION INSTALLATION

- A. Place insulation over clean roof deck where indicated on Drawings in accordance with manufacturer's instructions.
- B. Install insulation in thickness to meet specified minimum total R-value. Install additional thickness as required to meet requirements indicated on Drawings.
- C. Lay boards with edges in moderate contact without forcing. Cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- D. Apply no more insulation than can be covered with cover board and membrane in same day.
- E. Tape joints of insulation in accordance with insulation manufacturer's instructions.
- F. Stagger all joints when multiple layers or types of insulation are being installed.

3.4 GYPSUM ROOF COVER BOARD INSTALLATION

- A. Place cover board over clean insulation.
- B. Stagger all joints a minimum of 6 inches from underlying insulation joints.
- C. Fasten with disk-type fasteners as recommended by cover board manufacturer.

3.5 ROOFING MEMBRANE PLACEMENT, ATTACHMENT, AND HOT AIR WELDING

- A. General: Install membrane in accordance with manufacturer's instructions.
- B. Sweep substrate of all loose debris before laying membrane.
- C. Mechanically-Fastened Single-Ply Roofing System:
 - 1. Roll out membrane free from wrinkles or tears. Place sheet into place without stretching. Allow the membrane to relax at least fifteen minutes when the temperature is above 60 degrees F or 40 minutes when the temperature is below 60 degrees F prior to installation. Inspect for damage. Remove sections of membrane that are creased or damaged. Lap sheets as recommended by manufacturer.
 - 2. Perimeter: When installing roofing, where walls do not exceed or equal 24 inches in height, install a minimum of one sheet parallel with the perimeter and fasten with fastening system at the predetermined spacing in the lap area in a line centered approximately 1-1/2 inches from the edge of the sheet leaving 1/2 inch of membrane outside the disc. Weld lap area to metal base flashing continuously a minimum of 1-1/2 inches weld width.
 - 3. Field Areas: Run membrane perpendicular to roof slope. Install membrane overlaps to facilitate the flow of water. Overlap membrane sheets as recommended by manufacturer to provide space for fastener and disc placement for a continuous 1-1/2 inch width weld.
 - 4. Seal membrane continuous around all roof penetrations.
- D. Adhered Single-Ply Roofing System at Vertical Surfaces:
 - 1. Position membrane over the substrate.
 - 2. Fold membrane sheet back so half the underside is exposed.
 - 3. Stir bonding adhesive thoroughly scraping the sides and the bottom of the can (5 minutes minimum). Bonding surfaces must be dry and clean.
 - 4. Apply bonding adhesive to the exposed underside of the membrane and the corresponding substrate area. Do not apply adhesive along the splice edge of the membrane to be hot air welded over adjoining sheet.
 - 5. Apply adhesive evenly, without puddles using a plastic core medium nap roller to achieve continuous coating of both surfaces at a coverage rate recommended by adhesive manufacturer.
 - 6. Due to solvent flash-off, condensation may form on freshly applied bonding adhesive when the ambient temperature is near the dew point. If condensation develops, possible surface contamination may occur and the application of bonding adhesive must be discontinued. Allow the surface to dry and apply a thin freshener coat to the previously coated surface when conditions allow for continuing.
 - 7. Allow adhesive to dry until it is tacky but will not string or stick to a dry finger touch.
 - 8. Roll the coated membrane into the coated substrate while avoiding wrinkles.
 - 9. Brush down the bonded section of the membrane sheet immediately after rolling the membrane into the adhesive with a soft bristle push broom to achieve maximum contact.
 - 10. Fold back the unbonded half of the sheet in the same manner, overlapping edges a minimum of 2 inches to provide for a minimum of 1-1/2 inch hot air weld.
 - 11. Install adjoining membrane sheets in the same manner, overlapping a minimum of 2 inches to provide a minimum of 1-1/2 inch hot air weld.

12. Protect completed sections of the roof so bonding adhesive will not discolor the membrane surface. Do not place bonding adhesive containers or their lids directly on the surface of the membrane.
13. Install additional membrane securement at the perimeter of each roof level, roof section, curb, interior wall, penthouse, etc. at any inside angle change where slope exceeds 2 inches in one horizontal foot. Use manufacturer approved fasteners and standard seam fastening plates installed horizontally or vertically at the base of the walls, curbs, etc., spaced a minimum of 12 inches on center and flashed as recommended by roofing system manufacturer.

E. Welding of Laps:

1. General:
 - a. Roofing membrane connection shall be hot air welded only.
 - b. Surfaces to be welded shall be clean and dry.
2. Hot Air Welding:
 - a. Hot air weld the membrane sheets with an automatic hot air welding machine. Follow hot air welding machine manufacturer's instructions for use.
 - b. Where use of automatic hot air welding machines is not practical, use a hand-held hot air welding machine. Preheat the nozzle tip and apply over the overlap area until the material reaches required temperature, immediately follow with a hand roller to press the heated membrane surfaces together with slow, even movements. Keep the roller within one inch of the nozzle tip. Seam strength may be tested when cool. For best results, test seams 8 hours after hot air welding.
3. Quality Control of Seams: After seaming, check welded seams for continuity and integrity. Repair openings or "fishmouths" with a hand-held hot air tool fitted with a narrow nozzle tip and with a roller.
4. Membrane lap edges that have been exposed to the elements for approximately seven days or longer must be prepared with manufacturer-approved membrane cleaner. Prepare the surface where the cleaner has been applied as per manufacturer's instructions prior to hot air welding.

3.6 MEMBRANE FLASHING

- A. Flash all vertical surfaces with reinforced membrane. Use non-reinforced membrane only at inside and outside corners, field fabricated pipe seals, scuppers, and sealant pockets where the use of premolded accessories are not practical. Terminate the flashing in accordance with manufacturer-approved detail.
- B. Use bonding adhesive on vertical surfaces more than 12 inches high such as walls, curbs, and pipes. Bonding adhesive is not required for vertical surfaces terminated under a metal counter flashing less than 12 inches high. Bonding adhesive may be eliminated for flashing heights 18 inches or less when a coping or termination bar is used for vertical terminations.

3.7 OTHER RELATED WORK

- A. Walkways: Install walkway pads per manufacturer's recommendations in the locations indicated on Drawings. Position the walkway material. Cut the walkway rolls into maximum 10-foot lengths and position with a minimum 1-inch gap between adjacent pieces to allow for water drainage. Cut the walkway so a 4-inch minimum gap is created over any field membrane seams/splices.

- B. Safety Zone Markings: Install safety zone markings as recommended by the manufacturer in the locations indicated on Drawings.
 - 1. Clean roofing membrane with manufacturer's membrane cleaner.
 - 2. Roller apply manufacturer's low-VOC TPO primer. Install coverstrip immediately after primer flashes off.
 - 3. Peel off a length of protective release liner from coverstrip. Position coverstrip and press down using firm, even hand pressure across the entire area.
 - 4. Immediately roll coverstrip with silicone or steel roller using positive pressure. Roll across coverstrip edge, not parallel to the length.
- C. Copings, Counterflashing, and Other Metal Work: Refer to Section 07 62 00. Fasten flashing to prevent metal from pulling free or buckling. Seal to prevent moisture from entering the roofing system or building.
- D. At the underside of exposed decking, cover fastener tips of protruding fasteners with heat-shrink wrap tubing. Paint to match existing color or new paint where occurs.
- E. Expansion Joints: Refer to Section 07 95 00.

3.8 FIELD QUALITY CONTROL

- A. General: Comply with requirements of Division 01.
- B. The manufacturer's representative shall observe, conduct tests, and prepare test reports in accordance with the provisions of this Section at predetermined periods before, during, and after installation of the work – specifically at critical periods identified by roofing system manufacturer to ensure a completely warranted system.
- C. The manufacturer's representative and the testing agency shall conduct final roof inspection on completion of the work in this Section and submit report to Architect and Owner. Notify Architect and Owner 48 hours in advance of date and time of inspection.

3.9 CLEANING

- A. Clean roof surfaces as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.
- B. Where traffic must continue over finished roof membrane, protect surfaces.

END OF SECTION

SECTION 07 62 00
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior wall flashings.
- B. Roof flashings.
- C. Scuppers.
- D. Gutters.
- E. Rain water leaders.
- F. Pre-manufactured copings.
- G. Pre-manufactured fascias.
- H. Pre-manufactured roof penetration flashings.
- I. Reglets.

1.2 RELATED SECTIONS

- A. Section 07 54 23.13 – Adhered Thermoplastic-Polyolefin Roofing.
- B. Section 07 54 23.16 – Mechanically Fastened Thermoplastic-Polyolefin Roofing.
- C. Section 07 92 00 – Joint Sealants.
- D. Section 08 91 19 – Fixed Louvers.
- E. Section 09 91 00 – Painting.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AAMA 2605 – Voluntary Specifications, Performance Requirements, and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
 - 2. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM B32 – Standard Specification for Solder Metal.

4. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
5. ASTM D1187 – Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
6. ASTM D4586 – Standard Specification for Asphalt Roof Cement, Asbestos Free.
7. NRCA Roofing Manual.
8. SMACNA Architectural Sheet Metal Manual.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Describe material profile, jointing pattern, jointing details, fastening methods and installation details.
- C. Samples: Provide three-12 inch long samples of premanufactured copings, fascias, and reglets in selected color.

1.5 QUALITY ASSURANCE

- A. Applicator: Company specializing in sheet metal flashing work with sufficient documented experience.

1.6 SYSTEM DESCRIPTION

- A. Work of this Section is to physically protect roofing and exterior from damage that would permit water leakage to building interior.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Store products under provisions of Division 01.
- B. Stack preformed material to prevent twisting, bending or abrasion, and to provide ventilation.
- C. Prevent contact with materials during storage that may cause discoloration, staining or damage.

PART 2 PRODUCTS

2.1 SHEET MATERIALS

- A. Galvanized Steel: ASTM A653/A653M, G90; 24 gauge core steel, unless noted otherwise on Drawings.
- B. Aluminum: ASTM B209, 0.032 inch thickness, mill finish, unless noted otherwise on Drawings.

2.2 ACCESSORIES

- A. Fasteners: Galvanized steel or stainless steel with soft neoprene washers. Finish exposed fasteners same as flashing metal.
- B. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

- C. Touch-up Paint: "Galvalloy" or "Galvweldalloy."
- D. Sealant: Type specified in Section 07 92 00.
- E. Bedding Compound: Rubber-asphalt type.
- F. Asphalt Roofing Cement: ASTM D4586, asbestos free, of consistency required for application.
- G. Solder:
 - 1. Galvanized Steel: ASTM B32; 95-5 Tin Antimony type.
- H. Flux: Type as recommended by sheet metal manufacturer.
- I. Strainers: Provide and install strainers at rain water leader openings in gutters per SMACNA manual.

2.3 PREMANUFACTURED COPINGS

- A. Manufacturers:
 - 1. W.P. Hickman Company.
 - 2. Tremco.
 - 3. Metal Era.
 - 4. Permatite.
 - 5. Substitutions: Under provisions of Division 01.
- B. Copings: Modular Coping System.
 - 1. Coping shall be 0.050 thick aluminum with smooth surface.
 - 2. Sizes as required to accommodate varying wall thicknesses.
 - 3. Splice joints shall have 6 inch long concealed splice plates at 12 feet on center. Allow 1/4 inch at all butt joints per 12 foot length.
 - 4. Prefabricated corners shall be shop mitered and shop welded.
 - 5. All fasteners shall be concealed.
 - 6. Finish: Pre-finished with Kynar 500 three coat paint system in conformance with AAMA 2605, color as selected by Architect.

2.4 PREMANUFACTURED FASCIAS

- A. Manufacturers:
 - 1. W.P. Hickman Company. Product: TerminEdge Model No. TE657.
 - 2. Tremco.
 - 3. Metal Era.
 - 4. Permatite.
 - 5. Substitutions: Under provisions of Division 01.
- B. Fascias:
 - 1. Fascia covers shall be 0.050 inch thick aluminum with smooth surface and 6.75 inch face dimension. Provide matching 4 inch wide joint splice plates.

2. Continuous retainer base plate shall be 0.050 inch thick aluminum with 9/32 inch diameter pre-punched holes for fasteners at 12 inches on center.
3. Splice joints shall have 6 inch long concealed splice plates at 12 feet on center. Allow 1/4 inch at all butt joints per 12 foot length.
4. Prefabricated corners shall be shop mitered and shop welded. Corner leg lengths shall be minimum 12 inches long.
5. Fasteners shall be stainless steel hex head screw type. All fasteners shall be concealed with no penetrations on horizontal roof surface.
6. Finish: Pre-finished with Kynar 500 three coat paint system in conformance with AAMA 2605, color as selected by Architect.

2.5 PREMANUFACTURED ROOF PENETRATION FLASHINGS

A. At single ply membrane roofing:

1. Pipe Portal System as manufactured by Portals Plus or accepted equal. Products:
 - a. Pipe Boots: Compression molded EPDM rubber caps mechanically sealed to curb cover using two beads formed into the collar of the cover mated with double grooves molded into the inside of the cap. Provide manufacturer's standard adapter rings as required for a watertight installation. Size and type: As required for size and number of pipes to be flashed.
 - 1) Provide stainless steel clamps for final securement of pipe boots around penetrations.

2.6 REGLETS

A. Manufacturers:

1. Fry. Product:
 - a. Masonry Flashing System: Fry Reglet Model "MA" Springlok Masonry Reglet and Counter Flashing. Material shall be 0.025 inch thick aluminum with gray polyester coating.
2. MM Systems.
3. Superior.
4. Substitutions: Under provisions of Division 01.

2.7 FABRICATION

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.
- C. Form pieces in longest practical lengths.
- D. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- E. Form material with flat lock seam.
- F. Solder and seal metal joints watertight. After soldering, remove flux. Wipe and wash solder joints clean.

- G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.
- H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
- I. Expansion-contraction of sheet metal runs: Provide flat, loose locking slip joint at maximum of 10 foot intervals.

2.8 FINISH

- A. Back-paint concealed metal surfaces with bituminous paint to a minimum dry film thickness of 15 mils.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify shapes and dimensions of surfaces to be covered.
- B. Verify substrates are clean, dry, smooth and free of defects to the extent needed for sheet metal work.
- C. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Field measure site conditions prior to fabricating work.
- B. Install starter and edge strips, and cleats before starting installation.
- C. Install reglets true to lines and levels. Seal top of reglets with sealant.
- D. Insert flashings into reglets to form tight fit. Secure in place with plastic wedges at maximum 12 inches on center. Seal flashings into reglets with sealant.
- E. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations acceptable to Architect.
- F. Lock and seal all joints.
- G. Apply plastic cement compound between metal flashings and felt flashings.
- H. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- I. Solder metal joints watertight for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.
- J. Seal metal joints watertight.
- K. Single-Ply Roofing:
 - 1. Do not use petroleum-based products in conjunction with single-ply roofing.
 - 2. All sealants used in conjunction with single-ply roofing shall be approved by roof membrane manufacturer.

3.3 INSTALLATION

- A. Fabricate and install items in conformance with drawing details and SMACNA and NRCA manuals.
 - 1. Install premanufactured items in accordance with manufacturer's recommendations.
- B. Ensure that items are installed in true and accurate alignment with other items and related work; that joints are accurately fitted; that exposed surfaces are free from dents; that corners are reinforced; that seams are watertight.
- C. All work shall be left free of passivators, oil, grease, or acid residue, ready to receive painter's finish.
- D. Wherever possible, all fasteners shall be concealed. All exposed fasteners shall have neoprene gaskets and be capped with a bead of sealant.
- E. Install counter-flashings in reglets with continuous bead of sealant.

3.4 TOUCH-UP

- A. Where galvanized finish is damaged by fabrication or installation, repair with specified touch-up material, applying in accordance with manufacturer's printed instructions.

END OF SECTION

SECTION 07 72 13
MANUFACTURED CURBS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Prefabricated roof curbs.

1.2 RELATED SECTIONS

- A. Section 07 54 23.13 – Adhered Thermoplastic-Polyolefin Roofing.
- B. Divisions 21 - 23 – Mechanical.
- C. Divisions 25 - 28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards and Manuals:
 - 1. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Submit shop drawings indicating dimensions, materials, reinforcement and anchoring devices.

1.5 DESIGN REQUIREMENTS

- A. Curbs shall be designed to support imposed equipment and lateral loads with no deflection or failure of any component part.

1.6 QUALITY ASSURANCE

- A. Standards of Manufacture: Manufacturer designated herein indicates quality of materials to be used on this project. Products of other manufacturers equal to these standards in all respects may be provided.

1.7 WARRANTY

- A. Provide five-year warranty under provisions of Division 01.
- B. Warranty: Include coverage for defects in materials and workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Thybar Corporation. Products:
 - 1. Model No. TC-3 prefabricated insulated roof curb.
 - 2. Model No. TEMS-3.
- B. Substitutions: Under provisions of Division 01.

2.2 FABRICATION

- A. Curbs shall be constructed using minimum 16 gauge ASTM A653/653M G90 galvanized steel with mitered and continuously welded corners, integral base plates, internally reinforced with 1 inch x 1 inch x 1/8 inch steel angles, factory insulated with 1-1/2 inch thick, three pound density fiberglass antimicrobial rigid insulation, and factory installed pressure treated wood nailers. All seams shall be joined by continuous water and air tight welds.
- B. Minimum height of curb above roofing surface shall be 8 inches unless otherwise noted on Drawings.
- C. Curbs shall be constructed to match slope of roof and provide a level top surface for mounting of equipment.
- D. Curb platforms shall be manufactured to accommodate the mounting of all equipment, penetrations, and other items as required to mount and weatherproof all equipment.

PART 3 EXECUTION

3.1 COORDINATION

- A. Size of curbs and required options shall be coordinated by curb manufacturer and Contractor prior to fabrication.

3.2 EXAMINATION

- A. Verify that openings are ready to receive work.
- B. Verify that field measurements are as shown on shop drawings and as instructed by manufacturer.
- C. Beginning of installation means installer accepts existing substrate conditions.

3.3 INSTALLATION

- A. Curbs shall be installed in strict conformance with manufacturer's printed instructions and as indicated on Drawings.

END OF SECTION

SECTION 07 72 33

ROOF HATCHES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Prefabricated roof hatches, with integral support curbs, operable hardware and counter-flashings.
- B. Roof hatch guards.
- C. Accessories.

1.2 RELATED SECTIONS

- A. Section 05 31 00 – Steel Decking.
- B. Section 05 50 00 – Metal Fabrications: Roof access ladders.
- C. Section 07 54 23.13 – Adhered Thermoplastic-Polyolefin Roofing.
- D. Section 07 54 23.16 – Mechanically Fastened Thermoplastic-Polyolefin Roofing.
- E. Section 07 62 00 – Sheet Metal Flashing and Trim: Flashing to roof system.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A36 – Standard Specification for Structural Steel.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide data on unit construction, sizes, configuration, jointing methods and locations when applicable, and attachment method.
- C. Manufacturer's Installation Instructions: Indicate special installation criteria, interface with adjacent components.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Bilco, Products:
 - 1. Roof Hatches:
 - a. Type S-50 single leaf at administration roof.
 - b. Type F-50 single leaf at housing roof.
 - 2. Roof Hatch Guards:
 - a. Model RL-S at administration roof.
 - b. Model RL-F at housing roof.
- B. Babcock – Davis.
- C. Milcor.
- D. Substitutions: Under provisions of Division 01.

2.2 ROOF HATCHES

- A. Unit: 30 inches by 36 inches size, single leaf type.
 - 1. Performance Characteristics:
 - a. Cover shall be reinforced to support a minimum live load of 40 pounds per square foot with a maximum deflection of 1/150th of the span and 140 pounds per square foot wind uplift.
 - b. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - c. Operation of the cover shall not be affected by temperature.
 - d. Entire hatch shall be weathertight with fully welded corner joints on cover and curb.
 - 2. Cover: 11 gauge aluminum with a 3 inch beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
 - 3. Cover Insulation: Fiberglass of 1 inch thickness, fully covered and protected by an 18 gauge aluminum liner.
 - 4. Curb: 12 inches in height and of 11 gauge aluminum. The curb shall be formed with a 3-1/2 inch wide flange with 7/16 inch diameter holes provided for securing to the roof deck. Curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, with flashing system, including stamped tabs, 6 inches on center, bent inward.
 - 5. Curb Insulation: Rigid, high-density fiberboard of 1 inch thickness on outside of curb.
 - 6. Lifting Mechanisms: Provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.

7. Hardware:

- a. Heavy pintle hinges.
- b. Cover shall be equipped with a spring latch with interior and exterior turn handles.
- c. Roof hatch shall be equipped with interior and exterior padlock hasps.
- d. The latch strike shall be a stamped component bolted to the curb assembly.
- e. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1 inch diameter red vinyl grip handle to permit easy release for closing.
- f. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be Type 316 stainless steel.
- g. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

8. Finish: Factory finish shall be mill finish aluminum.

B. Unit: 48 inches by 48 inches size, single leaf type.

1. Performance Characteristics:

- a. Cover shall be reinforced to support a minimum live load of 40 pounds per square foot with a maximum deflection of 1/150th of the span and 20 pounds per square foot wind uplift.
- b. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
- c. Operation of the cover shall not be affected by temperature.
- d. Entire hatch shall be weathertight with fully welded corner joints on cover and curb.

2. Cover: 11 gauge aluminum with a 3 inch beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

3. Cover Insulation: Fiberglass of 1 inch thickness, fully covered and protected by an 18 gauge aluminum liner.

4. Curb: 12 inches in height and of 11 gauge aluminum. The curb shall be formed with a 3-1/2 inch wide flange with 7/16 inch diameter holes provided for securing to the roof deck. Curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, with flashing system, including stamped tabs, 6 inches on center, bent inward.

5. Curb Insulation: Rigid, high-density fiberboard of 1 inch thickness on outside of curb.

6. Lifting Mechanisms: Provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.

7. Hardware:

- a. Heavy pintle hinges.

- b. Cover shall be equipped with a spring latch with interior and exterior turn handles.
- c. Roof hatch shall be equipped with interior and exterior padlock hasps.
- d. The latch strike shall be a stamped component bolted to the curb assembly.
- e. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1 inch diameter red vinyl grip handle to permit easy release for closing.
- f. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be Type 316 stainless steel.
- g. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

8. Finish: Factory finish shall be mill finish aluminum.

2.3 ROOF HATCH GUARDS

A. Performance Characteristics:

- 1. High visibility safety yellow color shall be molded in.
- 2. Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
- 3. Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two.
- 4. UV and corrosion resistant construction with a twenty-five year warranty.
- 5. Self-closing gate shall be provided with hatch rail system.

B. Posts and Rails: Shall be round pultruded reinforced fire retardant yellow fiberglass treated with a UV inhibitor.

C. Hardware: Mounting brackets shall be 1/4 inch thick hot dip galvanized steel. Hinges and post guides shall be 6063-T5 aluminum. Fasteners shall be Type 316 stainless steel.

2.4 ACCESSORIES

A. Safety Post: Bilco, Model LU-1, Ladder up.

2.5 FABRICATION

- A. Fabricate components free of visual distortion or defects. Weld corners and joints.
- B. Provide for removal of condensation occurring within components or assembly.
- C. Fit components for weathertight assembly.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install roof hatches and roof hatch guards in accordance with manufacturer's instructions.
- B. Coordinate with installation of roofing system and related flashings for weathertight installation.

- C. Apply bituminous paint on surfaces of units in contact with cementitious materials or dissimilar metals.
- D. Test units for proper function and adjust until proper operation is achieved.

3.2 CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION

SECTION 07 72 56
FALL PROTECTION DEVICES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Roof tie-down system of fall restraint and fall arrest for worker safety.

1.2 RELATED SECTIONS:

- A. Section 05 12 00 – Structural Steel Framing.
- B. Section 05 31 00 – Steel Decking.
- C. Section 07 54 23.16 – Mechanically Fastened Thermoplastic-Polyolefin Roofing.

1.3 REFERENCES

- A. Occupational Health And Safety Administration (OSHA).
 - 1. OSHA 1910.66 App C - Personal Fall Arrest System.
 - 2. OSHA 1926.502 – Fall Prevention Systems Criteria and Practices.

1.4 SYSTEM DESCRIPTION

- A. General: Provide structural fall restraint and fall arrest system capable of withstanding loads and stresses within limits and under conditions specified in OSHA and other applicable safety codes. Provide fall protection anchors permanently attached to roof structure.
 - 1. Anchors shall be installed where roof parapet heights are less than 42 inches above adjacent roof surface.
- B. Design Requirements: Anchors and accessories comprising system of following types:
 - 1. Anchors, spaced as indicated by manufacturer, for safety snap connection by individual workers capable of withstanding a 5,000 pound load or safety factor of 2 meeting the requirements of OSHA 1926.502(d)(8).
- C. Performance Requirements: System and components shall be tested for the resistance of the following loads:
 - 1. Fall Restraint: One user.
 - 2. Fall Arrest: One user.
 - 3. Design fall protection anchors to resist a 5,000 pound load applied in any direction at maximum anchor height or provide engineered system designed meeting the requirements of OSHA 1926.502(d)(8).

1.5 SUBMITTALS

- A. Product Data: For each type of device specified, including manufacturer's standard fabrication details and installation instructions.

- B. Shop Drawings: Show anchor layout, profiles, and attachment details. Shop drawings and calculations shall be signed and stamped by a Professional Engineer registered in the State of California.
- C. Maintenance Data: Written instructions for maintenance of fall prevention safety devices shall be included in the operation and maintenance manual.
- D. In-house Test Reports: Indicate anchor fabrication compliance with performance requirements.
- E. Signage: Provide laminated sign showing system layout and usage notes, to be installed at roof access locations.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company having at least ten years continuous experience in manufacturing fall safety equipment similar to systems specified and exhibiting records of successful in-service acceptability and performance. Company must employ personnel dedicated to provide regularly scheduled Authorized and Competent Person Training courses as mandated by OSHA 1926 and OSHA 1910 for Owner's authorized safety personnel.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where the Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of roof anchors that are similar to those indicated for this Project in material, design and extent.
- C. OSHA Standards: Comply with Occupational Safety and Health Administration Standards for the Construction Industry 29 CFR § 1926.500 Subpart M (Fall Protection), and with applicable State Administrative Code safety standards for Fall Restraint and Fall Arrest.
- D. Source Limitations: Obtain all roof anchors through one source from a single manufacturer.
- E. Testing: Perform quality control tests for each system per manufacturer's requirements.

1.7 COORDINATION

- A. Coordinate installation of structural deck to meet requirements of roof anchor manufacturer.
 - 1. Metal Deck: Minimum 18 gauge thickness, or provided with additional deck reinforcing per manufacturer's instructions.
 - 2. Structural beam for weld-on or backer plate connection: Structure must be capable of supporting a 5,000 pound ultimate load.
 - 3. Concrete or composite metal deck for backer plate or toggle anchor connection: Deck must be capable of supporting a 5,000 pound ultimate load.
- B. Coordinate installation of structural deck reinforcements and anchorages to receive fall protection anchors.
- C. Coordinate placement of roofing system, insulation, and flashing to ensure water-tight integrity to roof.

1.8 WARRANTY

- A. Provide manufacturer's standard warranty to guarantee products will be free from defects for a period of twelve months. Warranty period shall become effective on date of project substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Guardian Fall Protection Inc., Kent, WA; 800-466-6385, www.guardianfall.com. Product: CB-18 Galvanized Roof Anchors.
 - 2. Tractel Ltd., Fallstop Division, Anjou, Quebec, Canada; 800-561-3229, www.tractel.com.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Anchor Post: 2-1/2 inch diameter Schedule 80 pipe, galvanized steel; size as necessary for height.
- B. Anchor U-bar: 5/8 inch diameter U-bar, galvanized steel.
- C. Anchor Base Plate: Galvanized steel.

2.3 FABRICATION

- A. Fabricate work true to dimension, square, plumb, level, and free from distortions or defects detrimental to appearance and performance.
- B. Prepare, treat, and coat galvanized metal to comply with manufacturer's written instructions. Prepare galvanized metal by removing grease, dirt, oil, flux, and other foreign matter.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine framing and substrate and verify conditions. Comply with structural requirements for proper system performance.
- B. Proceed with installation of roof anchors only after verifying conditions are satisfactory.

3.2 INSTALLATION

- A. General: Install anchor posts per manufacturer's instructions and recommendations and details on Drawings.

3.3 ADJUSTMENT AND INSPECTION

- A. Ensure all manufactured anchors have been installed in accordance with fall protection manufacturer's engineering documentation and specifications.

- B. Provide record drawings showing any deviations to shop drawing anchor locations, as installed.

END OF SECTION

SECTION 07 81 16
CEMENTITIOUS FIREPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work under this Section consists of the furnishing of all labor, materials, equipment and services necessary for, and incidental to, the complete and proper installation of all spray-applied fireproofing and related work as shown on Drawings or specified in this Section, and in accordance with all applicable requirements of the Contract Documents.
 - 1. The following is used in the project:
 - a. Standard density gypsum based cementitious fireproofing.
 - b. High density Portland cement fireproofing at exposed steel members in perimeter chases of housing units.
- B. The material and installation shall conform to the applicable building code requirements of all authorities having jurisdiction.
- C. For patch and repair work, match existing adjacent fireproofing thickness to obtain the code-required fire rating for that location.

1.2 RELATED SECTIONS

- A. Section 05 12 00 – Structural Steel Framing.
- B. Section 05 31 00 – Steel Decking.
- C. Section 05 50 00 – Metal Fabrications.
- D. Divisions 21 - 23 – Mechanical.
- E. Divisions 25 - 28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM D2240 – Standard Test Method for Rubber Property – Durometer Hardness.
 - 2. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 4. ASTM E605 – Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Material (SFRM) Applied to Structural Members.

5. ASTM E736 – Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials (SFRM) Applied to Structural Members.
6. ASTM E759 – Standard Test Method for Effect of Deflection on Sprayed Fire-Resistive Material Applied to Structural Members.
7. ASTM E760 – Standard Test Method for Effect of Impact on Bonding of Sprayed Fire Resistive Material Applied to Structural Members.
8. ASTM E761 – Standard Test Method for Compressive Strength of Sprayed Fire-Resistive Material Applied to Structural Members.
9. ASTM E859 – Standard Test Method for Air Erosion of Sprayed Fire-Resistive Materials (SFRMs) Applied to Structural Members.
10. ASTM E937 – Standard Test Method for Corrosion of Steel by Sprayed Fire-Resistive-Material (SFRM) Applied to Structural Members.
11. ASTM E1354 – Standard Test Method for Heat Visible Smoke Release Rates for Materials and Products Using an Oxygen Consumption Calorimeter.
12. ASTM G21 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
13. UL Fire Resistance Directory.
14. AWCI – Inspection Procedure for Field-Applied Sprayed Fire Protection Materials.
15. SFM Approved Materials and Equipment Listing Services.

1.4 SUBMITTALS

- A. Submit all information under provisions of Division 01.
- B. Manufacturers' Data:
 1. Submit manufacturer's instructions for proper application of sprayed fireproofing.
 2. Submit product data indicating UL listings, product characteristics and performance and limitation criteria.
- C. Submit manufacturer's certificate under provisions of Division 01 stating that products meet or exceed the specified requirements.
- D. Submit manufacturer's letter verifying that the UL Designs selected for the project are not load restricted.
- E. Test Data: From a qualified independent testing agency employed and paid by the manufacturer. Provide reports indicating that physical properties of proposed sprayed on fireproofing products comply with specified requirements based on comprehensive testing of current product formulations according to the following requirements:
 1. Testing is performed on sprayed on fireproofing materials randomly selected from bags bearing the applicable classification marking of UL or another inspecting and testing agency acceptable to authorities having jurisdiction.
 2. Testing is performed on specimens of sprayed on fireproofing materials that comply with laboratory testing requirements specified in Part 2 and are otherwise identical in every respect to the installed fireproofing including application of sealers, topcoats, tamping, troweling, rolling and water overspray, if any of these are used in final application.

3. Qualified independent testing agency does testing on laboratory specimens that it witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.
 4. Test reports without the above information are not acceptable.
- F. Fire Testing: Submit evidence that the cementitious fireproofing has been subjected to full scale ASTM E84 and ASTM E119 fire testing by Underwriters Laboratories Inc. Include evidence that the fire testing was sponsored by the manufacturer and that the material tested was produced at the manufacturer's facility under the supervision of Underwriters Laboratories Inc. personnel. Letters documenting classification status are not acceptable evidence of compliance with this Section.
- G. Test Reports:
1. Submit all test reports under provisions of Division 01.
 2. For primers and other coatings applied to structural steel from a qualified independent testing agency employed and paid by Contractor indicating that primers and coatings proposed for application in shop or field are compatible with sprayed on fireproofing. Instruct laboratory to determine compatibility as follows:
 - a. By testing for bond per ASTM E736 and requirements specified in UL "Fire Resistance Directory" about coating materials.
 - b. By verifying that fireproofing manufacturer has not found primers or coatings to be incompatible with fireproofing based on its own laboratory testing or field experience.
- H. Shop Drawings: Submit shop drawings indicating the following:
1. Where and what kinds of surface preparations are required before applying fireproofing.
 2. Extent of sprayed fire resistive material for each different construction and fire resistance rating including the following:
 - a. Applicable fire resistive design designations of inspecting and testing agency applicable to authorities having jurisdiction.
 - b. Minimum thickness needed to achieve required fire resistance ratings of structural components and assemblies.
 - c. Treatment of fireproofing after its application.
- I. ICC Evaluation reports or research reports of the model code organization acceptable to authorities having jurisdiction showing that the sprayed fire resistive material complies with the building code in effect for the Project.
- J. Request for Substitution: Provide the following information with any request for substitution on the item or process that is being requested to be substituted:
1. A complete description of the item or process.
 2. Samples of color and texture.
 3. Submit a complete thickness schedule for each structural component and assembly to be fireproofed.
 4. Performance characteristics and production rates. All performance tests shall be conducted at the average density listed in the UL Fire Resistance Directory.

5. A list of at least three other projects of similar nature to this contract where the products have been in use for at least one year, including telephone number and person to contact at these other projects.
6. An analysis of the effect of the substitution on the schedule and contract cost and on the overall project as it relates to adjoining work.

1.5 QUALITY ASSURANCE

- A. Fireproofing work shall be installed by a firm with not less than three years of successful experience in the application of specified fireproofing materials on projects of similar scope. Applicator shall be licensed or otherwise approved in writing by the manufacturer of fireproofing materials.
- B. Products, execution and fireproofing thickness and density shall conform to the applicable code requirements for the required fire-resistance ratings for the type of member / assembly to be fireproofed.
 1. UL design listings must state that the loading was determined by Allowable Stress Design Method or Load and Resistance Factor Design Method. UL design listings requiring a load restriction factor are not allowed.
- C. Sprayed fireproofing shall form a sound bond with the steel.
- D. Prior to the execution of work, Contractor shall call a pre-installation meeting to review product selection, check substrates for acceptability, verify designs and thickness, discuss inspection procedures, and coordinate the fireproofing installation with the work of other trades. The meeting shall be attended by Contractor, fireproofing applicator, an employee of the fireproofing manufacturer, and a representative of the independent testing agency.
- E. Obtain sprayed fire resistive materials for all required products from a single manufacturer.
- F. Prior to installation of the fireproofing, prepare a sample installation of at least 100 square feet over a representative area on site. The sample area shall be tested for density, and bond strength to assure compliance with the submitted independent laboratory reports or the project requirements.
- G. Sprayed fireproofing shall meet requirements of systems approved by State Fire Marshal and local Building Inspector.
- H. Applicator Qualifications: Applicator shall be approved by sprayed fireproofing manufacturer, including qualified factory training where recommended by manufacturer.
- I. Fireproofing products shall be 100 percent free of asbestos and mineral wool fibers and contain less than ten percent vermiculite.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Conform to the requirements specified in Division 01.
- B. Material shall be delivered in original unopened packages, fully identified as to manufacturer, brand or other identifying data, and bearing the proper Underwriters' Laboratories, Inc. labels for fire hazard and fire-resistance classification.

- C. Material shall be stored (above ground), under cover and in a dry location until ready for use. All bags that have been exposed to water before use shall be found unsuitable for use and discarded. Stock of material is to be rotated and used prior to its expiration date.
- D. Leave seals unbroken and labels intact until time of use. Remove from job site any rejected or damaged packages found unsuitable for use. Remove from job site any bags of sprayed fireproofing materials that have been exposed to water before use.

1.7 PROJECT/SITE CONDITIONS

- A. A minimum temperature of 40 degrees F for air and substrate must be maintained for 24 hours before, during and for 24 hours after application of the sprayed fireproofing. If necessary for job progress, Contractor shall provide enclosures with heat to maintain temperatures.
- B. Contractor shall provide ventilation to allow for proper drying of the fireproofing during and subsequent to its application. In poorly ventilated areas lacking natural ventilation, forced air ventilation (minimum total air exchange rate of four times per hour) shall be employed to cause the material to become substantially dry.
- C. Protection:
 - 1. Protect adjacent surfaces and equipment from damage by overspray, fall-out and dusting-off of sprayed fireproofing materials.
 - 2. Provide temporary enclosures to prevent spray fireproofing from contaminating air.
 - 3. Provide means to prevent damage to sprayed fireproofing from inclement weather.
 - 4. Provide tarping of all floor areas where spray fireproofing is to occur.

1.8 SEQUENCING

- A. Prior to installation of sprayed fireproofing all other trades must have completed installation of all items such as hangers, clamps, and other attachments for work suspended from, attached to, or passing through construction required to receive sprayed fireproofing.
- B. Apply sprayed fireproofing prior to installation of ducts, piping conduit, and other work preventing correct application.
- C. Apply no fireproofing to underside of steel decking until completion of concrete work.
- D. At roof decks that do not receive concrete fill, apply no fireproofing to underside of roof decking until completion of roofing installation and until roof traffic has ceased.

1.9 WARRANTY

- A. Special Project Warranty: Submit written warranty, executed by Contractor and cosigned by Installer, agreeing to repair/replace fireproofing work of this Section, which has cracked, flaked, dusted excessively, peeled or fallen from substrate, or otherwise deteriorated to a condition where it would not perform effectively as intended for fireproofing purposes; due substantially to defective materials or workmanship and not due to abuse by occupants, improper maintenance, unforeseeable ambient exposure, or other causes beyond anticipated conditions and Contractor's/Installer's control. Warranty period shall be two years after date of final project completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers and Products:

1. Basis-of-Design: Construction Products Division of W. R. Grace & Co., Cambridge, MA; 866-333-3726, www.na.graceconstruction.com. Products:
 - a. Monokote Type MK-6, standard density.
 - b. Z-146, high density.
2. Carboline, St. Louis, MO; 800-848-4645, www.carboline.com.
3. Isolatek International (Cafco), Stanhope, NJ; 973-347-1200, www.cafco.com.

B. Substitutions: Under provisions of Division 01.

1. UL tested assemblies used in the design of this project are based on products by W. R. Grace & Co. If other manufacturers are proposed for installation, submit equivalent UL tested assemblies using that manufacturer for Architect's review prior to the submission of shop drawings.

2.2 MATERIALS – STANDARD DENSITY

A. The sprayed material shall be a factory-mixed, dry formulation of gypsum or Portland cement binders and lightweight aggregates mixed with water at the project site to form a slurry for conveyance and application. The fireproofing material shall be free of asbestos and mineral wool, and contain less than ten percent vermiculite. The cementitious fireproofing shall comply with the following physical performance standards:

1. Dry Density: 15 pounds per cubic foot minimum average density regardless of density indicated in referenced fire-resistive design, or greater if required to attain fire-resistance ratings indicated, as determined per ASTM E605 or Appendix A "Alternate Method for Density Determination" of AWCI Technical Manual 12-A.
2. Deflection: Material shall not crack or delaminate from the surface to which it is applied when tested in accordance with ASTM E759.
3. Bond Impact: Material subject to impact tests in accordance with ASTM E760 shall not crack or delaminate from the surface to which it is applied.
4. Bond Strength: Fireproofing material when tested in accordance with ASTM E736, shall have a minimum average bond strength of 200 pounds per square foot and a minimum individual bond strength of 150 pounds per square foot.
5. Air Erosion: Maximum allowable weight loss of the fireproofing material shall be 0.005 grams per square foot when tested in accordance with ASTM E859. For laboratory tests, the minimum sprayed fire resistive material thickness shall be 0.75 inch, the maximum dry density shall be 15 pounds per cubic foot. Test specimens are not prepurged by mechanically induced air velocities and the total reported weight loss shall be the total weight loss over a 24 hour period.
6. High Speed Air Erosion: Materials to be used in plenums or ducts shall exhibit no continued erosion after four hours at an air speed of 2,500 feet per minute. (29 miles per hour) when tested in accordance with the UMC (1985) Appendix A, Section 10.116 and ASTM E859.

7. Compressive Strength: The fireproofing shall not deform more than ten percent when subjected to compressive forces of 1,000 pounds per square foot when tested in accordance with ASTM E761. Minimum sprayed-on fireproofing thickness tested shall be 0.75 inch and the minimum dry density shall be as specified, but not less than 15 pounds per cubic foot.
 8. Corrosion Resistance: Steel with applied fireproofing shall be tested in accordance with ASTM E937 and shall not promote corrosion of steel.
 9. Surface Burning Characteristics: Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
 - a. Flame Spread: 0.
 - b. Smoke Development: 0.
 10. Mold Resistance: The fireproofing material shall be tested in accordance with ASTM G21 and shall show resistance to mold growth for a period of sixty days.
 11. Combustibility: Material shall have a maximum total heat release of 20 MJ/m² ten minutes after insertion to a radiant heat flux of 75 kW/m² when tested in accordance with ASTM E1354.
- B. Spatterkote SK-3 shall be applied to all cellular decking prior to the application of the Monokote MK-6 fireproofing material.
- C. Mixing water shall be clean, fresh and suitable for domestic consumption and free from such amounts of mineral or organic substances as would affect the set of the fireproofing material.
- D. Provide accessories which comply with manufacturers recommendations and which meet fire resistance designs and code requirements. Such accessories include but are not limited to: bonding agents, topcoats, stud pins, metal lath, scrim and plastic netting.

2.3 MATERIALS – HIGH DENSITY

- A. The sprayed material shall be a factory blended cementitious fireproofing which when mixed at the jobsite with water and applied will provide compliance with all Drawings, Specifications and the following physical performance test criteria:
1. Dry Density: The field density shall be measured, in accordance with ASTM Standard E605. Minimum average density shall be 40 pounds per cubic foot as listed in the UL Fire Resistance Directory, ICC Evaluation Report or as required by the authority having jurisdiction.
 2. Deflection: Material shall not crack or delaminate from the surface to which it is applied when tested in accordance with ASTM E759.
 3. Bond Impact: Material subject to impact tests in accordance with ASTM E760 shall not crack or delaminate from the surface to which it is applied.
 4. Bond Strength: Fireproofing, when tested in accordance with ASTM E736, shall have a minimum average bond strength of 10,000 pounds per square foot and a minimum individual bond strength of 8,000 pounds per square foot.
 5. Air Erosion: Maximum allowable weight loss of the fireproofing material shall be 0.005 grams per square foot when tested in accordance with ASTM E859.

6. Compressive Strength: The fireproofing shall not deform more than ten percent when subjected to compressive forces of 10,000 pounds per square foot when tested in accordance with ASTM E761.
 7. Corrosion Resistance: Steel with applied fireproofing shall be tested in accordance with ASTM E937 and shall not promote corrosion of steel.
 8. Surface Burning Characteristics: Material shall exhibit the following surface burning characteristics when tested in accordance with ASTM E84:
 - a. Flame Spread: 0.
 - b. Smoke Development: 0.
 9. Durometer Hardness: The fireproofing shall have a minimum Durometer Hardness of 40 when tested in accordance with ASTM D2240.
 10. Mold Resistance: Fireproofing material shall be tested in accordance with ASTM G21 and shall show resistance to mold growth for a period of sixty days.
- B. The sprayed fireproofing material shall have been tested and reported by Underwriters' Laboratories, Inc. in accordance with the procedures of ASTM E119.
- C. Mixing water shall be clean, fresh and suitable for domestic consumption and free from such amounts of mineral or organic substances as would affect the set of the fireproofing material.

2.4 ACCESSORIES

- A. Metal Lath: Expanded metal flat diamond weighing 3.4 pounds per square yard with galvanized finish as manufactured by ClarkDietrich Building Systems, Cemco, Amico, or accepted equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. All surfaces to receive sprayed fireproofing shall be free of oil, grease, rolling compounds or lubricants, loose mill scale, excess rust, non-compatible primer, lock down agent, dirt or any other foreign substances that will impair proper adhesion of the fireproofing to the substrate. Where necessary, cleaning of surfaces to receive fireproofing shall be the responsibility of Contractor.
- B. Structural steel and steel deck surfaces shall be compatible with sprayed fireproofing.
1. Primed structural steel shall be tested and reported by Underwriters' Laboratories. The report shall indicate approval for the specific primer and its use on the maximum uninterrupted span of the structural steel surface. All primed structural steel shall bear the appropriate Underwriters' Laboratories Inc. label indicating compliance.
 2. Where a corrosive environment such as where excessive moisture or free water will contact the fireproofing or fireproofed member, a coating must be applied to prevent corrosion of the steel surfaces. The coating must be applied prior to the fireproofing application. The coatings manufacturer shall certify as to the compatibility of the coating with Portland cement based products and as to the degree of corrosion protection offered. Underwriters' Laboratories, Inc. has specific Requirements when coatings are used as substrates for fireproofing materials.

3. Rolling compounds or lubricants:

- a. Architect shall determine whether the lock-down agent and/or primer has been tested in accordance with ASTM E119 with the specified sprayed replacement fireproofing material to provide the required fire resistant rating.
 - b. Steel surfaces that have been sprayed with a lock-down agent and/or primer will require a fireproofing bond test to determine if the lock-down formulation or primer will impair proper adhesion. Determination of the compatibility for the lock-down agent and/or primer with the sprayed fireproofing shall be the responsibility of the lock-down and/or primer manufacturer.
- C. Application of the fireproofing shall not begin until Contractor, applicator, and fireproofing testing laboratory (inspector) have examined surfaces to receive fireproofing and determined that the surfaces are acceptable to receive the fireproofing material.

3.2 PREPARATION

- A. Prior to application of fireproofing, clips, hangers, support sleeves and other attachments required to penetrate the fireproofing shall be in place.
 1. Securely attach lath to framing members with mechanical fasteners. Lap edges of lath a minimum of 2 inches.
- B. Ducts, piping, equipment or other suspended matter which would interfere with application of fireproofing materials shall not be positioned until fireproofing work is complete.
- C. Prior to application of the fireproofing to the underside of roof decks, all roofing applications shall be completed. All roof traffic shall be prohibited upon commencement of the fireproofing application and until the fireproofing material is cured and fully dried.
- D. Prior to application of the fireproofing to the underside of steel decking, concrete work above shall be complete.
- E. Provide masking, drop cloths or other satisfactory coverings to prevent overspray of sprayed fireproofing.
- F. Where concrete, masonry or other surfaces subject to overspray are to remain permanently exposed, they shall be protected with masking, drop cloths or other satisfactory coverings.
- G. Fireproofing is slippery when wet. Contractor and Applicator shall be responsible for posting appropriate cautionary SLIPPERY WHEN WET signs. Signs shall be posted in all areas in contact with wet fireproofing material. In addition, Contractor shall be responsible for appropriate barriers to prevent entry by non-fireproofing workers into the fireproofing spray and mixer areas or other areas exposed to wet fireproofing material.
- H. Prior to application of the fireproofing material to all concrete substrates, a bonding agent approved by the fireproofing material manufacturer, shall be applied.

3.3 APPLICATION

- A. Equipment and application procedure shall conform to the material manufacturer's application instructions.
- B. Apply sprayed fire resistive material that is identical to products tested as specified in this Section, with respect to use of sealers, topcoats, tamping, troweling, water overspray or other materials and procedures affecting the test results.

- C. Maintain ambient conditions during installation and for cure period following installation, as recommended by manufacturer. Provide ventilation and avoid excessive rate of drying. Protect from exposure to sun.
- D. Utilize probes or other approved means to determine thickness during application.

3.4 FIELD QUALITY CONTROL

- A. Owner will pay an independent testing laboratory to sample and verify the thickness and density of the fireproofing in accordance with provisions of ASTM E605, "Standard Test Methods for Thickness and Density of Sprayed Fire-Resistive Materials Applied to Structural Members," the "Inspection Procedure for Field-Applied Sprayed Fire Protection Materials" as published by the AWCI. Where density samples are of irregular shape, a displacement method approved by Underwriters Laboratories Inc. shall be used to determine in place fireproofing density.
- B. Owner will pay an independent testing laboratory to randomly sample and verify the bond strength of the fireproofing in accordance with provisions of ASTM E736.
- C. The results of the above tests shall be made available to all parties at the completion of each floor.
- D. Areas not in compliance will be reported for proper repair. Contractor shall patch areas from which testing samples have been removed.
- E. Repair or replace fireproofing found (by field tests) to be below compliance requirements. Add extra course of fireproofing material where feasible to achieve compliance; otherwise remove course and replace with newly installed complying work.

3.5 CLEANING

- A. After the completion of fireproofing work, application equipment shall be removed.
- B. Floors, walls, and other adjacent surfaces shall be left in a clean condition.
- C. Immediately upon completion of spraying operations in each containable area of project, remove over-spray and fall-out of materials from surfaces of the work, and clean surfaces to remove evidence of soiling. Repair or replace damaged work to restore surfaces to acceptable condition.

3.6 PATCHING

- A. Maintain protection of structure afforded by fireproofing by patching any areas which have been removed or damaged.
- B. All patching and repairing of spray-applied fireproofing, due to damage by other trades, shall be performed with same materials under this Section, and paid for by the trade(s) responsible for the damage.

3.7 PROTECTION

- A. Protection: Installer of sprayed-on fireproofing shall advise Contractor of protection requirements for fireproofing work, which will ensure that fireproofing will be substantially without damage or deterioration at time of final completion of project. Provide protection from reasonably predictable harmful exposures. Repair or replace work which has not been successfully protected.

END OF SECTION

SECTION 07 84 00
FIRESTOPPING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Mineral wool safing insulation in wall and floor/ceiling construction.
- B. Firestop sealants and caulks.
- C. Elastomeric firestop sealants.
- D. Firestop putty.
- E. Intumescent putty pads.
- F. Flexible firestop spray.
- G. Firestop collars.
- H. Firestopping for large openings.
- I. Firestop pillows.
- J. Cast-in-place firestop devices.
- K. Intumescent wrap.
- L. Firestop mortar.
- M. Fire-rated cable pathway.
- N. Fire-rated HVAC retaining angles.
- O. Firestop plugs.
- P. Fire-rated T collar devices.
- Q. Fire-rated grommets.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 03 45 00 – Precast Concrete.
- C. Section 04 22 00 – Concrete Unit Masonry.
- D. Section 07 92 00 – Joint Sealants.
- E. Section 09 29 00 – Gypsum Board.
- F. Divisions 21 – 23 Sections, as applicable to mechanical work.
- G. Divisions 25 – 28 Sections, as applicable to electrical work.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 2. ASTM E119 – Standard Test Methods for Fire Tests of Building Construction and Materials.
 - 3. ASTM E814 – Standard Test Method for Fire Tests of Penetration Firestop Systems.
 - 4. ASTM E1399 – Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.
 - 5. ASTM E2174 – Standard Practice for On Site Inspection of Installed Fire Stops.
 - 6. ASTM E2393 – Standard Practice for On Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.
 - 7. UL Fire Resistance Directory.
 - 8. UL 263 – Fire Tests of Building Construction and Materials.
 - 9. UL 723 – Test for Surface Burning Characteristics of Building Materials.
 - 10. UL 1479 – Standard for Fire Tests of Through-Penetration Firestops.
 - 11. UL 2079 – Tests for Fire Resistance of Building Joint Systems.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Provide manufacturer's brochures describing firestop materials and insulation proposed for use, and types of mechanical fasteners to be used in the installation of the firestopping materials.
- C. Certificates of Compliance: Before installation of products specified in this Section, Contractor shall furnish to Architect a certificate certifying that materials to be incorporated in the work conform to specified requirements.
- D. Submit certification that the installers of products specified in this Section meet the qualification requirements described in Article 1.6 of this Section.
- E. Submit manufacturer's product literature and installation procedures for each type of firestop material to be installed. Literature shall indicate product characteristics, typical uses, performance and limitation criteria, and test data. Submit cured samples of firestop materials.
- F. Shop drawings: Show typical installation details for the methods of installation. Indicate which firestop materials will be used where and application requirements to meet specific jobsite conditions.

- G. Provide manufacturer's Engineering Judgment (EJ) identification number and drawing details when no UL system is available for an application. Engineering Judgment shall include both project name, and name of contractor who will install the firestop system in accordance with EJ drawing. Submit Engineering Judgment to Authority Having Jurisdiction (AHJ) for review and approval prior to installation.

1.5 QUALITY ASSURANCE

- A. Requirements of Regulatory Agencies: Materials and installation shall comply with requirements of governing regulations and authorities.
 - 1. Comply with requirements of 2013 California Building Code, Chapter 7, "Fire and Smoke Protection Features".
- B. Firestopping systems (materials and design) shall be F-rated to meet the hourly rating of the wall or floor as tested by nationally accepted test agencies per ASTM E814 or UL 1479 in a configuration representative of field conditions. T-ratings for floors shall be as required in the 2013 CBC Chapter 7 "Fire and Smoke Protection Features", as applicable to design conditions. L-ratings shall be tested in accordance with ANSI/UL1479 (smoke barriers) and ANSI/UL2079 (joints), such that for each 100 square feet of area, the total cumulative leakage of each firestop assembly shall not exceed 50 cubic feet per minute.
- C. Unless specified and approved, no pipe insulation shall be removed; all insulation shall remain intact, continuous and undamaged when firestopped.
- D. A manufacturer's direct representative (not distributor or agent) shall be on-site prior to the initial installation of firestop systems to train appropriate Contractor personnel in proper selection and installation procedures. This shall be done per manufacturer's written recommendations published in their literature and drawing details.
- E. 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 or shear wall assembly.
- F. Firestop applications for which no UL tested system is available through an acceptable manufacturer, submit acceptable manufacturer's Engineering Judgment derived from similar UL design systems or other acceptable tests, to local authorities having jurisdiction, for review and approval prior to installation. Engineering Judgment drawings shall meet the requirements set forth by the International Firestop Council (September 7, 1994).

1.6 INSTALLER QUALIFICATIONS

- A. Engage an experienced installer who is certified, licensed, and FM Approved in accordance with FM 4991, certified by UL as a Qualified Contractor. A manufacturer's willingness to sell its firestopping products to Contractor or to an Installer engaged by Contractor does not confer qualification on the buyer.

1.7 DEFINITION

- 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, water and hot gases through penetrations in fire-rated wall and floor assemblies.

1.8 SYSTEM DESCRIPTION

- A. Firestopping materials shall comply with ASTM E84, ASTM E119, ASTM E814, ASTM E1399, UL 263, UL 1479 and UL 2079 to achieve a fire rating as noted on Drawings.
- B. Surface Burning: ASTM E84, UL 723. Flame Spread: 5 maximum, Smoke Density: 15 maximum.
- C. Firestop all interruptions to fire rated assemblies, materials, and components.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the project site in the manufacturer's original packaging. Clearly identify manufacturer, contents, brand name, applicable standard, lot number, UL label and mixing and installation instructions.
- B. Store materials off-ground and protect against weather, condensation and damage. Immediately remove damaged or deteriorated materials from the job site.
- C. All firestop materials shall be installed prior to expiration of shelf life.
- D. Do not install damaged or expired materials.

1.10 SCHEDULING

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

1.11 PROJECT CONDITIONS

- A. Conform to manufacturer's printed instructions for installation and, when applicable, curing in accordance with temperature and humidity. Conform to ventilation and safety requirements.
- B. Do not use materials that contain flammable solvents.
- C. Schedule installation of firestopping after completion of penetrating item installation but prior to covering or concealing of openings.
- D. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.
- E. Weather conditions:
 - 1. 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.
 - 2. Do not install firestopping products when substrates are wet due to rain, frost, condensation, or other causes.
- F. During installation, provide masking and drop cloths to prevent firestopping materials from contaminating any adjacent surfaces.

PART 2 PRODUCTS

2.1 GENERAL

- A. Provide and install firestopping materials to meet applicable codes and installation requirements for each firestopping application. Products using caulking, putty, wrap strips, mortar, composite boards and/or mechanical devices shall be used as appropriate for the specific condition.
- B. When caulking is used, provide and install flexible caulking materials. Cured firestop materials 1/8 inch thick shall be able to bend around a 1 inch mandrel without breaking.
- C. Provide products that upon curing do not re-emulsify, dissolve, leach, breakdown or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction. Latex sealants containing sodium silicate or other water soluble intumescent ingredients are not permitted.
- D. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
- E. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
- F. Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur.
- G. When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.
- H. Penetrants passing through fire-resistance rated floor-ceiling assemblies contained within chase wall assemblies shall be protected with products tested by being fully exposed to the fire outside of the chase wall. Systems within the UL Fire Resistance Directory that meet this criterion are identified with the words "Chase Wall Optional".
- I. Provide fire-resistive joint sealants sufficiently flexible to accommodate movement such as thermal expansion and other normal building movement without damage to the seal.
- J. Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criteria as outlined in UL 2079.
- K. Provide penetration firestop systems subjected to an air leakage test conducted in accordance with Standard, UL 1479 for penetrations with published L-Ratings for ambient and elevated temperatures as evidence of the ability of firestop system to restrict the movement of smoke.
- L. Provide T-Rating Collar Devices tested in accordance with ASTM E814 or UL 1479 for metallic pipe penetrations requiring T-Ratings per the applicable building code.

- M. 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.
- N. Provide components for each firestopping system that is 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.
- O. At through penetrations of fire rated assemblies, provide a firestop system with an "F" rating as determined by UL 1479 or ASTM E814 that is equal to the time rating of construction assembly.
- P. At fire rated assemblies, provide a firestop system with an Assembly Rating as determined by UL 2079 that is equal to the time rating of construction assembly.

2.2 MINERAL WOOL INSULATION

- A. Acceptable Manufacturers and Products:
 - 1. Thermafiber, Inc., Wabash, IN; 888-834-2371, www.thermafiber.com.
- B. Through penetrations: Provide 4 pcf mineral wool per tested system.
- C. Head of wall construction gaps: Provide 4 pcf mineral wool per tested system.
- D. Perimeter safing slot: Provide 4 pcf mineral wool batt insulation per tested system.
- E. Accessories: Provide all accessories and anchors for installation as recommended by the manufacturer.

2.3 FIRESTOP SEALANT

- A. Sealant for penetrations by noncombustible items including steel pipe, copper pipe, rigid steel conduit and electrical metallic tubing (EMT).
- B. Acceptable Manufacturers and Products:
 - 1. SpecSeal a division of Specified Technologies Inc. (STI), Somerville, NJ; 800-992-1180, www.stifirestop.com. Products: Series SSS Sealant, LCI Sealant, or LC Sealant.
 - 2. Hilti, Tulsa, OK; 866-445-8827, www.us.hilti.com. Product: FS-One.
 - 3. Substitutions: Under provisions of Division 01.
- C. Sealant shall be a one-part intumescent latex compound. When exposed to high heat or flame, sealant shall be capable of expanding to seal off the annular spaces and voids at the joint. Expansion shall continue at temperatures greater than 230 degrees F. Sealant shall be thixotropic and suitable for caulking or troweling onto vertical and overhead surfaces. Sealant shall be UL Classified (UL 1479) and tested in accordance with ASTM E814 requirements. Penetrations in fire rated assemblies shall be protected and sealed in accordance with CBC Chapter 7 requirements.

2.4 ELASTOMERIC FIRESTOP SEALANT

- A. Sealant for openings between structurally separate sections of walls and floors. At top-of-walls.

B. Acceptable Manufacturers and Products:

1. STI. Product: Series ES100 Elastomeric Sealant.
2. Hilti. Product: CP601S.
3. 3M, St. Paul, MN; 800-328-1687, www.solutions.3m.com. Products: Fire Barrier Sealants 1000, 1003, 2000, 2000+, 2001, and 2003.
4. Substitutions: Under provisions of Division 01.

C. Elastomeric sealant shall be a non-halogenated, latex-based, highly flexible caulk. The sealant shall be thixotropic for high-build application using standard caulking equipment or by troweling onto vertical surfaces or overhead. The sealant shall be UL Classified (UL 2079) and tested to the requirements of ASTM E814. Closures in fire rated assemblies shall be protected and sealed in accordance with CBC Chapter 7.

2.5 FIRESTOP PUTTY

A. Putty for penetrations by combustible items (penetrants consumed by high heat and flame) including insulated metal pipe, PVC jacketed flexible cable, or cable bundles and plastic pipe (closed piping systems). Clay-based products will not be allowed.

B. Acceptable Manufacturers and Products:

1. STI. Product: SSP Putty.
2. Substitutions: Under provisions of Division 01.

C. Putty shall be a one-part intumescent, non-hardening compound. The putty, when exposed to high heat or flame shall be capable of expanding to seal off annular spaces created. Range of continuing expansion shall be from 230 degrees F to greater than 1,000 degrees F. The putty shall be soft and pliable with aggressive adhesion. The putty shall be UL Classified (UL 1479) and tested to the requirements of ASTM E814. Penetrations in fire rated assemblies shall be protected and sealed in accordance with CBC Chapter 7.

2.6 INTUMESCENT PUTTY PAD

A. Firestop Putty Pads for Electrical Boxes: Intumescent moldable butyl-based firestop putty pad. Clay-based products will not be allowed.

B. Acceptable Manufacturers and Products:

1. STI. Products:
 - a. SSP4S 7.25 inches by 7.25 inches.
 - b. SSP9S 9 inches by 9 inches.
2. Substitutions: Under provisions of Division 01.

2.7 FLEXIBLE FIRESTOP SPRAY

A. Firestop spray for perimeter fire barrier system, fire-rated construction joints, and other gaps.

B. Acceptable Manufacturers and Products:

1. STI. Products: AS200 Elastomeric Firestop Spray or Fast Tack Elastomeric Silicone/Urethane Hybrid Firestop Spray.
2. Hilti. Product: CFS-SP WB or CFS-S SIL GG.

3. 3M. Products: Firedam Spray and Fire Barrier Spray.
4. Substitutions: Under provisions of Division 01.

C. Spray shall be flexible, sprayable water-based coating that dries in ambient conditions to form a flexible seal that will compress/extend with the intended range of the joint. The spray shall be UL classified (UL 2079) and tested to the requirements of ASTM E1966. Closures in fire rated assemblies shall be protected and sealed in accordance with CBC Chapter 7. Provide silicone-based firestopping products where building perimeter fire barrier systems are required.

2.8 FIRESTOP COLLARS

- A. Collars for penetrations by combustible plastic pipe (opening piping systems).
- B. Acceptable Manufacturers and Products:
 1. STI. Products: SSC or LLC Firestop Collar.
 2. Hilti. Product: CP642/CP643 Firestop Collar.
 3. 3M. Products: Fire Barrier PPD Plastic Pipe Device and Ultra Plastic Pipe Device.
 4. Substitutions: Under provisions of Division 01.
- C. Firestop collar shall be made of a galvanized steel housing and shall contain a section of intumescent material. The material shall be designed to expand when exposed to fire. The collars shall be UL classified (UL 1479) and tested to the requirements of ASTM E814. Closures in fire rated assemblies shall be protected and sealed in accordance with CBC Chapter 7.

2.9 FIRESTOPPING FOR LARGE OPENINGS

- A. Firestopping for large size, complex penetrations made to accommodate cable trays, multiple steel and copper pipes and electrical busways in raceways.
- B. Acceptable Manufacturers and Products:
 1. STI. Products: SSB Firestop Pillows, CS Composite Sheet, or SSM Mortar.
 2. Hilti. Product: FS 657 Fire Block.
 3. 3M. Product: Fire Barrier CS-195+ Composite Sheet and Fire Barrier Mortar.
 4. Substitutions: Under provisions of Division 01.
- C. For large openings, install intumescent compound. The intumescent compound, when exposed to high heat or flame, shall be capable of expanding to seal off annular spaces created. Product shall be UL classified (UL 1479) and tested to the requirements of ASTM E814. Closures in fire rated assemblies shall be protected and sealed in accordance with CBC Chapter 7.

2.10 FIRESTOP PILLOWS

- A. Pillows for large openings, self-contained intumescent product capable of expanding to seal-off openings. UL Classified, tested per UL 1479 and ASTM E814.
- B. Acceptable Manufacturers and Products:
 1. STI. Product: SSB Firestop Pillow.

2. 3M. Product: Fire Barrier Pillow.
3. Substitutions: Under provisions of Division 01.

2.11 CAST-IN-PLACE FIRESTOP DEVICES

- A. Devices for use with non-combustible and combustible pipes (closed and open piping systems), conduit, and cable bundles penetrating concrete floors and framed gypsum board wall assemblies.
- B. Acceptable Manufacturers and Products:
 1. STI. Products:
 - a. CD Cast-In Firestop Device.
 2. Hilti. Products:
 - a. CP 680-P Cast-in-Place Firestop Device.
 - 1) Add Aerator Adapter when used in conjunction with aerator (Sovent) system.
 - b. CP 680-M Cast-in-Place Firestop Device for use with non-combustible penetrants.
 - c. CP 681 Tub Box Kit for use with tub applications.
 3. Substitutions: Under provisions of Division 01.
- C. Acceptable Penetrations: Sealing pipes and cables up to 6 inches in diameter in penetration through fire-rated floors, suitable for: vented or closed plastic pipes, PVC, CPVC, ABS, innerduct, FRPP, steel, cast-iron, copper pipes, insulated steel and copper pipes, EMT and ENT electrical conduits, bundled cables, and blank openings.

2.12 INTUMESCENT WRAP

- A. Intumescent Wrap: Precut wrap strips for plastic and insulated pipe penetration through rated assemblies.
- B. Acceptable Manufacturers and Products:
 1. STI. Products: RED2 or BLU2 Wrap Strip.
 2. Hilti. Product: CP 648, Firestop Wrap Strip.
 3. Substitutions: Under provisions of Division 01.

2.13 FIRESTOP MORTAR

- A. Fire-resistant, cement-based mortar for firestop-sealing medium-sized to large openings with non-combustible pipes or cable trays, and permanent fire seal for cables, cable trays and non-combustible pipes. For use with concrete and masonry assemblies, and for walls and floors rated up to three hours.
- B. Acceptable Manufacturers and Products:
 1. STI. Product: SSM Firestop Mortar.
 2. Hilti. Product: FS 637 Trowelable Firestop Compound.
 3. Substitutions: Under provisions of Division 01.

2.14 FIRE-RATED CABLE PATHWAY

- A. Gangable fire-rated device modules capable of retrofit, comprised of steel raceway with intumescent foam pads allowing 0 percent to 100 percent cable fill for cable penetrations through gypsum or CMU walls, concrete floors and concrete walls.
- B. Acceptable Manufacturers and Products:
 - 1. STI. Product: EZ Path Pathway Device Series 22, 33 or 44.
 - 2. Substitutions: Under provisions of Division 01.

2.15 FIRE-RATED HVAC RETAINING ANGLES

- A. Steel angle system with integral intumescent firestop gasket for use on steel HVAC ducts.
- B. Acceptable Manufacturers and Products:
 - 1. STI. Product: Fyre-Flange Steel Firestop Retaining Angle.
 - 2. Substitutions: Under provisions of Division 01.

2.16 FIRESTOP PLUGS

- A. Re-enterable, foam rubber plug impregnated with intumescent material for use in blank openings and cable sleeves.
- B. Acceptable Manufacturers and Products:
 - 1. STI. Product: FP Firestop Plug.
 - 2. Substitutions: Under provisions of Division 01.

2.17 FIRE-RATED T COLLAR DEVICES

- A. Louvered steel collar system with synthetic aluminized polymer coolant wrap installed on metallic pipes where T Ratings are required by applicable building code requirements.
- B. Acceptable Manufacturers and Products:
 - 1. STI. Product: SpecSeal T-Collar Device.
 - 2. Substitutions: Under provisions of Division 01.

2.18 FIRE-RATED GROMMETS

- A. Molded two-piece grommet made from plenum grade polymer with a foam inner core for sealing individual cable penetrations up to 0.27 inch diameter.
- B. Acceptable Manufacturers and Products:
 - 1. STI. Product: Ready Firestop Grommet.
 - 2. Substitutions: Under provisions of Division 01.

2.19 ACCESSORIES

- A. Installation Accessories: Clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

PART 3 EXECUTION

3.1 CONDITIONS REQUIRING FIRESTOPPING

- A. General: Provide firestopping for conditions specified whether or not firestopping is indicated and, if indicated, whether such material is designed as insulation, safing or otherwise.
- B. Penetrations:
 - 1. Penetrations include conduit, cable wire, pipe, duct or other elements that pass through one or both outer surfaces of a fire-rated floor, wall or partition.
 - 2. These requirements for penetrations shall apply whether or not sleeves have been provided, and whether or not penetrations are to be equipped with escutcheons or other trim. If penetrations are sleeved, firestop annular space, if any, between sleeve and wall opening.
- C. Provide firestopping to fill miscellaneous voids and openings in fire-rated construction as specified herein.
- D. Provide intumescent moldable pads over backs and sides of all electrical junction and utility boxes at fire rated walls.

3.2 EXAMINATION

- A. Verify site conditions under provisions of Division 01.
- B. Verify openings are ready to receive the work of this Section.

3.3 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material or other matter that may affect bond of firestopping material.
- B. Remove incompatible materials that may affect bond.
- C. Install noncombustible backing materials to arrest liquid material leakage.
- D. Examine the areas and conditions where firestops are to be installed and notify Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected by Contractor in a manner acceptable to Architect.
- E. Verify penetrations are properly sized and in suitable condition for application of materials.
- F. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
- G. Comply with manufacturer's recommendations for temperature and humidity conditions before, during and after installation of firestopping.

3.4 INSTALLATION

A. General:

1. Installation of firestops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures. Written verification of the manufacturer's training shall be submitted to Architect.
2. Apply firestops in accordance with fire test reports, fire resistance requirements, acceptable sample installations, manufacturer's recommendations, and listing descriptions.
3. Provide sprinkler piping with NFPA 13 required annular space using firestop to allow movement.
4. Coordinate with plumbing, mechanical, electrical and other trades to assure that all pipe, conduit, cable and other items which penetrate fire-rated construction have been permanently installed prior to installation of firestops.
5. All penetrations for pipes, conduits, tubing or other building service elements shall be installed below the head-of-wall joint such that the distance between the top of the wall and the top of the penetrant is a minimum of 3 inches, no exceptions.

B. Regulatory Requirements: Install firestop materials in accordance with published "Through-Penetration Firestop Systems" in UL's Fire Resistance Directory.

C. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of through-penetration materials.

1. Seal all holes or voids made by penetrations to ensure an air- and water-resistant seal.
2. Protect materials from damage on surfaces subjected to traffic.

D. Field Quality Control:

1. Prepare and install firestopping systems in accordance with manufacturer's printed instructions and recommendations.
2. Follow safety procedures recommended in the Material Safety Data sheets.
3. Finish surfaces of firestopping which are to remain exposed in the completed work to a uniform and level condition.
4. All areas of work must be accessible until inspection by the applicable Code authorities.
5. Correct unacceptable firestop installations and provide additional inspection to verify compliance with this Section at no additional cost.
6. All firestop assemblies shall be identified with a permanently affixed ID label as follows:
 - a. Firestop System Warning Label: Minimum 3 inch by 5 inch label, red color or with red colored type and "WARNING" written in bold type. Label shall be adhesive backed or provide other means of permanent attachment. Identified or included spaces for the following information:
 - 1) Name of manufacturer.
 - 2) Name of Installer.
 - 3) Date firestop system was installed.
 - 4) Firestop System UL number or manufacturer's engineered design number.

- 5) F Rating and T Rating as applicable.
- 7. All fire-rated wall assemblies shall be identified with signs or by stenciling with red paint in accessible concealed floor, floor-ceiling, or attic spaces at intervals not exceeding 30 feet and within 15 feet of the end of each wall per CBC Section 703.7. Lettering shall be not less than 3 inches in height, incorporating the appropriate wording such as: "FIRE AND/OR SMOKE BARRIER-PROTECT ALL OPENINGS", with the relevant hourly fire resistance rating clearly stated.
- 8. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.
- 9. Keep areas of work accessible until inspection by applicable code authorities.
- 10. Perform under this Section patching and repairing of firestopping caused by cutting or penetrating of existing firestop systems already installed by other trades.
- E. Installation shall be completed in a neat, workmanlike manner according to manufacturer's recommendations. Securely fasten and anchor insulation in place to prevent displacement or sagging of material. Safing insulation shall be adequately lapped.
- F. Install material at fire rated horizontal to vertical assembly closures and at fire rated walls or partition openings which contain penetrating sleeves, piping, ductwork, conduit and other items requiring firestopping.
- G. Apply primer and materials in accordance with manufacturer's instructions.
- H. Apply firestopping material in sufficient thickness to achieve rating.
- I. Compress fibered material to achieve a density of forty percent of its uncompressed density.
- J. Dam material to remain.

3.5 INSPECTIONS

- A. Inspection of completed work shall be performed by Authority Having Jurisdiction (AHJ) and/or the building underwriter's designee. If required by Authority Having Jurisdiction (AHJ) or underwriter, inspections may be performed by an independent, third-party construction inspection and testing service provided that:
 - 1. Inspections are performed to the requirements of the following standards as applicable:
 - a. Construction Joints: ASTM E2393.
 - b. Service Penetrations: ASTM E2174.
 - 2. Individual(s) performing inspection shall provide evidence of valid Errors and Omissions Insurance coverage for this service.
 - 3. Individual(s) performing inspection shall not have any financial connection to installer, firestop manufacturer, distributor or supplier.

3.6 CLEANING

- A. Clean Work under provisions of Division 01.
- B. Clean adjacent surfaces of firestopping materials.
- C. Remove spilled and excess materials adjacent to firestopping without damaging adjacent surfaces.

- D. Leave finished work in a neat and clean condition with no evidence of spillovers or damage to adjacent surfaces.

3.7 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Division 01.
- B. Protect adjacent surfaces from damage by material installation.
- C. Where firestopping is installed at locations which will remain exposed in the completed work, provide protection as necessary to prevent damage to adjacent surfaces and finishes, and protect as necessary against damage from other construction activities.

END OF SECTION

SECTION 07 92 00

JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Sealants.
- B. Sealant Accessories.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 03 45 00 – Precast Concrete.
- C. Section 04 22 00 – Concrete Unit Masonry.
- D. Section 06 41 00 – Architectural Wood Casework.
- E. Section 07 19 19 – Silicone Water Repellents.
- F. Section 07 42 16 – Insulated-Core Metal Wall Panels.
- G. Section 07 62 00 – Sheet Metal Flashing and Trim.
- H. Section 07 84 00 – Firestopping.
- I. Section 08 11 13 – Hollow Metal Doors and Frames.
- J. Section 08 34 63 – Detention Doors and Frames.
- K. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.
- L. Section 08 44 13 – Glazed Aluminum Curtain Walls.
- M. Section 08 65 19 – Pass Windows.
- N. Section 08 81 00 – Glass Glazing.
- O. Section 08 88 53 – Security Glazing.
- P. Section 08 91 19 – Fixed Louvers.
- Q. Section 09 29 00 – Gypsum Board.
- R. Section 13 34 23 – Modular Precast Concrete Cells.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.

- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM C510 – Standard Test Method for Staining and Color Change of Single or Multicomponent Joint Sealants.
 - 2. ASTM C719 – Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).
 - 3. ASTM C794 – Standard Test Method for Adhesion in Peel of Elastomeric Joint Sealants.
 - 4. ASTM C834 – Standard Specification for Latex Sealants.
 - 5. ASTM C881 – Standard Specification for Epoxy Resin Base Bonding Systems for Concrete.
 - 6. ASTM C919 – Standard Practice for Use of Sealants in Acoustical Applications.
 - 7. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 - 8. ASTM C1087 – Standard Test Method for Determining Compatibility of Liquid Applied Sealants with Accessories Used in Structural Glazing Systems.
 - 9. ASTM C1193 – Standard Guide for Use of Joint Sealants.
 - 10. ASTM C1248 – Standard Test Method for Staining of Porous Substrate by Joint Sealants.
 - 11. ASTM C1311 – Standard Specification for Solvent Release Sealants.
 - 12. ASTM D2203 – Standard Test Method for Staining from Sealants.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specification for each product.
- C. Samples: Submit manufacturer's standard color ranges of exposed sealant materials for Architect's selection.
- D. Quality Assurance/Control Submittals:
 - 1. Product validation/assurance submittals.
 - 2. Manufacturer's laboratory adhesion and stain testing results.
 - 3. Joint sealants field adhesion to joint substrates test results.
- E. Closeout Submittals:
 - 1. Cleaning and maintenance data.

1.5 DEFINITIONS

- A. Sealant Types:
 - 1. S: Single component sealant, cures by moisture reaction.
 - 2. M: Multiple component sealant; cures by chemical reaction.

B. Sealant Grades:

1. NS: Non-sag or gunnable sealant that permits application in joints on vertical surfaces without sagging or slumping.
2. P: Pourable or self leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.

C. Sealant Classes:

1. 12.5: A sealant that when tested for adhesion and cohesion under cyclic movement shall withstand an increase and decrease of at least 12.5 percent of the joint width as measured at the time of application.
2. 25: A sealant that when tested for adhesion and cohesion under cyclic movement shall withstand an increase and decrease of at least 25 percent of the joint width as measured at the time of application.
3. 35: A sealant that when tested for adhesion and cohesion under cyclic movement shall withstand an increase and decrease of at least 35 percent of the joint width as measured at the time of application.
4. 50: A sealant that when tested for adhesion and cohesion under cyclic movement shall withstand an increase and decrease of at least 50 percent of the joint width as measured at the time of application.
5. 100/50: A sealant that when tested for adhesion and cohesion under cyclic movement shall withstand an increase of at least 100 percent and a decrease of at least 50 percent of the joint width as measured at the time of application.

D. Sealant Uses:

1. A: Sealant acceptable for use on an aluminum substrate.
2. G: Sealant acceptable for use on a glass substrate.
3. I: Sealant designed for use in joints which are submerged continuously in a liquid.
 - a. Immersion rated sealant applications require primer.
4. M: Sealant acceptable for use on a mortar substrate.
5. NT: Sealant designed for use in joints in non-traffic areas.
6. T: Sealant designed for use in joints in pedestrian and vehicular traffic areas such as walkways, plazas, decks, and parking garages.
7. O: Sealant acceptable for use on substrates other than those listed above including, but not limited to, color anodized aluminum, metals other than aluminum, painted surfaces, brick, stone, tile, and wood.

E. Miscellaneous:

1. FC: Fast cure sealants; provides lesser cure times than corresponding standard cure sealants.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

A. Comply with Division 01.

- B. Meet VOC requirements of South Coast Air Quality Management District (SCAQMD) Rule 1168. Information is available at www.aqmd.gov. VOC limit expressed in grams per liter as follows:

Sealant	VOC Limit
Architectural	250
Roadways	250
Single Ply Roof Material Installation/Repair	450
Nonmembrane Roof Installation/Repair	300
Other	420

Sealant Primer	VOC Limit
Architectural – Nonporous	250
Architectural - Porous	775
Other	750

- C. Provide sealants with no carcinogen or reproductive toxicant components at more than one percent of total mass of product as defined in the following lists:
1. California OEHHA, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Information is available at www.oehha.ca.gov/prop65.html.
 2. California Air Resources Board (CARB), list of Toxic Air Contaminants (California Air Toxics). Information is available at www.arb.ca.gov/toxics.

1.7 QUALITY ASSURANCE

- A. Qualifications:
1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section.
 2. Applicator Qualifications: Firm specializing in installing work specified in this Section with experience on at least five projects of similar nature in past three years.
- B. Product Validation/Assurance: Provide products with current SWRI Validation or provide independent third-party laboratory test results showing product meets performance requirements in accordance with ASTM C920 and as specified in this Section.
- C. Compatibility: Materials forming joints and adjacent materials shall not adversely affect sealant materials or sealant color per ASTM C1087.
- D. Staining: Sealants shall not stain joint substrates per ASTM C510, ASTM C1248, and ASTM D2203.
- E. Manufacturer Adhesion, Cohesion, and Stain Testing: Provide manufacturer's laboratory adhesion and cohesion testing per ASTM C719 and ASTM C794, and stain testing per ASTM C510, using specimens of actual substrates to ensure sealant compatibility with substrate before product acceptance.
- F. Joint Sealants Field Test for Adhesion and Cohesion to Joint Substrates: Perform field tests for each elastomeric joint sealant with the manufacturer's representative present prior to installation as follows:
1. Install joint sealants in five foot joint lengths. Allow sealant to fully cure before testing.

2. Make a knife cut of the sealant across the joint and along each side of the joint approximately 3 inches long.
3. Place a mark on the sealant tab, 1 inch from the adhered joint to the tab's free end.
4. Grasp a 2 inch piece of sealant firmly just beyond the 1 inch mark and pull at a 90 degree angle.
5. Record whether or not sealant in joint maintained adhesion to substrate.
6. Record percentage length of sealant elongation.
7. Sealant product acceptance shall be based on pass/fail adhesion performance.

G. Coordination and Pre-Installation Meetings:

1. Conduct pre-installation meeting in accordance with provisions of Division 01.
2. Convene pre-installation meeting prior to commencing work of this Section.
3. Coordinate work in this Section with work in related Sections.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver materials in the unopened, original containers or unopened packages with manufacturer's name, labels, product identification, color, expiration period, curing time and mixing instructions for multi-component materials.
- C. Storage and Protection: Store materials in a dry secure location with ambient temperature range of 60 degrees F to 80 degrees F.

1.9 PROJECT/SITE CONDITIONS

- A. Do not install primers or sealants when ambient or joint surface temperatures are less than 40 degrees F, or as otherwise recommended by manufacturer.

1.10 SEQUENCING

- A. Apply waterproofing, water repellents, and preservative finishes after sealants have fully cured.

1.11 WARRANTY

- A. Comply with provisions of Division 01.
- B. Provide manufacturer's warranty against material defects, air and water tightness, loss of adhesion, cohesion, and staining as follows:
 1. Silicone sealants – Twenty years.
 2. Urethane sealants – Five years.
 3. Security sealants – Five years.
 4. Other sealants – Two years.
- C. Provide installer's two year workmanship warranty.

1.12 MAINTENANCE DATA

- A. Submit in accordance with Division 01.

- B. Provide cleaning and maintenance information, recommended inspection intervals, and instructions for repairing and replacing failed sealant joints.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Tremco Sealant Weatherproofing Division of RPM International, Inc., Beachwood, OH; 800-321-7906, www.tremcosealants.com.
2. Dow Corning Corporation, Midland, MI; 800-634-9660, www.dowcorning.com.
3. GE Silicones, Huntersville, NC; 951-201-2000, www.gesilicones.com.
4. Pecora Corporation, Harleysville, PA; 800-523-6688, www.pecora.com.
5. BASF Corporation – Building Systems, Shakopee, MN; 800-433-9517 www.buildingsystems.basf.com.
6. USG – United States Gypsum Co., Chicago, IL; 800-874-4968, www.usg.com.
7. Sika Corporation, Lyndhurst, NJ; 800-933-7452, www.sikaconstruction.com.

B. Substitutions: Under provisions of Division 01.

2.2 SEALANTS

A. General:

1. Provide sealants that have been tested and found suitable for the substrates to which they will be applied.
2. Color: As selected by Architect from manufacturer's full range of colors.

B. Exterior Sealants:

1. Exterior Perimeter Sealant: Polyurethane sealant; ASTM C920; Type M; Grade NS; Class 50; uses: A, I, M, NT, O, T.
 - a. Products:
 - 1) Tremco Dymeric 240FC.
 - 2) BASF MasterSeal NP150 Tint Base.
 - 3) or accepted equal.
 - b. Use at exterior vertical joints bordered on one or both sides by:
 - 1) Porous materials such as concrete or masonry.
 - 2) Non-porous materials such as painted metal, anodized or mill finish aluminum.
2. Exterior Perimeter Sealant: Ultra-low modulus moisture curing, non-staining, non-bleeding silicone sealant; ASTM C920; Type S; Grade NS; Class 100/50; uses: A, G, M, NT, O.
 - a. Products:
 - 1) Tremco Spectrem 1.
 - 2) Dow Corning Corp. 790 Silicone Building Sealant.
 - 3) Pecora 890NST.

- 4) or accepted equal.
- b. Use at exterior vertical joints bordered on one or both sides by joints at precast concrete panels, metal panels, and window perimeters.
- 3. Glazing Sealant: Medium modulus, neutral curing, non-staining, non-bleeding silicone sealant; ASTM C920; Type S; Grade NS; Class 50; uses: A, G, M, NT, O.
 - a. Products:
 - 1) Tremco Spectrem 2.
 - 2) Dow Corning Corp. 795 Silicone Building Sealant.
 - 3) GE Silicones SilPruf SCS2000.
 - 4) Pecora 895NST.
 - 5) or accepted equal.
 - b. Use at exterior joints in window wall systems such as glass to glass, glass to metal, and metal to metal joints.
- 4. Traffic Sealant: Self leveling, chemical curing, non-staining, non-bleeding polyurethane sealant; ASTM C920; Type M; Grade P; Class 25; uses: M, O, T.
 - a. Products:
 - 1) Tremco THC900, Vulkem 245.
 - 2) Pecora Corp. Urexpan NR-200.
 - 3) BASF MasterSeal SL 2.
 - 4) or accepted equal.
 - b. Use at:
 - 1) Exterior horizontal traffic expansion joints in concrete with slopes less than five percent.
 - 2) Interior horizontal traffic joints in low-slope concrete with slopes less than five percent.
- 5. Traffic Sealant: Slope grade chemical curing, non-staining, non-bleeding polyurethane sealant; ASTM C920; Type M; Grade P; Class 25; use: T.
 - a. Products:
 - 1) Tremco THC 901.
 - 2) Pecora Corp. DynaTrol II-SG.
 - 3) BASF MasterSeal SL 2 Slope Grade.
 - 4) or accepted equal.
 - b. Use at:
 - 1) Exterior horizontal traffic expansion joints in concrete with slopes between five percent and ten percent.
 - 2) Interior horizontal traffic joints in concrete with slopes between five percent and ten percent.

6. Metal Lap and Bedding Sealant: Non-drying, non-skinning, non-curing flexible butyl rubber sealant; ASTM C1311; Type S; Grade NS; Class 10; uses: G, M, O.
 - a. Products:
 - 1) Tremco Butyl Sealant.
 - 2) Pecora Corp. BA-98 Butyl Rubber Sealant.
 - 3) or accepted equal.
 - b. Use for bedding thresholds, glazing secondary seals, and sheet metal flashing and trim not exposed to ultraviolet (UV) light.
7. Metal Lap and Bedding Sealant: High performance, moisture curing, gun grade polyurethane sealant; ASTM C920; Type S; Grade NS; Class 25; use: A, I, M, NT, O, T.
 - a. Products:
 - 1) Tremco Vulkem 116.
 - 2) BASF MasterSeal TX1.
 - 3) or accepted equal.
 - b. Use for bedding thresholds, glazing secondary seals, and sheet metal flashing and trim exposed to ultraviolet (UV) light.

C. Interior Sealants:

1. Interior Sealant: Nonoxidizing, skinnable, paintable, gunnable, non-staining, non-bleeding acrylic latex sealant; ASTM C834; Type S; Grade NS; Class 12.5; use: O.
 - a. Products:
 - 1) Tremco Tremflex 834.
 - 2) Pecora Corp. AC-20 + Silicone.
 - 3) or accepted equal.
 - b. Use at interior trim and finish joints expecting minimal movement.
2. Interior Sealant: Low modulus, moisture curing, non-staining, non-bleeding polyurethane sealant; ASTM C920; Type S; Grade NS; Class 35; uses: A, M, NT, O.
 - a. Products:
 - 1) Tremco Dymonic FC.
 - 2) or accepted equal.
 - b. Use at interior vertical expansion, control, and air seal joints.
3. Sanitary Sealant: Mildew resistant with fungicide, acetoxycuring, non-staining, non-bleeding silicone sealant; ASTM C920; Type S; Grade NS; Class 25; uses: A, G, NT, O.
 - a. Products:
 - 1) Tremco Tremsil 200 Sanitary.
 - 2) Dow Corning Corp. 785 Mildew Resistant.
 - 3) GE Silicones Sanitary SCS 1700.
 - 4) Pecora 898.
 - 5) or accepted equal.
 - b. Use at interior joints with nonporous substrates around ceramic tile, showers, sinks and plumbing fixtures.

4. Acoustical Sealant: Non-skinning, non-hardening synthetic rubber sealant; ASTM C919; Type S; Grade NS; use: O.
 - a. Products:
 - 1) Tremco Acoustical Sealant.
 - 2) Pecora BA-98.
 - 3) or accepted equal.
 - b. Use at concealed joints and penetrations in interior acoustical walls.
5. Acoustical Sealant: Nonoxidizing, skinnable, paintable, gunnable, non-staining, non-bleeding acrylic latex sealant; ASTM C834 and C919; Type S; Grade NS; Class 12.5; use: O.
 - a. Products:
 - 1) Tremco Tremflex 834.
 - 2) Pecora Corp. AC-20 FTR.
 - 3) USG Sheetrock Brand Acoustical Sealant.
 - 4) or accepted equal.
 - b. Use at exposed joints and penetrations in interior acoustical walls.
6. Security Sealant: 100 percent solids, moisture tolerant, low-modulus, non-sag, paste-consistency epoxy resin binder sealant; ASTM C881, Type M; Grade NS; use: A, M, NT, O.
 - a. Products:
 - 1) Sika Sikadur 23 Security Sealant.
 - 2) BASF MasterEmaco ADH 327.
 - 3) or accepted equal.
 - b. Use at all horizontal and vertical joints in exposed areas subject to contact by inmates including, but not limited to, the following:
 - 1) Detention doors and frames.
 - 2) Detention furnishings and accessories.
 - 3) Security plumbing and electrical fixtures.
 - 4) Exposed decking and deck seams/joints.
 - 5) Seams in cells and mezzanines.
 - 6) Security electronic devices.
7. Security Sealant: Solvent-free, moisture tolerant, flexible epoxy control joint sealant and adhesive; ASTM C920; Type M; Grade NS; use: A, M, NT, O.
 - a. Products:
 - 1) Sika Sikadur 51 Security Sealant.
 - 2) BASF MasterEmaco CR 190.
 - 3) or accepted equal.
 - b. Use at all horizontal and vertical joints in exposed areas subject to contact by inmates including, but not limited to, the following:
 - 1) Wall to decking intersections.

- 2) Guardrail and railing joints and seams.
- 3) Concrete masonry unit control joints at interior locations.
- 4) Pass through transaction units.

2.3 ACCESSORIES

- A. Joint Cleaner: Non-corrosive and non-staining type as recommended by sealant manufacturer; compatible with joint forming materials.
- B. Primers: Non-staining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.
- C. Joint Backing: Non-adhering backing to sealant; non-staining, compatible with sealant and primer such as round, closed cell polyethylene foam rod; oversized 25 percent to 50 percent larger than joint width. Materials impregnated with oil, bitumen or similar materials are not permitted.
- D. Bond Breakers: Type and consistency recommended by the sealant manufacturer to suit the particular application.
- E. Bond Breaker Tape: Self-adhesive, pressure sensitive polyethylene tape.
- F. Masking tape: Non-staining, non-absorbent tape compatible with joint sealants and adjacent joint surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions; verify substrate, surfaces, and joint openings are ready to receive work and field measurements are as shown on drawings, as specified in this Section, and as recommended by manufacturer.
- B. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and prime joints in accordance with ASTM C1193 and manufacturer's instructions.
- B. Remove loose materials and foreign matter that might impair sealant adhesion. Clean porous materials such as concrete or masonry by grinding, sand or water blast cleaning, mechanical abrading, acid washing or a combination of these methods as required to provide a clean, sound base surface for sealant adhesion.
 1. Remove laitance by acid washing, grinding or mechanical abrading.
 2. Remove form oils, release agents, chemical retardants, by sand or water blast cleaning.
 3. Blow out joints with oil-free compressed air loose particles resulting from grinding, abrading, or blast cleaning prior to sealant application.
 4. Do not apply sealant to masonry joints where water repellent or masonry preservative has been applied. Apply water repellents or waterproofing treatments after sealants have fully cured. Coordinate with Section 07 19 19.

- C. Mechanically or chemically clean nonporous surfaces such as metal and glass. Remove temporary protective coatings on metallic surfaces using solvents that leave no residue as recommended by metal surface manufacturer. When masking tape or strippable films are used, remove the tape or film and clean any residual adhesive. Apply and wipe-dry cleaning solvents using clean, lint-free cloths or paper towels, do not allow solvent to air dry without wiping.
- D. Protect elements surrounding the work of this Section from damage or disfiguration. Apply masking tape to adjacent surfaces to prevent damage to finishes from sealant installation.

3.3 APPLICATION

- A. Apply sealants in accordance with ASTM C1193, manufacturer's instructions, and accepted shop drawings.
- B. Apply acoustical sealants in accordance with ASTM C919, manufacturer's instructions, and accepted shop drawings.
- C. Apply sealant where indicated on the Drawings and at all exterior joints and openings in the building envelope that are observable sources of air or water infiltration.
- D. Measure joint dimensions and size materials to achieve required width-to-depth ratios. Acceptable joint width-to-depth ratios:

Material	Joint Width	Joint Depth	
		Minimum	Maximum
Metal, glass, or other nonporous surfaces.	1/4 inch (minimum)	1/4 inch	1/4 inch
	Over 1/4 inch	1/2 of width	Equal to width
Wood, concrete, masonry, or other porous surfaces.	1/4 inch (minimum)	1/4 inch	1/4 inch
	Over 1/4 inch	1/2 of width	Equal to width
	Over 1/2 to 2 inches	1/2 inch	1/2 inch
	Over 2 inches	As recommended by sealant manufacturer.	

- E. Install joint backing to achieve desired joint width-to-depth ratio. Roll the material into the joint to avoid lengthwise stretching. Do not twist or braid rod stock.
- F. Install bond breaker where joint backing is not used.
- G. Apply primer where required and where recommended by sealant manufacturer for sealant adhesion.
- H. Install sealants within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- I. Install sealants immediately after joint preparation.
- J. Install sealants free of air pockets, foreign embedded matter, ridges, and sags.
- K. Tool joints concave. Use dry tooling method.

3.4 CLEANING AND REPAIRING

- A. Immediately clean work under provisions of Division 01.

B. Clean adjacent soiled surfaces. Use a cleaning agent as recommended by the sealant manufacturer. Remove any masking tape immediately after tooling joints, leaving finished work in neat and clean condition.

C. Repair or replace defaced or disfigured caused by work of this Section.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Division 01.

B. Protect sealant until cured.

C. Do not paint sealants until sealant is fully cured.

D. Do not paint silicone sealant.

E. Protect joint sealants from contact with contaminating substances and from damage. Cut out, remove and replace contaminated or damaged sealants, immediately, so that they are without contamination or damage at time of Project Completion.

END OF SECTION

SECTION 07 95 00
EXPANSION CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-rated expansion joint assemblies for wall and roof surfaces.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 07 54 23.16 – Mechanically Fastened Thermoplastic Polyolefin Roofing.
- D. Section 07 92 00 – Joint Sealants.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM D1187 – Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 - 3. ASTM D2000 – Standard Classification System for Rubber Products in Automotive Applications.
 - 4. ASTM D4637 – Standard Specification for EPDM Sheet Used In Single-Ply Roof Membrane.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide joint assembly profiles, dimensions, locations in the Work, affected adjacent construction, anchorage devices, available colors and finish, and locations of splices.
- C. Manufacturer's Installation Instructions: Indicate rough-in sizes. Provide templates for cast-in or placed frames or anchors, and indicate tolerances for item placement.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Sufficient experience specializing in the manufacturing of expansion joint assemblies utilizing membrane seals.

- B. Application: Factory approved, trained and certified in the proper installation of the specified expansion control system.

1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as instructed by the manufacturer.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products in each manufacturer's original, intact, labeled containers, pallets or bundles and store under shelter in a dry location with temperatures above 40 degrees F until installed. Store off the ground, protect from freezing, direct sun exposure in elevated temperatures and construction activities.

1.8 WARRANTY

- A. The expansion system shall be warranted for a period of three years for normal usage under specified movements and design conditions.
- B. The three year warranty shall warrant and provide at no charge, all materials and labor needed to properly repair or replace defective or damaged product within the term of the provided warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Balco, Inc. Products:
 - 1. BCSW-800 Series Foam Compression Seal, exterior wall-to wall, vertical.
 - 2. BRBG-SE Series, roof-to-wall.
 - 3. CE-200 SX Series Silicone Compression Seal, exterior wall-to wall, vertical.
 - 4. 6TW Series, exterior wall-to wall, vertical.
 - 5. 6TWC Series, exterior wall-to wall, vertical corner.
 - 6. LPR Roof Metal Series, exterior wall-to-wall, horizontal.
- B. MM Systems Corporation.
- C. Watson Bowman Acme.
- D. InPro Corporation.
- E. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Extruded Aluminum: ASTM B221; 6063-T5 alloy for extrusions; clear anodized finish.
- B. Resilient Filler: Neoprene; exhibiting Shore 'A' hardness of 40-50 Durometer.
- C. Threaded Fasteners: Aluminum or stainless steel.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187.

- E. Seals: ASTM D2000 extruded elastomeric silicon. Color as selected by Architect.
- F. Provide 45 mil flexible EPDM Class I water barriers per ASTM D4637 with drainage fittings and tubing at exterior joints for a waterproof installation.

2.3 FABRICATION

- A. Joint Covers: Aluminum cover plate, aluminum frame construction, retainers with resilient filler strip, designed to permit ± 100 percent joint movement with full recovery, flush and recess mounted; refer to drawings for types and locations.
- B. Back paint components in contact with cementitious materials with bituminous coating.
- C. Shop-assemble components and package with anchors and fittings. At metal components, provide factory welded transitions and corners.
- D. Provide joint components in single length wherever practical. Minimize site splicing.
- E. Only straight, butt splice connections shall be allowed on the jobsite following manufacturer's written instructions utilizing specialty heat fusing equipment or the manufacturer's specialty splicing adhesive. All factory and field fused connections shall incorporate bonding of the complete seal profile. This includes fusing of all internal and external web configurations.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing conditions prior to installation.
- B. Verify that joint preparation and affected dimensions are acceptable.

3.2 PREPARATION

- A. Provide anchoring devices for installation and embedment.
- B. Provide templates and rough-in measurements.

3.3 INSTALLATION

- A. Install components and accessories in accordance with manufacturer's instructions.
- B. Align work plumb and level, flush with adjacent surfaces.
- C. Rigidly anchor components to substrate to prevent misalignment.
- D. Make allowances for change in joint size due to difference between installation and building operating temperatures.
- E. Cover and protect expansion joint cover assemblies from construction traffic.
- F. Exterior Expansion Systems: Mechanically fasten frames to each side of joint and attach interior and exterior seals and water barrier systems.
- G. Roof Joint Covers: Attach to curbs and substrates at 18 inches on center maximum.

H. Remove excess and misplaced sealants as work progresses.

I. Remove protective film or coverings from expansion joint covers upon completion of adjacent construction.

3.4 ADJUSTING AND PROTECTION

A. Adjust joint seal to freely accommodate joint movement.

B. Protect installation from damage by work of other Sections.

END OF SECTION

DIVISION 08
OPENINGS

SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Standard hollow metal doors and frames.
 - 1. Hollow metal doors, rated and non-rated.
 - 2. Hollow metal frames, rated and non-rated.
- B. Borrowed lights (interior windows, fixed).
- C. Sidelights.
- D. Cased openings.
- E. Door glazing.
- F. Door louvers.
- G. Finish: Field-painted, color as indicated on Drawings; if not indicated, to be selected by Architect. Provide exterior paint system on both interior and exterior sides, four edges, and frames of exterior doors.
 - 1. Exterior Door Assembly Colors (Interior and Exterior Faces): Color as indicated; if not indicated, verify exposed face and edge colors with Architect prior to painting.

1.2 RELATED SECTIONS

- A. Section 04 22 00 – Concrete Unit Masonry.
- B. Section 05 40 00 – Cold-Formed Metal Framing.
- C. Section 07 92 00 – Joint Sealants.
- D. Section 08 14 00 – Wood Doors.
- E. Section 08 71 00 – Door Hardware.
- F. Section 08 81 00 – Glass Glazing.
- G. Section 08 88 13 – Fire Rated Glazing.
- H. Section 08 91 19 – Fixed Louvers.
- I. Section 09 22 16 – Non-Structural Metal Framing.
- J. Section 09 29 00 – Gypsum Board.
- K. Section 09 91 00 – Painting.
- L. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
1. ANSI/SDI A250.6 – Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
 2. ANSI/SDI A250.8 – Standard Steel Doors and Frames.
 3. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 4. ASTM A1008/A1008M – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
 5. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
 6. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
 7. ASTM E283 – Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 8. ANSI/NAAMM HMMA 861 – Guide Specifications for Commercial Hollow Metal Doors and Frames.
 9. California Building Code, Section 716 “Opening Protectives,” Paragraph 716.5 “Fire Door and Shutter Assemblies”.
 10. California Code of Regulations, Title 24, Part 12, 2013 California Referenced Standards Code – Chapter 12-7-4, Fire-Resistive Standards.
 11. NAAMM HMMA 840 – Guide Specification for Installation and Storage of Hollow Metal Doors and Frames.
 12. NFPA 80 – Standard for Fire Doors and Other Opening Protectives.
 13. NFPA 105 – Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives.
 14. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies.
 15. NFRC 400 – Procedure for Determining Fenestration Product Air Leakage.
 16. UL 10B – Fire Tests of Door Assemblies.
 17. UL 10C – Positive Pressure Fire Tests of Door Assemblies.
 18. UL 1784 – Air Leakage Tests for Door Assemblies.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Include illustrations and schedule of finish hardware, door and frame size, type, material, fire ratings, construction, finishing, anchoring, glazing, accessories and preparation for installing hardware.
 - 1. Method of attachment of frames to structure shall be reviewed by Architect for acceptance or rejection.
 - 2. Details of conduit and preparations for power, signal, and control systems.
- C. Templates: Furnish hardware templates to fabricator of frames to be factory prepared for installation of hardware. Refer to Section 08 71 00 for hardware requirements.
- D. Manufacturer's Certificate for Exterior Door Assemblies: Certify that door assemblies meet air infiltration requirements of California Energy Code, California Code of Regulations, Title 24, Part 6, Section 116, as referenced in California Building Code, Chapter 13, "Energy Efficiency".
 - 1. Air Leakage Limits: Manufactured exterior door assemblies shall have air infiltration rates not exceeding 0.3 cubic feet per minute per square foot of door area for nonresidential single doors (swinging and sliding), and 1.0 cubic feet per minute per square foot for nonresidential double doors (swinging), when tested according to NFRC 400 or ASTM E283 at a pressure differential of 75 pascals or 1.57 pounds per square foot.
- E. Submit product data for type of metal primer proposed for use.

1.5 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings.
- B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8.

1.6 QUALITY ASSURANCE

- A. Provide doors and frames complying with ANSI A250.8, ANSI/NAAMM-HMMA 861, and as specified herein.

1.7 REGULATORY REQUIREMENTS

- A. Fire-Rated Doors and Frames: Provide doors and frames complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252, UL 10C, or UL 10B.
 - 1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - 2. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 degrees F above ambient after thirty minutes of standard fire-test exposure.

- B. Testing of Fire-Rated Door and Frame Assembly: Conform to applicable requirements of State Fire Marshal Standard 12-7-4, "Fire Door Assembly Tests," as referenced in 2013 California Referenced Standards Code, Chapter 12-7-4, "Fire-Resistive Standards."
- C. Doors and Frames for Smoke-Control Door Assemblies: Comply with applicable requirements of NFPA 105 or UL 1784.
- D. Fire-Rated Door and Frame Labels: All fire rated doors and frames shall have metal labels (including "S" labels) permanently fastened to the jamb indicating the fire rating and Testing Agency name.
 - 1. Do not apply primer or paint over fire rating labels.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials under protective cover and store in upright position within a dry enclosed space in a manner that will prevent rust and damage. Do not create a humidity chamber by using a plastic or canvas shelter that is not adequately vented.
- B. Deliver fully-welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

1.9 PROJECT CONDITIONS

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

1.10 COORDINATION

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

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers, Hollow Metal Doors and Frames:
 - 1. Ceco Door Products, Milan, TN; 888-232-6366, www.cecodoor.com.
 - 2. Curries Company, Mason City, IA; 800-377-3948, www.curries.com.
 - 3. Steelcraft, Cincinnati, OH; 800-243-9780, www.steelcraft.com.
 - 4. Door Components Inc., Fontana, CA; 866-989-3667, www.doorcomponents.com.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Cold-Rolled Steel Sheets for Doors and Frames: Commercial Steel (CS), Type B, complying with ASTM A1008/A1008M.
 - 1. Use cold-rolled steel for door frames and exposed-to-view surfaces.

- B. Hot-Rolled Steel Sheets and Strip for use at Door Frames: Commercial Steel (CS), Type B; complying with ASTM A1011/A1011M.
 - 1. Steel to be free of mill scales, pitting, or surface defects; pickled and oiled.
 - 2. Use hot-rolled steel for reinforcement and concealed components only.
- C. Factory-Applied Primer: Manufacturer's standard primer, thickness: two mils minimum, and compatible with ferrous and galvanized metal primers specified in Section 09 91 00.
- D. Refer to Section 08 81 00 and Section 08 88 13 for glass glazing requirements.
- E. Refer to Section 08 71 00 for hardware requirements.

2.3 STANDARD HOLLOW METAL DOOR FABRICATION

- A. General: Fabricate to sizes shown, providing necessary clearances and bevels to permit operation without binding. Doors shall be free from warp, wave, buckle or other defect. Doors shall be 1-3/4 inches thick, unless otherwise indicated on Drawings.
- B. Flush Door Construction: Door shall be Grade III, Model 2, fabricated with face sheets of 16 gauge steel in accordance with ANSI/SDI A250.8 and galvanized to ASTM A653/A653M G60 at exterior locations and interior wet locations. Door shall be flush with edge seams, weld filled and ground smooth. Bevel lock edge 1/8 inch in 2 inches. Door shall be provided with top flush cap and bottom inverted 14 gauge steel channels welded within the door. Door shall be reinforced, stiffened and sound deadened with impregnated kraft honeycomb core completely filling door cavity, and laminated to the inside faces of panels.
 - 1. Exterior doors shall be insulated with an expanded polystyrene or polyurethane core, or as standard with manufacturer. Completely fill door cavity with insulation. Expanded polystyrene to be ASTM C578, Type 1 or Type 2, with minimum one pound per cubic foot density.
- C. Preparation of Hardware: Per ANSI/SDI A250.6, door shall be mortised, reinforced, drilled and tapped at the factory from templates for all mortise hardware listed in the Hardware Schedule. Door shall be reinforced for surface applied hardware such as closers, checks, escutcheons and kick plates; drilling and tapping to be done in the field by door installer. Reinforcement to be 12 gauge for locksets and latchsets, and 14 gauge for surface applied hardware, except use 3/16-inch thick plate for butt hinges. Door shall be provided with reinforcing unit as recommended by lock manufacturer.
- D. Hardware Mounting Heights and Door Clearances: In accordance with California Building Code and applicable requirements of Section 08 71 00.

2.4 STANDARD HOLLOW METAL FRAME FABRICATION

- A. General:
 - 1. Provide fully-welded frames; location as indicated on Drawings.
 - 2. Hollow metal frames shall be formed to shapes and sizes shown.
- B. Fully-Welded Frames: Head and jamb splices shall be fabricated with mitered, coped and continuously welded inside and outside corners and be finished on the outside face to present a smooth surface for painting.

- C. Frames shall be fabricated from 16 gauge steel, and shall be designed with integral stop and trim. All corners shall be reinforced with 18 gauge "L" shaped reinforcements welded on the inside face of the frame.
- D. Reinforce frames wider than 48 inches with roll formed steel channels fitted tightly into frame head, flush with top.
- E. Frames shall be galvanized to ASTM A653/A653M G60 at exterior locations and interior wet locations.
- F. Preparation for Hardware: Per ANSI/SDI A250.6, frame shall be prepared at the factory for all hardware using templates furnished by hardware supplier. Locations of miscellaneous hardware shall conform to the recommendations for the Door and Hardware Institute. Mortise, reinforce, drill and tap for mortise type hardware. Reinforce frames for surface applied hardware; drilling and tapping to be done in the field by door installer.
 - 1. Hardware cutouts shall have steel plate reinforcements with tapped holes fillet welded to frame on all four sides of the plate. Fillet welds shall be minimum 1 inch long. Reinforcement shall include 3/16 inch butt reinforcement; 12 gauge lock strike; 14 gauge for surface applied items.
 - 2. Provide strike stops at frames to receive metal doors with holes for three rubber door silencers. On double door frames, provide for two silencers per door at head. Omit holes at frames to receive unitized gasketing; refer to Section 08 71 00.

2.5 BORROWED LIGHTS (INTERIOR WINDOWS, FIXED)

- A. Interior Window Units: Furnish shop assembled and welded units for fixed windows, fabricated to the designs and dimensions indicated. Provide metal glazing stops and mouldings of same gauge as frame on secure side of window for field assembly with countersunk oval head self-tapping screws spaced not over 16 inches on center. Frames shall be complete with all corners welded, ground smooth, and provided with anchors.

2.6 ANCHORS

- A. Frame shall be anchored to structure with anchors appropriate for use with type of adjacent construction. Anchorage shall securely fasten frames to wall construction involved. Provide a minimum three anchors, including one adjustable floor anchor, at each door jamb. Anchors shall provide stiffness and rigidity to keep frames square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the frame manufacturer or as conditions warrant:
 - 1. Metal Framing: Two #10 self-tapping sheet metal screws per anchor, length as required; fastener to penetrate a minimum of 1/4 inch into framing member.
 - 2. Concrete/Masonry: 1/4 inch diameter stainless steel wedge anchors, three per jamb, with 1-1/2 inches minimum embedment into substrate and 2 inches minimum edge distance to face of substrate.

2.7 PRIMING

- A. Doors and frames shall be leveled and welds ground smooth. Apply mineral filler to eliminate weld scars and other blemishes.

- B. Shop Priming: All surfaces shall be cleaned, phosphatized, and given one coat of baked-on rust-inhibiting primer in accordance with the Steel Door Institute Specification "Test Procedure and Acceptance Criteria for Primer Painted Steel Doors and Frames".

1. Do not prime paint fire-rated door and frame labels.

2.8 ACCESSORIES

- A. Glazing Stops: LoPro by Anemostat or Slimline by Air Louvers, Inc. Galvanized steel; mitered corners; prepared for countersink style screws. At fire-rated assemblies, fire-rating of glazing stops shall match fire-rating of opening. Sizes as indicated on Drawings. Install glazing stop fasteners on the non-secure side of doors. Finish shall be factory primed to receive site paint finish, color as selected by Architect.
- B. Glass Glazing: As specified in Section 08 81 00 and Section 08 88 13.
- C. Security Door Louvers:
1. Door Louvers: Provide heavy-duty, vandal-resistant door louvers with security grille; size as indicated on Drawings.
 - a. Louvers with Grilles: Two-piece louver design; galvanized steel, G90 coating; 18 gauge inverted-Y louver blades; and 12 gauge security grille on both sides.
 - b. Fasteners: Security fasteners, non-removable from secure side.
 - c. Finish: Factory-applied primer, suitable for field painting.
 - d. Free Area: Forty percent, minimum.
 2. Basis-of-Design Product: Model 1500-A Security Louver by Air Louvers Inc., City of Commerce, CA; 800-766-0660, www.airlouvers.com or accepted equal by Anemostat Door Products (A Mestek Company), Carson, CA; 310-835-7500, www.anemostat.com.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that opening sizes and tolerances are acceptable.

3.2 INSTALLATION

- A. Install doors and frames in accordance with ANSI A250.8, and ANSI/NAAMM-HMMA 861, and UL 752, as applicable.
- B. Set frame level and plumb, and brace adequately to prevent damage or distortion. Secure to structure with minimum of three anchors at each jamb. Field joints shall be welded, body puttied and ground smooth.
1. Removable Spreaders: Wherever possible, leave frame spreaders intact until frames are set perfectly square and plumb, and anchors are securely attached.
- C. Door Installation in Hollow Metal Frames: Fit hollow metal doors accurately in frames.
- D. Coordinate installation of doors and frames with installation of doors specified in Section 08 14 00, hardware specified in Section 08 71 00, and glazing as specified in Section 08 81 00 and Section 08 88 13, and louvers as specified in this Section.

3.3 ERECTION TOLERANCES

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.4 ADJUST AND CLEAN

- A. Prime Coat Touch-Up: Immediately after erection, sand smooth all rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer. Touch-up shall not be obvious.
- B. Cleaning and Finishing: Upon completion of the work, clean all exposed surfaces, removing any discoloration or foreign matter, and touch up all abraded or cut areas and exposed edges with finishing material recommended by the manufacturer. Touch-up of finish shall not be obvious.
- C. Final Adjustments: Adjust door for smooth and balanced door movement. Check and readjust operating finish hardware in hollow metal work immediately prior to final inspection. Leave work in complete and proper operating condition.
- D. Defective Work: Remove and replace defective work, including doors and frames which are warped, bowed or otherwise damaged, as directed by Architect, at no cost to Owner.
- E. Protection: Protect installed hollow metal work against damage from other construction work.

3.5 CLEAN-UP

- A. Upon completion of the work of this Section, remove all excess materials, rubbish, and debris from the premises.

END OF SECTION

SECTION 08 14 00

WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Non-Rated Flush Wood Doors.
- B. Door Glazing.

1.2 RELATED SECTIONS

- A. Section 08 11 13 – Hollow Metal Doors and Frames.
- B. Section 08 71 00 – Door Hardware.
- C. Section 08 81 00 – Glass Glazing.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ANSI/WDMA I.S.1-A – Architectural Wood Flush Doors.
 - 2. ASTM F152 – Standard Test Methods for Tension Testing of Nonmetallic Gasket Materials.
 - 3. WI/AWI Architectural Woodwork Standards, including WI Supplemental Text.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware and identify cutouts for glazing.
- C. Product Data: Indicate door core materials and construction; veneer species and cut, type and characteristics; factory machining criteria, factory finishing criteria.
- D. Samples: Submit three sets of three samples each of door veneer, 8 inches x 8 inches in size, illustrating specified wood species, grain, and range of color.

1.5 QUALITY ASSURANCE

- A. Single Source Responsibility: All doors specified in this Section shall be manufactured and provided by a single manufacturer to ensure door compatibility and quality.
- B. Perform work in accordance with WI/AWI, Section 9, Custom Grade.

C. Other requirements shall conform to WDMA I.S. 1A-04 as follows:

Performance Attribute	Duty Level
	Extra Heavy Duty
Adhesive Bond Durability WDMA TM-6, 1988	Type I
Cycle Slam WDMA TM-7, 1990	1, 000,000 cycles
Hinge-Loading WDMA TM-8, 1990	550 pounds
Screwholding WDMA TM-10, 1990	
Door Face Unblocked	550 pounds
Door Face (with optional blocking)	700 pounds
Vertical Door Edge	550 pounds
Horizontal Door Edge (applies when hardware attached)	300 pounds
Telegraph WDMA T-1	Maximum 0.010 inch per 3-inch span
Warp Tolerance WDMA T-2	Maximum 0.25 inch per 3 foot 6 inches by 7 foot door section
Squareness WDMA T-3	Diagonal Variance 0.125 inch

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section.

1.7 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 01.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Comply with requirements in ANSI/WDMA I.S.1A: How to store, handle, finish, install and maintain wood doors.

D. In the event of damage, immediately make all repairs and replacements necessary at no additional cost to Owner.

E. Store flat on a level surface in a dry, well-ventilated building. Cover to keep clean but allow air circulation.

F. Handle with clean gloves and do not drag doors across one another or across other surfaces.

G. Do not subject door to abnormal heat, dryness or humidity.

H. Deliver in clean trucks and, in wet weather, under cover.

1.8 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

1.9 COORDINATION

- A. Coordinate the work with door opening construction, doorframe, door hardware, and door glazing installation.

1.10 WARRANTY

- A. Provide warranty under provisions of Division 01.
- B. Warranty Period:
 - 1. Interior Solid Core Standard Doors: Life of installation.
 - 2. Include coverage for delamination of veneer, warping or twisting (not to exceed 1/4 inch in any face including diagonal) or other defects. Warranty shall cover replacement of door plus costs of hanging and finishing.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. VT Industries, Holstein, IA; 800-827-1615, www.vtindustries.com.
- B. Eggers Industries, Two Rivers, WI; 920-793-1351, www.eggersindustries.com.
- C. Algoma Hardwoods, Inc., Algoma, WI; 800-254-6623, www.algomahardwoods.com.
- D. Graham, Mason City, IA; 641-423-2444, www.grahamdoors.com.
- E. Substitutions: Under provisions of Division 01.

2.2 DOOR CONSTRUCTION

- A. All doors shall be 1-3/4 inch thickness, unless noted otherwise.
- B. Solid, non-rated particleboard core: WI/AWI Section 9, 5-ply; Custom Grade.
- C. Faces:
 - 1. Veneer Species: Stain grade cherry veneer for transparent finish.
 - 2. Cut: Quarter cut.
 - 3. Match between Veneer Leaves: Book match.
 - 4. Assembly of Veneer Leaves on Door Faces: Balance match.
 - 5. Face veneers for pairs of doors shall be selected for color and grain match. Face veneers shall not be less than 1/50 inch at 12 percent moisture content after factory sanding. Crossbanding shall be high density fiberboard (HDF), MDF will not be allowed as a veneer substrate (crossband). Thin veneers are not acceptable.
 - 6. Use solid stock for exposed edges to match face veneer.
- D. Provide solid blocking on doors with surface mounted hardware or closers, for attachment with screws in lieu of through-bolts.
- E. Top and bottom rails shall be a minimum of 2-1/4 inch before trimming, mill option species structural composite lumber for non-rated doors.

2.3 ADHESIVE

- A. Facing Adhesive: Type I – waterproof.

2.4 ACCESSORIES

- A. Glazing Stops: LoPro by Anemostat or Slimline by Air Louvers, Inc. Galvanized steel; mitered corners; prepared for countersink style screws. Sizes as indicated on Drawings. Install glazing stop fasteners on the non-secure side of doors. Finish in custom paint color as selected by Architect.
- B. Glass Glazing: As specified in Section 08 81 00.

2.5 FABRICATION

- A. Fabricate non-rated doors in accordance with WI/AWI Architectural Woodwork Standards requirements.
- B. Provide blocking at top of door for closer for attachment with screws.
- C. Bond edge banding to cores.
- D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.
- E. Undercut doors where indicated on Drawings.
- F. Glass Cutouts: Provide cutouts for glass of size and shape indicated. Glass for doors is specified under Section 08 81 00.
- G. Factory seal top and bottom rails before shipment.
- H. Bevel both stiles 1/8 inch in 2 inches (3 degree bevel) and undersize doors 1/4 inch in width so that they swing freely and do not hinge bind.

2.6 FINISH

- A. All doors shall be factory pre-finished, equal to WI/AWI Section 5, System #3, or accepted equal. Transparent finish, stain color and tone as selected by Architect and accepted on submitted sample. Apply finish at all edges of doors.
 - 1. Color: VT Industries Wheat #WH07 or accepted equal by other manufacturers.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify frame opening conditions.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.2 INSTALLATION

- A. Install non-rated doors in accordance with WI/AWI Section 9 requirements.

- B. Pre-adjust door height, supply doors with factory undercut.
- C. Where required, trim non-rated door width by cutting equally on both jamb edges.
- D. Where required, trim door height by cutting bottom edge to a maximum of 3/8 inch above finished floor or threshold.
- E. Pilot drill screw and bolt holes.
- F. Machine cut for hardware. Core for handsets and cylinders.
- G. Coordinate installation of doors with installation of frames specified in Section 08 11 13, hardware specified in Section 08 71 00, and glazing as specified in Section 08 81 00.

3.3 INSTALLATION TOLERANCES

- A. Maximum Diagonal Distortion (Warp): 1/4 inch measured with straight edge or taught string, corner to corner, over an imaginary 36 inch x 84 inch surface area.
- B. Maximum Vertical Distortion (Bow): 1/4 inch measured with straight edge or taught string, top to bottom, over an imaginary 36 inch x 84 inch surface area.

3.4 ADJUSTING

- A. Adjust work under provisions of Division 01.
- B. Adjust door for smooth and balanced door movement, and wipe clean.

END OF SECTION

SECTION 08 31 00
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire rated access doors.
- B. Non-fire-rated access doors.
- C. Medium security access doors.

1.2 RELATED SECTIONS

- A. Section 09 22 16 – Non-Structural Metal Framing.
- B. Section 09 29 00 – Gypsum Board.
- C. Section 09 91 00 – Painting.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ITS Directory of Listed Products.
 - 2. UL Building Materials Directory.
 - 3. NFPA 80.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Include sizes, finish, and hardware.
- C. Shop Drawing: Show scheduled locations and details of adjoining work.

1.5 REGULATORY REQUIREMENTS

- A. Conform to requirements of CBC Section 1209 for access to unoccupied spaces.
- B. Labeling of fire-rated assemblies:
 - 1. Fire rated access doors shall be labeled per Title 24, Part 12, 2013 California Referenced Standards Code – Chapter 12-7-4, Fire-Resistive Standards; Section 12-7-407.

1.6 PRE-INSTALLATION MEETINGS AND COORDINATION

- A. Conduct pre-installation meeting in accordance with provisions of Division 01.
- B. Convene pre-installation meeting prior to commencing work of this Section.
- C. Coordinate work in this Section with work in related Sections.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Nystrom Building Products, Minneapolis, MN 55428; phone: 800.547.2635, fax: 800.317.8770, www.nystrom.com.
 - 2. Karp Associates, Inc., Maspeth, NY 11378; phone: 718.784.2105, www.karpinc.com.
 - 3. J.L. Industries Inc., Bloomington, MN 55435; phone: 952.835.6850, fax: 952.835.2218, www.jlindustries.com.
 - 4. Milcor, Inc., Holland, OH 43528; phone: 800.528.4144, www.milcorinc.com.
- B. Substitutions: Under provisions of Division 01.

2.2 ACCESS DOORS

- A. Fire-Rated Access Doors for Gypsum Board:
 - 1. Product: UL rating 1.5 hours (B label); ITS rating 3 hours in ceiling.
 - a. Nystrom, Model IW.
 - b. Karp, Model KRP-350FR.
 - 2. Components:
 - a. Sizes: As shown on the Drawings.
 - b. Frame: 16 gauge steel.
 - c. Door: 20 gauge steel.
 - d. Hinge: Continuous piano hinge (Karp), concealed pin hinge (Nystrom).
 - e. Latch: Bolt type, key operated, self-latching with automatic closer and interior latch release.
 - f. Insulation: 2 inch thick fire rated mineral fiber.
 - g. Finish: Phosphate dipped, and prime coat of rust inhibitive electrostatic powder, baked grey enamel.
- B. Non-Rated Access Doors for Gypsum Board:
 - 1. Product:
 - a. Nystrom, Model NW.
 - b. Karp, Model KDW.
 - 2. Components:
 - a. Sizes: As shown on the Drawings.

- b. Frame: 16 gauge steel.
 - c. Door: 14 gauge steel.
 - d. Hinge: Concealed continuous piano hinge.
 - e. Latch: Screwdriver operated, stainless steel cam and stud.
 - f. Finish: Phosphate dipped, and prime coat of rust inhibitive electrostatic powder, baked grey enamel.
- C. Medium Security Access Doors at all other wall and ceiling areas:
 - 1. Product: Nystrom Model MT.
 - 2. Components:
 - a. Sizes: As shown on Drawings.
 - b. Frame: 12 gauge cold rolled steel with 1 inch flange.
 - c. Door: 12 gauge cold rolled steel.
 - d. Hinge: Concealed continuous piano hinge.
 - e. Latch: Key operated cylinder lock.
 - f. Finish: Phosphate dipped, and prime coat of rust inhibitive electrostatic powder, baked grey enamel.

2.3 FABRICATION

- A. Welded construction.
- B. Manufacture each access panel assembly as an integral unit ready for installation.
- C. Furnish with a sufficient quantity of 1/4 inch diameter mounting holes to secure access panels to types of supports indicated on Drawings
- D. Furnish number of latches required to hold panel in flush, smooth plane when closed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions. Verify structure is plumb, level, and parallel. Verify rough openings for door and frame are correctly sized and located.
- B. Report unacceptable conditions to the Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions and approved shop drawings.
- B. Install units plumb, level, and square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction. Secure rigidly in place.
- C. Position unit to provide convenient access to concealed work requiring access.

3.3 ADJUSTING AND REPAIRING

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

END OF SECTION

SECTION 08 34 63
DETENTION DOORS AND FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Detention hollow metal doors, frames, panels, windows, and sidelites, rated and non-rated.
- B. Embedded anchor devices.
- C. Electrical conduit and wire as specified in this Section only. Conduit and junction boxes occurring within panels, doors or frames are to be installed by this Section.
- D. Miscellaneous items, appurtenances and devices incidental to or necessary for a sound, secure and complete installation.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry: Setting of embedded items and grouting in frames.
- C. Section 07 92 00 – Joint Sealants.
- D. Section 08 11 13 – Hollow Metal Doors and Frames.
- E. Section 08 71 63 – Detention Door Hardware.
- F. Section 08 88 53 – Security Glazing.
- G. Section 09 91 00 – Painting.
- H. Section 11 19 00 – Detention Equipment Contractor.
- I. Divisions 25-28 – Electrical and Security Work.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
 - 2. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
 - 3. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

4. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
5. ASTM A1008/A1008M – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
6. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
7. ASTM C476 – Standard Specification for Grout for Masonry.
8. California Code of Regulations, Title 24, Part 12, 2013 California Referenced Standards Code – Chapter 12-7-4, Fire-Resistive Standards.
9. FS FF-S-325 – Expansion Anchors and Anchor Bolts.
10. FS QQ-A-325 – Finish for Wedge Type Expansion Anchors.
11. FS QQ-Z-325C – Plating of Anchorage Components. B. Stainless Steel Anchor Bolt Standards.
12. FS TT-C-490 – Cleaning Methods for Ferrous Surfaces and Pretreatments for Organic Coatings.
13. FS TT-P-664 – Primer Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, VOC-Compliant.
14. NFPA Standard No. 80 – Standard for Fire Doors and Other Opening Protectives.
15. UL – Underwriters Laboratory.

1.4 SUBMITTALS

- A. Submit shop drawings under provisions of Division 01.
- B. Submit complete shop drawings for fabrication, erection and installation of all items of detention equipment. Include plans, elevations and large-scale details. Show anchorage and accessory items and include electrical junction boxes, conduit and wiring locations and connections, to insure a complete and proper installation. All Shop Drawings shall be referenced to Architect's Door Schedule, Glazing Schedule, Detail Numbers and Hardware Group as applicable.
- C. Submit product data under provisions of Division 01.
- D. Submit manufacturer's product data and installation instructions for each standard equipment and hardware item.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit operation data under provisions of Division 01.
- B. Detention equipment manufacturer shall furnish operating and specifications manuals for all detention hardware and all detention locking devices and provide instruction for the care of finishes and materials.

- C. Detention equipment manufacturer shall, upon notice of the Architect and without additional cost to Owner, provide factory representatives specifically trained in operation of detention equipment with a thorough knowledge of its mechanisms, for a five working day instruction and training period. Factory representatives must be capable of training custodial personnel in operation, repair and upkeep.

1.6 QUALITY ASSURANCE

- A. Detention equipment suppliers shall be pre-qualified by the Owner and provide the following information:
 - 1. List the last five jobs completed along with the Owner's and General Contractor's names.
 - 2. Show proof of completed schedule on past jobs.
- B. Manufacturer: Provide detention equipment products and items produced by manufacturers who have sufficient documented experience in manufacturing equipment for maximum security and medium security installation.
- C. Provide products of same manufacturer for each type of items or unit required. Provide each item as a unit, complete with all accessories, fittings, fastenings, anchorage, and devices necessary for items to correctly function for purpose for which intended.
- D. Installation shall be performed by manufacturer or his authorized representative under the manufacturer's direct supervision.
- E. Field Examination:
 - 1. At the direction of the Architect, the Contractor shall destroy a randomly selected security hollow metal door or panel by sawing it in half.
 - 2. If the examination reveals that the construction is in variance with the details or specifications, the door manufacturer shall replace all doors shipped to the project, as of the date of examination, with new doors constructed in conformance with the specifications. Under conditions of non-conformity, the door manufacturer shall pay for the destroyed door, related labor and all replacement costs.
 - 3. If the door was constructed in conformance with the specifications, the Owner shall pay for the replacement of the destroyed door and the related labor.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Deliver detention and security equipment cartoned or crated to extent feasible.
- C. Store in a protected location under cover with locks, operating and electrical devices in a securely locked room.
- D. Store larger items on wood blocking under cover and out of the weather.

1.8 REGULATORY REQUIREMENTS

- A. Wherever a fire-resistance classification is scheduled for a detention metal frame assembly, provide fire-rated metal frame assembly (complete with all products required) investigated and tested as a fire door assembly, complete with type of hardware to be used.

- B. Identify each fire door and frame with mylar UL labels, indicating applicable fire rating of door and frame.
- C. Construct and install assemblies to comply with NFPA Standard No. 80, and as herein specified.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Trussbilt – Vadnais Heights, MN.
 - 2. Habersham Metal Products – Atlanta, GA.
 - 3. Mid West Detention Products, Inc. – Minooka, IL
 - 4. Steel Door Industries, Inc. – San Antonio, TX.
 - 5. Southern Folger – Joliet, IL
 - 6. Sweeper Metal Fabricators Corp. – Drumright, OK
 - 7. Maximum Security Products – Newark, CA.
 - 8. Willo Products Company – Decatur, AL.
 - 9. Slate Security – Hartselle, AL.
- B. Substitutions: Under provisions of Division 01 and Section 11 19 00.

2.2 MATERIALS

- A. Fastening Devices:
 - 1. All exposed screws and nuts shall meet ASTM A307 – Grade A.
 - 2. In areas where it is necessary to remove items from time to time, screws shall have slots or holes that require a special tool for removing same and must be such that standard tools will not fit.
 - 3. Each type of fastener must be indicated on shop drawings.
 - 4. All exposed screw fasteners shall be installed with Loctite, or accepted equal thread locking adhesive/sealant.
- B. Anchorage Devices:
 - 1. Weld Studs: TRW Division “headed” studs; weld to steel plates.
 - 2. Wire Anchors: ASTM A615 grade 40 deformed rebar; weld to 10 gauge steel plates formed as required.
 - 3. Steel Plate Anchors: Galvanized steel sheets formed as required; thickness, sizes as indicated.
 - 4. Steel Plates: ASTM A36/A36M steel; form as required.
 - 5. Expansion Anchors: FS FF-S-325 Group II, Type 3, Class 3 plated finish. Provide each anchor complete with bolt, expansion sleeve, hex nut, washer; 1/2 inch diameter size required with length as required for 4 inch minimum embedment depth, except where indicated to be longer.

6. Anchor Bolts Concealed From View: FS FF-S-325 Group II, Type 4, Class 1 wedge-type expansion anchors with FS QQ-Z-325C Type 1, Class 3 plated finish. Provide each anchor complete with bolt, expansion sleeve, hex nut, washer; 5/8 inch diameter size required with length as required for 2-3/4 inch minimum embedment depth.

2.3 DETENTION HOLLOW METAL DOORS AND PANELS

- A. Construct of commercial quality, leveled, cold-rolled face sheets, ASTM A1008/A1008M, with interior vertical full-height steel reinforcing channels at 6 inches on center. Spot weld face sheets to each reinforcing channel at 3 inches on center maximum. Fill spaces between channels with mineral rock wool filler, six pound density. Exterior doors shall be galvanized to ASTM A653/A653M G60. Note: Manufacturer's standard alternate interior door reinforcing may be acceptable. Submit complete information and details for approval in compliance with provisions of Division 01.
- B. Doors and panels to be full flush design, 2 inches nominal thickness, sizes, type and elevations as shown on Drawings, schedules and approved shop drawings.
- C. Metal Gauges:
 1. Face Sheets:
Medium Security 12 Gauge
 2. Vertical Reinforcement:
Medium Security 12 Gauge
- D. Door Edges: Bevel vertical door edges 1/8 inch in 2 inches, reinforce full height with steel channels 1/8 inch thick, welded to both door faces at 3 inches on center maximum. Top and bottom reinforced full width with 10 gauge channels welded to vertical edge channels and to both door faces at 3 inches on center maximum. All edges shall be finished flush.
- E. Openings in Doors: In maximum security doors and panels, all openings shall be reinforced to match door edges.
- F. Maximum clearances between doors and frames:
 1. 1/8 inch at head.
 2. 1/8 inch at jamb.
 3. 1/8 inch at vertical meeting edge of pairs of doors.
 4. 3/4 inch under non-rated door with no threshold.
 5. 3/4 inch under fire rated door with no threshold.
 6. 3/4 inch under door with threshold.
- G. Provisions for Hardware:
 1. Mortise, cut, reinforce, drill and tap door edges to receive approved hardware. Comply with hardware manufacturer's recommendations and instructions.
 2. Provide reinforced pocket to receive mortised locks. Protect lock with steel plates welded inside of door faces; 1/8 inch thick plates at medium security.

3. Provide reinforced seats, 1/8 inch and 3/16 inch thick, drilled, tapped and set back to the thickness of the face of the lock installed through door edge. Weld to edge channel. Cut away edge reinforcing channel only as necessary to pass the lock. Provide lock centering clips on each side of lock pocket. Cut out faces to pass cylinders, etc.
4. Provide a special pocket where prison locks are installed through the face of door: 3/16 inch thick steel reinforcing plate welded inside the detention side of pocket. Cut away outside face for lock installation. Secure lock to 3/16 inch steel plate furnished by lock manufacturer as per manufacturer's details. Frame around pocket to allow this plate to finish flush with surface of door. Secure plate with minimum of eight 1/4 inch security screws. Removal of lock shall be impossible when lock bolt is extended.
5. Cut hinge edge reinforcing channel only as necessary for mortise butts. At each hinge location, weld inside the edge channel a 3/16 inch x 1-1/2 inch x 10 inch reinforcing plate. At the top hinge location, reinforce with an additional channel welded to the plate inside the edge channel.
6. Full Reinforcing: Steel plate, 3/16 inch x 1-1/2 inches x 10 inches, welded inside door.
7. At all other surface hardware locations, reinforce with 14 gauge steel welded inside door.
8. Electrical Items: Where electrical wiring passes through the door for electric locks, electric hinges or limit switches, the required junction boxes conduit or raceway shall be provided and factory installed by the door manufacturer. The electrical wiring shall be furnished, installed and connected in the field by the Detention Equipment Contractor.

H. Openings in Doors:

1. All openings in doors shall be framed inside the door with 12 gauge minimum steel channels welded to both faces.
2. Provide non-removable glazing stop on detention side.
3. Provide pressed steel angle type glazing stops fastened with 1/4 inch diameter machine screws placed a maximum of 2 inches from ends of stops and a maximum of 6 inches on center.

I. Factory Finish:

1. Before Assembly: Clean and coat all surfaces with corrosion resistant iron oxide-zinc chromate primer.
2. After Assembly: Grind, fill and sand all surfaces and edges, bonderize or phosphate treat, then coat all exposed surfaces with rust inhibitive primer.

J. Hardware Installation:

1. Factory installed hardware includes dead bolts, mortise locks, protection plates, flush bolts, push plates, kick plates, key escutcheons, head bolts, steel bolt pocket in door and all mortise hardware.
2. Field installed hardware includes all projecting items such as pulls, knobs and handles. These items are installed by Detention Equipment Contractor.

K. Sliding Doors: Construct as specified above for maximum security doors including all edge reinforcement and additional 12 gauge cold-rolled steel strip or channel at both top and bottom of doors. Adjust lock reinforcement to suit the lock specified.

L. Performance Tests:

1. Submit independent testing laboratory report on typical flush door. Include description of the test sample and all gauges of components.
2. Certify the door supported at both ends sustains a load of 13,000 pounds applied at quarter points with a maximum mid-span deflection of 0.50 inch for 3 foot x 7 foot doors and maximum security doors.
3. Certify the door fixed at one end and supported at one corner sustains a concentrated twisting force of 5,200 pounds applied to the unsupported corner with a maximum deflection of 2.55 inch for 3 foot x 7 foot doors and maximum security doors.

2.4 DETENTION PRESSED METAL FRAMES

- A. Provide pressed steel frames for doors, security type transoms, sidelites, borrowed lites, observation, visitation, control and security windows.
1. Exterior Frames: Commercial grade steel, 12 gauge, galvanized to ASTM A653/A653M G60.
 2. Interior Frames: Commercial grade cold-rolled steel, ASTM A1008/A1008M or commercial grade hot-rolled and pickled steel, ASTM A1011/A1011M, 12 gauge.
 3. All joints shall be fully mitered and continuously welded inside the miter across the full depth and width of the frame.
- B. Mullion and/or Rail Members: Closed tubular shapes with no visible seams or joints. Weld all abutting members.
- C. Furnish all frames as a single, complete unit where possible. Large frames may be furnished in sections with factory prepared splices. Show all field required splices and splice details on shop drawings.
- D. Provisions for Hardware:
1. Mortise, reinforce, drill and tap at the factory for approved hardware. Comply with manufacturer's instructions and recommendations.
 2. For mortise butts, provide full height 3/16 inch x 1-1/2 inch steel reinforcing plate offset at each hinge location, factory drilled and tapped. At top hinge, add a 3/16 inch backup angle welded to offset reinforcement and to the inside of frame trim.
 3. Follow manufacturer's recommendation for lock or keeper preparation. Reinforcement: 12 gauge for medium security, 1/8 inch thick for maximum security. Protect all cut-outs and reinforcement with pressed steel mortar guards inside the frame.
 4. Door closer reinforcement shall be 12 gauge one piece channel type, 2-1/2 inches deep by 14 inches long, actual configuration shall be verified with closer manufacturer.
 5. 1/8 inch thick reinforcing tabs for all mortise strike areas.

E. Provisions for Electrical Locks:

1. Where electric locks occur in metal frames, the frame face and dimensions shall be modified as recommended by the lock manufacturer, as shown on the drawings, or if not indicated, then as follows:
 - a. Increase frame face width at the lock location to accommodate lock size or provide face width required to accommodate lock size or provide face width required to accommodate lock for full height of frame as indicated on drawings. Set face back to a frame depth of 3-13/32 inch minimum. Provide opening for face access installation on the non-secure side.
 - b. Enclose and form lock pocket with 14 gauge steel welded on all sides.
 - c. Provide lock mounting plate at 3/16 inch steel inside the pocket welded to secure side of frame.
 - d. Provide 3/16 inch lock cover plate to close the face opening. Surface-mount the rounded edges. Fasten with twelve 1/4 inch #20 security screws.
 - e. Include the necessary holes for conduit, lock cylinder and other devices.
 - f. Electrical Items: All required junction boxes, conduit or raceway shall be provided and factory installed by door frame manufacturer. Factory install conduit in frame for electric power source to lock pockets and door position indicator switch. Install conduit from pocket vertically to top or bottom of frame. Verify location with electrical and electronics contractors for field conduit installation. Include conduit for communication intercoms located in frames. Coordinate size, locations and quantities required. The electrical wiring shall be furnished and installed in the field by electronics contractor with final terminations by Detention Equipment Contractor.

F. Provisions for Field Grouting:

1. Openings in Frames: Provide openings in all abutting mullions to facilitate free flow of grout to all frame members. At field welded frames in precast concrete walls with weld plates, provide 1-1/4 inch diameter holes at head frames to facilitate field solid grouting of frames.
 - a. Grout shall conform to ASTM C476.

G. Provide all frames with temporary spreader angles attached to the bottom of both jambs.

H. Glazed Openings in Frames:

1. Frames for glazed openings shall have non-removable stops on secure side and removable glazing beads on opposite side. Glazing beads shall be formed steel angles, size as shown on drawings. Factory-drill beads for 1/4 inch diameter machine security screws at 2 inches maximum from each end and 6 inches maximum on center. Furnish all security screws and special tools.
2. Where applicable, shall be provided with 1 inch maximum glass engagement or greater as required by glazing manufacturer and non-removable stops on the detention side and removable glazing beads opposite.
3. Glazing beads for medium security frames shall be formed steel channels to the depth shown, and of the same gauge as the associated frame. Glazing beads shall be factory drilled and countersunk for flat or oval head machine screws and shall be secured at the factory with slotted flat head machine screws.
4. Center pin rejection (Torx) security machine screws and special screwdrivers shall be furnished by the frame manufacturer for use to install glass and glazing in the field.

5. Where tool resistant (T.R.) bar passes through frame, ribs of bar shall be notched the thickness of material that bar passes through, and be rotated 90 degrees to form positive lock joint. Also, weld bar to frame where bar passes through.
6. Frame rabbets shall be additionally reinforced to engage at least four threads of the stop or head fastening screws.
7. Stop shall be painted to provide corrosion resistance on all surfaces including those concealed when stops or beads are in place.
- I. Security Framing for Control Room Framing and Miscellaneous Sidelites: Provide same material framing as specified above for security pressed metal frames with configurations and sizes as detailed on drawings.
- J. Intercom System: Where intercom speakers are required, factory-install junction boxes and required conduit in frames as per intercom manufacturer's recommendations. Verify size and placement and indicate these on the shop drawings.
- K. Frame Anchors: Locate jamb anchors at 8 inches from top and bottom and at 16 inches on center maximum. Locate head and sill anchors at 8 inches from ends and at 16 inches on center maximum where the masonry opening is 40 inches or greater.
 1. Anchors at Masonry: 3/8 inch diameter wire anchor loops welded to the 10 gauge steel plates; or steel straps welded to embedded steel anchor plates or angles.
 2. Anchors at Concrete: 3/8 inch steel straps welded to continuous embedded steel plate. Reinforce frame and anchors with 12 gauge steel plate.
 3. Anchors at Steel: 10 gauge zee welded to steel and frame.
 4. Floor Anchors: 10 gauge plate welded to frame with adjustable anchor leg.
 5. Provide and install frame stiffener plates, made of 10 gauge bent steel, at 8 inches on center each way in all frames with over 6 inches continuous width or height (one piece).

2.5 FINISHING

- A. After assembly, smooth tool marks and surface imperfections by grinding, filling and sanding. Welded joints exposed to view and not continuously welded shall be filled with a metallic filler and ground smooth so as to show no exposed seam. This applies to both factory assembled and field assembled frame and detention equipment components.
- B. Clean surfaces thoroughly of rust, oil and other impurities and phosphate coat to condition the surface in accordance with Federal Specification TT-C-490.
- C. Coat all surfaces, both inside and outside the frame, to a minimum thickness of 1 mil with rust inhibitive red iron oxide-zinc chromate primer (equal to Federal Specification TT-P-664).

PART 3 EXECUTION

3.1 INSPECTION

- A. Installer of detention equipment must examine the substrates, rough-ins and inserts related to installation of detention equipment and report in writing to the Contractor of conditions detrimental to the proper and timely installation of this work. Do not proceed until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.2 INSTALLATION

A. Detention Equipment:

1. Assemble units, which are not factory assembled. Set units in place and anchor to abutting construction as indicated and in accordance with final shop drawings.
2. Hollow metal frames and frames in masonry construction shall be set in place, anchored, and grouted under Section 04 22 00. Contractor shall provide visual verification of solid grouting by observing the frames being grouted. Grout shall be installed until it is released out of verification holes in glazing pockets. Contractor shall clean grout off directly after to avoid damage to frames.
3. Furnish inserts, anchors and templates for detention equipment that is to be built into concrete or masonry for installation under Section 03 30 00 and Section 04 22 00.
4. Install units plumb, square, properly aligned and securely anchored. Provide anchors, trim and accessories required for a complete, secure and functional installation.
5. Cut holes in detention equipment to accommodate plumbing lines as located by Plumbing Installer.
6. Make field connections, as detailed on final shop drawings. Perform welding using certified welders and grind all welds smooth.
7. Touch up welds and damaged areas with specified shop primer.

3.3 PROTECTION AND CLEANING

- A. Handle all fixtures, materials, assemblies and equipment to avoid injury to persons and to avoid damage to work in place. Satisfactorily repair or remove and replace work that has been damaged.
- B. Protect adjacent surfaces from damage and soiling.
- C. Clean work under provisions of Division 01.

END OF SECTION

SECTION 08 34 76
ELEVATOR DOOR SMOKE CONTAINMENT SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Elevator door smoke containment system.

1.2 RELATED SECTIONS

- A. Section 14 24 00 – Hydraulic Passenger Elevators.
- B. Division 26 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A240/A240M – Standard Specifications for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Application.
 - 2. California Referenced Standard Code- SFM Standard 12-7-4, Fire Door Assembly Tests.
 - 3. ICC ES AC77 – Acceptance Criteria for Smoke-Containment Systems Used with Fire-Resistive Elevator Hoistway Doors and Frames.
 - 4. UL Standard 864 – Control Units and Accessories for Fire Alarm Systems.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specification.
- C. Shop Drawings: Indicate complete installation including dimensions. Show system components, related work, and interface with adjacent work and substrates.
- D. Samples: Only as requested.
- E. Quality Assurance/Control Submittals:
 - 1. Manufacturer qualifications.
 - 2. Manufacturer's installation instructions.
- F. Closeout Submittals:
 - 1. Submit in accordance with Division 01.
 - 2. Operations and maintenance manual.

3. Manufacturer's warranty.

1.5 SYSTEM DESCRIPTION

- A. Active elevator smoke containment system consisting of a tight-fitting curtain and control system deployed and activated by smoke detector. Characteristics as follows:
 1. Smoke containment system deploys in less than ten seconds.
 2. Fail-safe system: Loss of AC power will deploy system and automatically rewinds into housing with restoration of power. Built-in deployment delay to avoid nuisance deployment due to brief power outage, and allowing time for electric generating units to power up.
 3. Approved by government authority having jurisdiction.
 4. Complies with ICC-ES AC77.
- B. Performance Requirements:
 1. Air Leakage: Not to exceed three cubic feet per minute per square foot of door opening at 0.1 inch water pressure differential at ambient temperature and 400 degrees F tested per SFM Standard 12-7-4.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum five years experience.
 2. Installer Qualifications: Factory trained by manufacturer.
- B. Pre-Installation Meetings:
 1. Conduct pre-installation meeting in accordance with Division 01.
 2. Convene pre-installation meeting prior to commencing work of this Section. Attendees: Owner, Architect, Contractor, smoke containment system contractor, painting contractor, electrical contractor.
 3. Review substrate conditions, requirements of related work, installation instruction, storage and handling procedures, and protection measures.
 4. Keep meeting minutes including responsibilities of various parties.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Storage and Protection: Store materials in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Smoke Guard Corporation, Boise, ID; 800-574-0330, www.smokeguard.com. Product: Smoke Guard System Model M400.

B. Substitutions: Under provisions of Division 01.

2.2 SMOKE CONTAINMENT SYSTEM

A. Components:

1. Curtain:

- a. Film: Minimum one mil thick transparent polyimide film reinforced with minimum 100 denier Nomex yarn at 0.25 inch each way.
- b. Magnetic strips: Flexible multi-pole strips attached to longitudinal edges of film with low modulus silicone adhesive.

2. Housing: 20 gauge powder coated, cold rolled steel container with dust cover and door with concealed hinges.

3. Auxiliary Rails:

- a. Material: ASTM A240/A240M, Type 430, ferretic stainless steel; 16 gauge.
- b. Size: 2 inches wide; 1 inch deep, as shown on shop drawings.

4. Rewind Motor: Manufacturer's standard; complies with California Electrical Code.

5. Release Mechanism: Manufacturer's standard; complies with UL Standard 864.

6. Screen Rewind Switch: Manufacturer's standard; activated from both sides of screen; mounted 42 inches above finished floor.

7. Wiring, connections, and other components as required for a complete system and as standard with manufacturer.

B. Identification: Provide a label at each smoke containment system with the following information:

1. Manufacturer's name.
2. Maximum air leakage rating at specified pressure and temperature conditions.
3. Label of quality control agency.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine job site conditions and verify field dimensions.

B. Verify substrate, hoistway frames, electrical requirements, and related work is ready to receive work and in accordance with approved shop drawings and coordination arrangements.

C. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions and approved shop drawings.
- B. Securely fasten components to wall construction. Install units plumb and free from warp or twist while maintaining dimensional tolerances and alignment with adjacent surfaces.

3.3 FIELD QUALITY CONTROL

- A. Conduct field testing in accordance with manufacturer's cycle test procedures in the presence of Owner, Architect, local Fire Marshal, fire alarm contractor, and elevator contractor. Notify attendees at least seven days in advance of scheduled testing.
- B. Complete maintenance service record.

3.4 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.

3.5 DEMONSTRATION

- A. Demonstrate required testing and maintenance procedures to Owner's Representative.

END OF SECTION

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum storefront system:
 - 1. Thermally broken at exterior locations.
 - 2. Non-thermally broken at interior locations.
- B. Aluminum and glass doors.
- C. Vision glass.
- D. Perimeter sealant.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 07 25 00 – Weather Barriers.
- C. Section 07 92 00 – Joint Sealants.
- D. Section 08 71 00 – Door Hardware.
- E. Section 08 81 00 – Glass Glazing.
- F. Section 09 22 16 – Non-Structural Metal Framing.
- G. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AA – Designation System for Aluminum Finishes.
 - 2. AAMA SFM-1 – Aluminum Store Front and Entrance Manual.
 - 3. AAMA 611 – Voluntary Standards for Anodized Architectural Aluminum.
 - 4. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
 - 5. ASTM B209/B209M – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 6. ASTM B221/B221M – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

- 7. ASTM E283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- 8. NFRC 100 – Procedure for Determining Fenestration Product U-Factors.
- 9. NFRC 200 – Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
- 10. NFRC 400 – Procedure for Determining Fenestration Product Air Leakage.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, expansion and contraction joint location and details.
- C. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners and glass.
- D. Submit two samples, 12 inches by 12 inches minimum in size, illustrating pre-finished aluminum surface, EPDM or neoprene gasketing, glass and glazing materials, and flexible flashing membrane.
- E. Provide windload and deadload charts to verify that the system meets all design loads and meets the minimum pounds per square foot required at the location of the project.

1.5 SYSTEM DESCRIPTION

- A. Aluminum storefront system includes shop fabricated, factory pre-finished tubular aluminum sections and doors, glass, related flashings, anchorage and attachment devices.

1.6 PERFORMANCE REQUIREMENTS FOR EXTERIOR STOREFRONT

- A. Air leakage of exterior window system shall not exceed 0.3 cubic feet per minute per square foot of window area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.
- B. Air leakage of each single exterior entrance door shall not exceed 0.3 cubic feet per minute per square foot of door area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.
- C. Air leakage of each set of double exterior entrance doors shall not exceed 1.0 cubic feet per minute per square foot of door area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.

1.7 REGULATORY REQUIREMENTS FOR EXTERIOR STOREFRONT

- A. Exterior window systems and exterior doors shall be certified under provisions of the 2013 California Energy Code, Section 116.
 - 1. A fenestration product's U-factor shall be rated in accordance with NFRC 100, using the specific glazing, window system, and door assemblies to be installed on the project.
 - a. If there is less than 10,000 square feet of site-built fenestration on the project, the default U-factor may be calculated as set forth in Reference Nonresidential Appendix NA6.

2. A fenestration product's Solar Heat Gain Coefficient (SHGC) shall be rated in accordance with NFRC 200, using the specific glazing, window system, and door assemblies to be installed on the project.
 - a. If there is less than 10,000 square feet of site-built fenestration on the project, the default SHGC may be calculated as set forth in Reference Nonresidential Appendix NA6.
3. Provide label certificate for each type of window and door product indicating compliance with the U-factors listed in Table 116-A, SHGC values listed in Table 116-B, and air leakage requirements specified in this Section. Field-fabricated fenestration and exterior doors may only be installed when documentation indicating compliance with the above has been provided.
4. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the fenestration product meets the acceptance requirements.

1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with AAMA SFM-1.
- B. These requirements establish standards of design and quality for material, construction and workmanship. When substitute products of equal quality are to be submitted, Contractor shall submit for consideration supporting technical literature, samples, drawings and performance data so these items may be evaluated.
- C. The approved manufacturer's recommended installation procedures will become the basis for inspecting or rejecting actual installation procedures used on the work.
- D. Single Source Responsibility: Provide storefront system, doors, and accessories produced as standard products of one single manufacturer.

1.9 QUALIFICATIONS

- A. Manufacturer and Installer: Company specializing in manufacturing aluminum glazing systems.

1.10 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01.
- B. Protect pre-finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.11 WARRANTIES

- A. Storefront System:
 1. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within one year from date of Project Completion.
 2. Warranty shall cover following:
 - a. Complete watertight and airtight system installation within specified tolerances.
 - b. System is structurally sound and free from distortion.

- B. Finish: Ten years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Kawneer North America, Norcross, GA; 770-449-5555, www.kawneer.com. Products:
 - a. Exterior Storefront: Trifab VG 451T storefront, center loaded, with Series 500 doors.
 - b. Interior Storefront: Trifab VG 451 storefront, center loaded, with Series 500 doors.
2. Oldcastle Building Envelope, Santa Monica, CA; 866-653-2278, www.oldcastlebe.com.
3. Arcadia Incorporated, Vernon, CA; 323-269-7300, www.arcadiainc.com.
4. EFCO Corporation, Monett, MO; 800-221-4169. www.efcocorp.com.

- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Extruded Aluminum: ASTM B221; 6063 alloy, T6 temper. Wall thickness shall provide structural strength to meet specified performance requirements.
- B. Sheet Aluminum: ASTM B209.
- C. Fasteners: Stainless steel.
- D. Perimeter Anchors: Stainless steel.

2.3 DOORS

- A. Doors: Corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and minimum 1-1/8 inch long fillet welds. Glazing stops shall be snap-in type with EPDM flashing gaskets. Refer to Drawings for stile and rail sizes.
 1. Hardware: As specified in Section 08 71 00. Hardware shall be installed at the factory prior to shipment.
 2. Thresholds: Thresholds shall be one piece thresholds in a bed of mastic. Threshold shall set no higher than 1/2 inch from the lowest floor surface. When complete, threshold shall be accessible.
- B. Weather-strip: Door manufacturer's standard felt insert strip designed into door system along perimeter door edges.

2.4 ACCESSORIES

- A. Flashings and Closures: 0.050 inch thick aluminum, finish to match window wall system finish where exposed.

2.5 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials:

1. Exterior Storefront System: 1 inch insulated glass units as specified in Section 08 81 00.
2. Interior Storefront System: 1/4 inch glass as specified in Section 08 81 00.

3. Doors: 1/4 inch glass as specified in Section 08 81 00.

- B. Glazing gaskets and seals used for aluminum work shall be an integrated glazing system designed by the aluminum work manufacturer to produce a watertight assembly, and shall be physically and chemically compatible with each other and with adjacent materials.
1. Neoprene and EPDM materials shall not come in contact with silicone sealant materials.
 2. Gaskets shall be designed, when in final compression form, to be compressed a minimum of 25 percent and a maximum of 40 percent, and to exert a pressure of between four pounds and ten pounds pressure per linear inch.
 3. All side light and transom glass shall be set with the same type and size of glazing gasket material.
- C. Contractor shall provide and set lead blocking for all window systems installed. Each glass panel supplied shall display a factory mark certifying each glass panel is manufactured of tempered glass. Plate glass and laminated glass will not be acceptable.

2.6 FLEXIBLE FLASHING MATERIALS

- A. Flexible Flashing Materials: As specified in Section 07 25 00.

2.7 SEALANT MATERIALS

- A. Sealant and Backing Materials: As specified in Section 07 92 00.

2.8 FABRICATION

- A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
- B. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof. Sealant will not be allowed at exposed joints.
- C. Prepare components to receive anchor devices. Fabricate anchors.
- D. Arrange fasteners and attachments to conceal from view.
- E. Prepare components with internal reinforcement of 1/4 inch thick galvanized steel mounting backing plates for door hardware and hinge hardware as per ASTM A36.
- F. Exposed work shall be carefully matched to produce continuity of line, design and finish. Joints in exposed work, unless otherwise shown or required for thermal movement, shall be accurately fitted, rigidly secured with hairline contacts and sealed watertight.
- G. Removable members such as glass stops shall be extruded and securely engaged into adjacent components as indicated by product manufacturer.
- H. Face clearances between glass and stop shall comply with code requirements and glass manufacturer's recommendations.
- I. All fasteners shall be of sufficient strength to support both horizontal wind load and vertical dead load, with a Factor of Safety of 1.5. They shall be spaced and be sized to develop the maximum strength of the members they secure or support. Washers, where required, shall be of the same material as the fastener. Unless otherwise shown or approved, fastening systems shall be concealed.

- J. Install internal steel stiffeners within the window wall system as required to meet the windload/deflection requirements at the location of this project.
- K. Sealants, gaskets, setting blacks, tapes and separators, where used, shall be physically and chemically compatible with each other and with adjacent materials. Items shall be installed so that they will not become dislodged during or after assembly of units.

2.9 SPECIAL REQUIREMENTS

- A. Dissimilar Materials Protection: Use chromate gasketing to separate aluminum surfaces in contact with other metals, plaster or concrete, or heavy coat of alkali resistant bituminous paint. Aluminum need not be separated from stainless or galvanized steel.

2.10 FINISHES

- A. All aluminum extrusions shall have Architectural Class I finish per Aluminum Association Standard AA-M12 C22 A41, clear anodized complying with AAMA 611, 0.7 mil minimum thickness.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify dimensions, tolerances and method of attachment with other work.
- B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

- A. Install window wall system and doors in accordance with manufacturer's instructions and AAMA SFM-1. Manufacturer shall provide installation instructions and installer shall comply with these instructions.
- B. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- D. Provide alignment attachments and shims to permanently fasten system to building structure.
- E. Frames shall be anchored to structure with concealed fasteners appropriate for use with type of adjacent construction. Fasteners shall securely fasten frames to wall construction involved. Fasteners shall provide stiffness and rigidity to keep frames square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the window wall manufacturer or as conditions warrant:
 - 1. Metal Framing: #14 stainless steel self-tapping sheet metal screws at 12 inches on center all around by length as required to penetrate framing member 1/4 inch minimum.
- F. Install perimeter flexible flashing membrane around all window openings in accordance with manufacturers' installation instructions and under provisions of Section 07 25 00.

- G. Install perimeter metal flashings.
- H. Install perimeter sealant to method required to achieve performance criteria and installation criteria described in Section 07 92 00.
- I. Set thresholds in bed of mastic and secure with mechanical fasteners, minimum three per threshold.
- J. Refer to Section 08 71 00 for hardware installation requirements.
- K. Install glass in accordance with Section 08 81 00, to glazing method required to achieve performance criteria.

3.3 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch every 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 CLEARANCES

- A. Top and sides of door shall have a minimum of 1/16 inch to a maximum of 1/8 inch clearance.
- B. Bottom of door and threshold shall have a minimum of 1/8 inch to a maximum of 1/4 inch clearance.
- C. All doorframes shall be measured with the minimum clearance of exact size or a maximum of 1/4 inch overall clearance to fit sides of opening to 1/8 inch at top of opening.
- D. All installation clearances for door frame and door in either newly constructed openings or as replacement units for existing openings will be strictly adhered to. No other minimum or maximum clearances will be acceptable and will prove cause for total replacement of the opening at the sole expense to Contractor.
- E. Mortise hardware shall fit flush with finished trim moldings and applied directly to recessed sidewalls of the door and or frame system. Cutouts in door or frame moldings shall require separate screw applied tabs or straps on which to mount concealed hardware per manufacturer's templates as detailed on Drawings. Where shims and spaces are required for finished appearance, they shall provide full and solid bearing for the hardware.

3.5 ADJUSTING

- A. Adjust work under provisions of Division 01.
- B. Adjust operating hardware for smooth operation.

3.6 CLEANING

- A. Clean work under provisions of Division 01.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.7 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Division 01.

B. Protect finished Work from damage.

END OF SECTION

SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glazed aluminum curtain wall systems, thermally broken, stick assembly.
- B. Aluminum and glass doors.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 05 50 00 – Metal Fabrications.
- C. Section 07 92 00 – Joint Sealants.
- D. Section 08 41 13 – Aluminum Framed Entrances and Storefronts.
- E. Section 08 71 00 – Door Hardware.
- F. Section 08 81 00 – Glass Glazing.
- G. Section 08 90 50 – Field Testing of Glazed Wall Systems.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AA – Designation System for Aluminum Finishes.
 - 2. AAMA – Metal Curtain Wall Manual.
 - 3. AAMA – Curtain Wall Manual #10 – Care and Handling of Architectural Aluminum from Shop to Site.
 - 4. AAMA 501.1 – Standard Test Method for Water Penetration of Windows, Curtain Walls, and Doors Using Dynamic Pressure.
 - 5. AAMA 501.2 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
 - 6. AAMA 611 – Voluntary Standards for Anodized Architectural Aluminum.
 - 7. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
 - 8. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

- 9. ASTM A153/A153M – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.
- 10. ASTM A1008/A1008M – Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.
- 11. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- 12. ASTM B209/B209M – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
- 13. ASTM B221/B221M – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
- 14. ASTM B308/B308M – Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.
- 15. ASTM B429/B429M – Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube.
- 16. ASTM E283 – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- 17. ASTM E331 – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform Static Air Pressure Difference.
- 18. NFRC 100 – Procedure for Determining Fenestration Product U-Factors.
- 19. NFRC 200 – Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
- 20. NFRC 400 – Procedure for Determining Fenestration Product Air Leakage.
- 21. SSPC – Paint 20 Zinc Rich Coating.
- 22. SSPC – Paint Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments).

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, related Work, expansion and contraction joint location and details.
- C. Product Data: Provide for each type of product indicated. Include dimensions of individual components and profiles, finishes, anchorage, fasteners, and glazing.
- D. Submit two samples, 12 inches by 12 inches minimum in size, illustrating pre-finished aluminum surface, EPDM or neoprene gasketing, glass and glazing materials, and flexible flashing membrane.
- E. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the professional engineer, licensed in the State of California, responsible for their preparation.

F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified preconstruction testing agency, for glazed aluminum curtain walls, indicating compliance with performance requirements.

1. Provide complete shop drawings of test specimen with report.

G. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.

1.5 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of manufacturer's standard glazed aluminum curtain walls representing those indicated for this Project, without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum curtain walls shall withstand movements of supporting structure indicated on Drawings including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:

- a. Thermal stresses transferring to building structure.
- b. Glass breakage.
- c. Noise or vibration created by wind and thermal and structural movements.
- d. Loosening or weakening of fasteners, attachments, and other components.
- e. Failure of operating units.

B. Delegated Design: Design glazed aluminum curtain walls, including comprehensive engineering analysis by a professional engineer, licensed in the State of California, using performance requirements and design criteria indicated.

1. Glass, sealants and interior finishes shall not be assumed to contribute to framing member strength, stiffness or lateral stability.
2. Compression flanges of flexural members shall be assumed to receive effective lateral bracing only from (a) anchors to building structure and (b) intersecting members that restrain the compression flange against lateral movement or twisting. Points of contraflexure shall not be regarded as lateral braces or as end points of an unbraced length; unbraced length shall be the distance between effective lateral braces.
3. Only true tubes shall be analyzed as tubes for determination of allowable stress (ASD) or factored limit state stress (LRFD). True tubes have a continuous boundary of solid metal (no joints) enclosing a hollow cavity.

C. Structural Loads: Curtain wall system to withstand wind and other loads as indicated on Drawings.

1. No deflection in excess of $L/175$ of the span of any framing member at design load. At structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2 percent of their clear spans shall occur.

D. Seismic Performance: Comply with 2013 CBC requirements.

1. Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to CBC Chapter 16.

- E. Story Drift: Accommodate design displacement of adjacent stories indicated.
 - 1. Design Displacement: As indicated on Drawings.
 - 2. Test Performance: Meeting criteria for passing based on building occupancy type when tested according to AAMA 501.4 at specified design displacement.
- F. Air Infiltration:
 - 1. Air leakage of window system shall not exceed 0.3 cubic feet per minute per square foot of window area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.
 - 2. Air leakage of each single entrance door shall not exceed 0.3 cubic feet per minute per square foot of door area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.
 - 3. Air leakage of each set of double entrance doors shall not exceed 1.0 cubic feet per minute per square foot of door area at a pressure differential of 1.57 pounds per square foot when tested according to NFRC 400 or ASTM E283.
- G. Water Penetration:
 - 1. Water Resistance, (Static): Test in accordance with ASTM E331. There shall be no leakage at a static air pressure differential of 10 pounds per square foot, as defined in AAMA 501.
 - 2. Water Resistance, (Dynamic): Test in accordance with AAMA 501.1. There shall be no leakage at a static air pressure differential of 10 pounds per square foot, as defined in AAMA 501.
- H. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:
 - 1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.
 - 2. Test Interior Ambient-Air Temperature: 75 degrees F.
 - 3. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
- I. Energy Performance: Glazed aluminum curtain walls shall have certified and labeled energy performance ratings in accordance with NFRC.
 - 1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.48 Btu/sq. ft. x h x degrees F as determined according to NFRC 100.
- J. Provide internal gutter and weep system for glazing pockets and frame cavities.

1.6 REGULATORY REQUIREMENTS

- A. Comply with 2013 CBC Chapter 24 "Glass and Glazing" requirements.

- B. Window systems and exterior doors shall be certified under provisions of the 2013 California Energy Code, Section 116.
 - 1. A fenestration product's U-factor shall be rated in accordance with NFRC 100, using the specific glazing, window system, and door assemblies to be installed on the Project.
 - a. If there is less than 10,000 square feet of site-built fenestration on the project, the default U-factor may be calculated as set forth in Reference Nonresidential Appendix NA6.
 - 2. A fenestration product's Solar Heat Gain Coefficient (SHGC) shall be rated in accordance with NFRC 200, using the specific glazing, window system, and door assemblies to be installed on the Project.
 - a. If there is less than 10,000 square feet of site-built fenestration on the project, the default SHGC may be calculated as set forth in Reference Nonresidential Appendix NA6.
 - 3. Provide label certificate for each type of window and door product indicating compliance with the U-factors listed in Table 116-A, SHGC values listed in Table 116-B, and air leakage requirements specified in this Section. Field-fabricated fenestration and exterior doors may only be installed when documentation indicating compliance with the above has been provided.
 - 4. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the fenestration product meets the acceptance requirements.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Provide glazed aluminum curtain walls that comply with test-performance requirements indicated, as evidenced by reports of tests performed on manufacturer's standard assemblies by a qualified testing agency.
 - 1. Provide complete shop drawings of test specimen with report.

1.8 QUALITY ASSURANCE

- A. These requirements establish standards of design and quality for material, construction and workmanship. When substitute products of equal quality are to be submitted, Contractor shall submit for consideration supporting technical literature, samples, drawings and performance data so these items may be evaluated.
- B. Manufacturer's recommended installation procedures will be the basis for inspecting or rejecting actual installation procedures used on the Work.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code – Steel."
 - 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 - 3. Energy Performance Standards: Comply with California Energy Code requirements.
- D. Mockups: Construct mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Construct full size mockup of typical wall area, minimum ten feet wide x full height.
 - 2. Field water testing shall be performed on mockups according to requirements in "Field Quality Control" Article in this Section.

3. Acceptance of mockups does not constitute acceptance of deviations from the Contract Documents contained in mockups unless Architect specifically accepts such deviations in writing.
4. Accepted mockups may become part of the completed Work, and will be the standard of quality for the remainder of the window system installation.

1.9 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacture of glazed aluminum curtain wall systems.
- B. Installer: Company specializing in fabrication and/or installation of glazed aluminum curtain wall systems.

1.10 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for glazed aluminum curtain walls by field measurements before fabrication and indicate measurements on Shop Drawings.

1.11 WARRANTY

- A. Special Assembly Warranty: Standard form in which manufacturer agrees to repair or replace components of glazed aluminum curtain walls that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
- B. Warranty Period: Five years from date of Project Completion.
- C. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period:
 1. Warranty Period: Ten years from date of Project Completion.

1.12 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01.
- B. Protect pre-finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

- A. Acceptable Manufacturers:
 1. Kawneer Company, Inc., an Alcoa Company, Norcross, GA; 770-449-5555; www.kawneer.com. Products:
 - a. Series 1600 Wall System 1, front set, typical unless noted otherwise.
 - b. Entrance Doors: Heavy Wall 500 Entrances.
 - 1) Provide entrance adapters.
 2. Oldcastle Building Envelope, Santa Monica, CA; 866-653-2278, www.oldcastlebe.com.

3. United States Aluminum, Waxahachie, TX; 800-627-6440; www.usalum.com.

B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Extruded Aluminum: ASTM B221; 6063 alloy, T6 temper. Wall thickness shall provide structural strength to meet specified performance requirements.

B. Sheet Aluminum: ASTM B209.

C. Extruded Structural Pipe and Tubes: ASTM B429.

D. Structural Profiles: ASTM B308/B308M.

E. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.

F. Fasteners: Stainless steel.

G. Perimeter Anchors: Stainless steel or plated steel providing the steel is properly isolated from the aluminum.

H. Steel Reinforcement:

1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.

2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.

3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.

4. Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

2.3 FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken. Thermal separator shall be extruded using a silicone compatible elastomer that provides for silicone adhesion.

2. Glazing System: Retained mechanically with gaskets on four sides.

3. Glazing Plane: Front.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, non-ferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

D. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (or as standard with curtain wall manufacturer) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding flashing compatible with adjacent materials.

F. Framing Sealants: Manufacturer's standard sealants.

2.4 DOORS

A. Doors: Corner construction shall be dual moment welded with deep penetration plug welds and fillet welds at rail/stile connections. Square glazing stops shall be snap-in type with EPDM flashing gaskets. Refer to Drawings for stile and rail sizes. Stile and rail wall thickness shall be 3/16 inch. Door depth shall be 2 inches.

1. Hardware: As specified in Section 08 71 00. Hardware shall be installed at the factory prior to shipment.
2. Thresholds: Thresholds shall be one piece thresholds in a bed of mastic. Threshold shall set no higher than 1/2 inch from the lowest floor surface. When complete, threshold shall be accessible.

B. Weather-strip: Door manufacturer's standard felt insert strip designed into door system along perimeter door edges.

2.5 GLASS AND GLAZING

A. Glass and Glazing:

1. Curtain Wall System: 1 inch insulated glass units as specified in Section 08 81 00.
2. Doors: 1/4 inch glass as specified in Section 08 81 00.

B. Glazing Gaskets: Glazing gaskets and seals used for aluminum work shall be an integrated glazing system designed by the aluminum work manufacturer to produce a watertight assembly, and shall be physically and chemically compatible with each other and with adjacent materials

1. Neoprene and EPDM materials shall not come in contact with silicone sealant materials.

2.6 SEALANTS

A. Sealant and Backing Materials: As specified in Section 07 92 00.

B. Glazing Sealants: As recommended by manufacturer. Comply with applicable requirements of Section 08 81 00.

2.7 ACCESSORIES

A. Flashings and Closures: 0.050 inch thick aluminum, finish to match curtain wall framing where exposed.

B. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

C. Provide weep system at curtain wall.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by de-scaling or grinding.

- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles: Sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior, unless otherwise recommended by manufacturer.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Curtain Wall Framing: Fabricate components for assembly using fabrication method as standard with manufacturer.
- E. Prepare components to receive anchor devices. Fabricate anchors as required by design conditions.
- F. Fasteners:
 - 1. Arrange fasteners and attachments to remain concealed from view in completed assembly.
 - 2. Fasteners shall be of sufficient strength to support both horizontal wind load and vertical dead load, with liberal safety allowance. Fasteners shall be spaced and sized to develop maximum strength as required for the members to be secured or supported. Washers, where required, shall be of the same material as the fastener. Unless otherwise shown or accepted, fastening systems shall be concealed.
- G. Exposed work shall be carefully matched to produce continuity of line, design and finish. Joints in exposed work, unless otherwise shown or required for thermal movement, shall be accurately fitted, rigidly secured with hairline contacts and sealed watertight.
- H. Face clearances between glass and stop shall comply with Code requirements and glass manufacturer's recommendations.
- I. Install internal steel stiffeners within the curtain-wall system as required to meet the wind load and deflection requirements at the location of the Project.
- J. Prepare components with internal reinforcement of 1/4 inch thick galvanized steel mounting backing plates for door hardware and hinge hardware as per ASTM A36.
- K. Sealants, gaskets, setting blacks, tapes and separators, where used, shall be physically and chemically compatible with each other and with adjacent materials. Items shall be installed so that they do not become dislodged during or after assembly of units.

2.9 SPECIAL REQUIREMENTS

- A. Dissimilar Materials Protection: Use chromate gasketing to separate aluminum surfaces in contact with other metals, plaster, and concrete, or apply a heavy coat of alkali-resistant bituminous paint. Aluminum need not be separated from stainless steel or galvanized steel.

2.10 FINISHES

- A. All aluminum extrusions shall have Architectural Class I finish per Aluminum Association Standard AA-M12 C22 A41, clear anodized complying with AAMA 611, 0.7 mil minimum thickness.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify dimensions, tolerances and method of attachment with other work.
- B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

- A. General:
 - 1. Install curtain wall system and doors in accordance with manufacturer's written instructions and AAMA – Metal Curtain Wall Manual. Manufacturer shall provide printed installation instructions and installer shall comply with these instructions.
 - 2. Do not install damaged components.
 - 3. Fit joints to produce hairline joints free of burrs and distortion.
 - 4. Rigidly secure non-movement joints.
 - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration, and impeding movement of moving joints.
 - 6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - 7. Seal joints watertight unless otherwise indicated.
- B. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- D. Provide alignment attachments and shims to permanently fasten system to building structure.
- E. Frames shall be anchored to structure with concealed fasteners appropriate for use with type of adjacent construction. Fasteners shall securely fasten frames to wall construction involved. Fasteners shall provide stiffness and rigidity to keep frames square, in accurate position without twisting, buckling or warping.
- F. Install flashings and sealants.
- G. Install components to drain water passing through the joints, condensation occurring within the framing members, and moisture migration within the glazed aluminum curtain wall system, to the exterior.
- H. Set thresholds in bed of mastic and secure with mechanical fasteners, minimum three per threshold.

- I. Refer to Section 08 71 00 for hardware installation requirements.
- J. Install glass in accordance with Section 08 81 00; glazing method as required to achieve specified performance criteria.
- K. Metal Protection:
 - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

3.3 ERECTION TOLERANCES

- A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.4 CLEARANCES

- A. Top and sides of door shall have a minimum of 1/16 inch to a maximum of 1/8 inch clearance.
- B. Bottom of door and threshold shall have a minimum of 1/8 inch to a maximum of 1/4 inch clearance.
- C. All doorframes shall be measured with the minimum clearance of exact size or a maximum of 1/4 inch overall clearance to fit sides of opening to 1/8 inch at top of opening.
- D. All installation clearances for door frame and door shall be strictly adhered to. No other minimum or maximum clearances will be acceptable and will prove cause for total replacement of the opening at the sole expense to Contractor.
- E. Mortise hardware shall fit flush with finished trim moldings and applied directly to recessed sidewalls of the door and or frame system. Cutouts in door or frame moldings shall require separate screw applied tabs or straps on which to mount concealed hardware per manufacturer's templates as detailed on Drawings. Where shims and spaces are required for finished appearance, they shall provide full and solid bearing for the hardware.

3.5 FIELD QUALITY CONTROL

- A. General: Comply with requirements of Division 01. Refer to Section 08 90 50 for additional testing requirements.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections specified in this Article, and prepare test and inspection reports; all costs to be borne by Contractor.
- C. Testing Services: Testing and inspecting of representative areas of glazed aluminum curtain walls shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.
 - 1. Water Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - a. Test Area: A minimum area of 75 feet by two-story of glazed aluminum curtain wall.
 - 1) Provide a minimum of two tests.
- D. Manufacturer's Field Services: Upon Owner's Request, provide manufacturer's field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer's instructions.
- E. Defective Work: Work will be considered defective when tests and inspections indicate that completed work does not conform to specified requirements. Repair or replace defective work as required, at no cost to Owner. If repair is deemed unacceptable by Architect or Owner, replace defective work with new components.
- F. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 ADJUSTING

- A. Adjust work under provisions of Division 01.
- B. Adjust operating hardware for smooth operation.

3.7 CLEANING

- A. Clean work under provisions of Division 01.
- B. Remove protective material from pre-finished aluminum surfaces.
- C. Remove excess sealant by method acceptable to sealant manufacturer.
- D. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

3.8 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Division 01.

- B. Protect installed product's finish surfaces from damage during construction. Provide protective covering as required to ensure installed panels will not be damaged by work of other trades.

END OF SECTION

SECTION 08 56 19

PASS WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum bullet resistant pass windows.
- B. Perimeter sealant.

1.2 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants: Perimeter sealant and back-up materials.
- B. Section 08 88 53 – Security Glazing.
- C. Section 09 22 16 – Non-Structural Metal Framing.
- D. Section 09 29 00 – Gypsum Board.
- E. Section 11 19 43 – Security Wall System.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AA – Aluminum Association Publication #45 – Designations for Aluminum Finishes.
 - 2. AAMA 101 – Voluntary Specifications for Aluminum Prime Windows and Sliding Glass Doors.
 - 3. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
 - 4. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work and installation requirements.
- C. Product Data: Provide component dimensions, anchorage, fasteners and glass.
- D. Submit two samples, 6 inches x 6 inches in size, illustrating window frame section, mullion section, pre-finished aluminum surfaces and glazing materials.

E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with AAMA 101.

1.6 QUALIFICATIONS

A. Manufacturer and Installer: Company specializing in manufacturing institutional aluminum exchange windows with sufficient documented experience.

1.7 PRE-INSTALLATION CONFERENCE

A. Convene one week prior to commencing work of this Section, under provisions of Division 01.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Division 01.

B. Protect pre-finished aluminum surfaces with strippable coating. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.9 JOB AND ENVIRONMENTAL CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and after installation of sealants.

1.10 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. C.R. Laurence. Product: Aluminum bullet resistant fixed windows.

B. Nissen & Company.

C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Frames: Aluminum bullet resistant frame modules shall be to the standards established by U.L. 752 Protection Level 3. Frames shall be constructed of 6063-T5 extruded aluminum lined with U.L. listed bullet resistant fiberglass. Replacement of glazing shall be from the secure side of the window. Shapes and sizes as indicated on Drawings. Frames must utilize testing recognized under the standards established by U.L. 752 for bullet resistant components.

B. Glazing: Glazing shall be 1-3/16 inch thick glass clad polycarbonate meeting or exceeding U.L. 752 testing standards Protection Level 3.

C. Surround Sound: Provide for two way "natural voice" or "surround sound" communication permitted by the design of the window jambs and glazing technique. Units shall be manufactured in strict accordance with the specifications, design, and details. No field alterations to the construction of the units fabricated under the acceptable standards shall be allowed unless approved by the manufacturer and the Architect.

D. Fasteners: Stainless steel.

2.3 SEALANT MATERIALS

A. Sealant and Backing Materials: As specified in Section 07 92 00.

2.4 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners and attachments to ensure concealment from view.

2.5 ACCESSORIES

A. Bullet resistant stainless steel shelf with Deal Tray, U.L. 752 Protection Level 3.

2.6 FINISHES

A. All aluminum extrusions shall have Architectural Class II finish per Aluminum Association Standard AA-M12 C22 A31 clear anodized.

B. Apply one coat of bituminous paint to concealed aluminum surfaces in contact with cementitious or dissimilar materials.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site opening conditions under provisions of Division 01.

B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

A. Install exchange window frames and glazing in accordance with manufacturers instructions.

B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances, aligning with adjacent work.

D. Install sill and sill end angles.

- E. Install shelf with deal tray and speak-through.
- F. Install glass in accordance with Section 08 88 53, to glazing method required to achieve performance criteria.
- G. Install perimeter sealant to method required to achieve installation criteria in accordance with Section 07 92 00.

3.3 TOLERANCES

- A. Maximum Variation from Level or Plumb: 0.06 inch every 3 feet non-cumulative or 0.5 inch per 100 feet, whichever is less.

3.4 ADJUSTING

- A. Adjust work under provisions of Division 01.
- B. Adjust operating hardware for smooth operation.

3.5 CLEANING

- A. Clean work under provisions of Division 01.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.
- C. Remove excess sealant by moderate use of mineral spirits or other solvent acceptable to sealant manufacturer.

END OF SECTION

SECTION 08 71 00
DOOR HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. BHMA finish door hardware for hollow metal, wood, and aluminum doors.
- B. Accessories including but not limited to door stops, kickplates, and push/pull plates.
- C. Weatherstripping, seals, and thresholds.
- D. Auxiliary Locks (Cabinets, Drawers, and Padlocks)

1.2 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Hardware templates for doors and frames.

1.3 RELATED SECTIONS

- A. Swinging Gates: Division 05 and/or Division 32 Metal Fabrications, applicable Sections including, but not limited to, ornamental, wood, and/or chain link gates.
- B. Section 08 11 13 – Hollow Metal Doors and Frames.
- C. Section 08 14 00 – Wood Doors.
- D. Section 08 41 13 – Aluminum-Framed Entrances and Storefronts.
- E. Section 12 55 00 – Detention Furnishings (for coordination of final keyed, cylinder for gun lockers)
- F. Divisions 26 through 28: Electrical rough in, wiring and connectors for electrified hardware including, but not limited to:
 - 1. Wire and connectivity from ceiling through frame to electrified hardware devices including non-Section 08 71 00 task of providing wiring inside of doors.
 - 2. FLS (Fire/Life Safety) Connectivity Scope: At fire and smoke rated opening, in event of fire/smoke, electrified strikes and auto operators to become non-electrified (drop power for doors can close, positive latch and to be only manually operated). Electrified fail-secure levers do not require coordination with FLS system.

1.4 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Hardware templates for doors and frames.

1.5 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. Refer to Architect's Division 01 for definitions, acronyms, and abbreviations.
 - 2. Unless otherwise noted; standards, manuals, and codes refer to the latest edition as of the issue date of this Project Manual.

B. Conform to the following Referenced Standards and Requirements:

1. CBC – 2013 California Building Code.
2. ADA – Americans with Disabilities Act - 2010 Standards for Accessible Design.
3. NFPA 80 – Standard for Fire Doors and other Opening Protectives.
4. NFPA 101 – Life Safety Code.
5. ANSI A156 Series – Builders Hardware Manufacturers Association (BHMA) Standards Set.

1.6 COORDINATION:

- A. The hardware groups/sets specified in Section 08 71 00 - Part 3 are intended to establish type and design standard when used together with the requirements of this Section, Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections. Examine Contract Documents and furnish proper hardware for door openings. Refer to specifications for clarification and detailed requirements and provide products and services in specifications even if not written in hardware groups/sets in Section 08 71 00 - Part 3.
- B. Coordinate work of this Section with other directly affected Sections involving manufacturer of any internal reinforcement for door hardware. In particular, coordinate door preparation in accordance with applicable regulatory and trade standards specified.
1. Provide hardware templates to door and frame manufacturer. Provide two templates to those manufacturers who are not currently registered template book holders.
 2. Provide finish hardware schedule for use by the door and frame suppliers.
 3. Where hardware sets/groups have different information than the specifications, refer to the specifications and drawings for clarification and bid combined hardware sets/groups and Contract Documents/specifications. Provide combined materials/devices at time of submittals in addition to other coordination items:
 - a. Coordinate keying requirements as specified in this Section.
- C. Convene coordination meeting between all opening vendors and installers at least two weeks prior to purchasing doors, frames, door hardware, and electrical devices required for complete systems.
1. Required attendance includes, but is not limited to, the following: Contractor, hardware supplier and/or installer, door supplier and/or installer, frame supplier and/or installer, security card reader vendor and/or installer, and electrical contractor.
 2. Contractor shall be responsible for verifying that the door hardware accepted for installation is compatible for use with the doors and door-frames.
 3. Vendor and/or installer (coordinate accordingly) is not responsible for electrical-power (see electrical drawings) or FLS (fire/life safety) connectivity to above frame or back-of-house power supply (back-of-house meaning remote low voltage power). FLS connectivity only required for fire or smoke rated opening in particular functions shall meet Code as scheduled.

1.7 SUBMITTALS

A. General:

1. Submit in accordance with Division 01.

B. Pre-Hardware Schedule:

1. Report all prevailing conditions that will adversely affect satisfactory execution of work. Examine existing doors and/or frames scheduled for hardware replacement.

C. Submit a detailed door and hardware schedule according to the following:

1. Hardware Schedule:

- a. Submit hard copy pages as required in Division 01 as well as via electronic PDF in vertical format as illustrated by the Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Schedules which do not comply will be returned for correction before checking. Horizontal-type schedules will be returned for correction before checking.
 - b. Hardware schedule shall clearly indicate each hardware group specified and manufacturer of each item proposed.
2. Provide two copies of illustrations from manufacturer's catalogs and data in brochure form.
 3. Wiring Information: Provide manufacturers' wiring information including manufacturers' door elevation diagrams for electrified hardware based on Door Hardware Institute (DHI) core class "Electrified Architectural Hardware" DHI class #COR133. Openings where only magnetic hold-opens or door position switches are specified do not require wiring information. Provide information with hardware schedule submittal for review. Provide detailed wiring diagrams with hardware delivery to jobsite.
 4. Review of schedules does not relieve the Contractor of providing all hardware required for the Work, whether or not such hardware was inadvertently omitted from Submittal.

D. Templates:

1. Provide listing of manufacturer's template numbers for each item of hardware in hardware schedule.
2. Submit templates and "Reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

E. Installation Instructions:

1. Provide manufacturer's written installation and adjustment instructions for finish hardware.
2. Send installation instructions to site with hardware.

F. Single Manufacturers for Manufacturer's Devices.

1. Obtain each type of hardware from single manufacturer, although several may be indicated as offering products complying with requirements.

G. Contract Closeout Submittals: Include specific requirements indicated below.

1. Operating and maintenance manuals: Submit three sets containing the following:
 - a. Complete information in care, maintenance, and adjustment, data on repair and replacement parts, and information on preservation of finishes.

- b. Catalog pages for each product.
- c. Name, address, and phone number of local representative for each manufacturer.
- d. Parts list for each product.
- e. Copy of final accepted hardware schedule, edited to reflect "As installed".
- f. Copy of final keying schedule.

1.8 QUALITY ASSURANCE:

A. Supplier Qualifications and Documentation:

- 1. Hardware Supplier Qualifications: Firm specializing in the supply and servicing of institutional and commercial door hardware; accredited by manufacturers; and having a minimum of three years documented experience. Hardware supplier to furnish list of at least ten past, finished projects. Include date completed, project location, and references. At least one member of the firm's staff shall be a member of DHI in good standing and is a DHI certified consultant having earned the title Architectural Hardware Consultant (AHC).

B. Manufacturer of Submitted Devices - Qualifications and Documentation:

- 1. Manufacturer Qualifications: Manufacturer specializing in manufacturing institutional and commercial door hardware with a minimum five years with the following documented experience. Furnish list of at least ten past, finished projects. Include date completed, project location, and references. Past project contact information will determine if Builders Hardware is acceptable.

C. Installer of Submitted Devices - Qualifications and Documentation:

- 1. Installer qualifications: The installer of assembly shall be trained in the trade of hanging commercial doors on commercial frames with commercial hardware. Supplier and Installer of door assemblies shall be authorized representative of manufacturers and have minimum of five years successful experience in detailing, supplying, and installing door assemblies specified on projects of similar size, complexity, and type to this Project.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Storage: Store materials in a cool and dry location, elevated from the ground and protected from the elements, and secured from theft or pilferage.

1.10 WARRANTY

- A. Comply with provisions of Division 01
- B. Warranty installed units to be free from defects in material and workmanship as follows:
 - 1. Hinges: Lifetime Warranty (Life of Building).
 - 2. Locksets and Exit Devices: Three years.
 - 3. Closers: Ten years.
 - 4. All other hardware: Two years.

1.11 MAINTENANCE

- A. Provide special wrenches and tools applicable to each special hardware component.
- B. Provide maintenance tools and accessories supplied by hardware manufacturer.

PART 2 PRODUCTS

2.1 FINISH

- A. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices/finishes, along with added finishes below, as indicated on drawings and detailed requirements for each type of device:
 - 1. Typical BHMA finish designation references:
 - a. BHMA 630– satin stainless steel.
 - b. BHMA 626– satin chromium plated brass or bronze.
 - c. BHMA 628– satin or dull aluminum, clear anodized (uncoated).
 - 2. Closers and Magnetic Holder (electrified, hold-open device):
 - a. BHMA 689: Sprayed aluminum paint finish.

2.2 RECYCLED CONTENT:

- A. Provide products with at least the following content:
 - 1. Mortise Locks: 52 percent post-consumer recycled content.
 - 2. Closers: 50 percent post-consumer recycled content.
 - 3. Exit Devices: 50 percent post-consumer recycled content.
 - 4. Steel Hinges: 35 percent pre-consumer recycled content.
 - 5. Steel Kick Plates: 35 percent pre-consumer recycled content.

2.3 HARDWARE TEMPLATE

- A. Make templates for hardware to be applied to metal doors or pre-finished doors.
- B. Hinge templates shall conform to ANSI A156.7.
- C. Promptly furnish template information or templates to door and frame manufacturers.
- D. Coordinate hardware items to prevent interference with each other.

2.4 FIRE RATED DOORS AND EXIT DOORS

- A. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on drawings and detailed requirements for each type of device. Provide all specifications even if not written in hardware sets/groups.
- B. Provide all hardware necessary to meet the requirements of CBC for fire doors and exit doors, as well as to other requirements specified, even if such hardware is not specifically mentioned under Article “Hardware Schedule” of this Section.

2.5 SCREWS, BOLTS, AND FASTENING DEVICES

- A. At all locations, whether or not specified below, furnish and install with exposed head x security torx fasteners/screws in countersunk holes unless otherwise specified. Use screws, bolts, washers, grommets, nuts, and other fastening devices of appropriate length, type, head, metal, and finish as necessary for proper match and application of hardware.
- B. Threshold anchors shall be Flat Sleeve Anchors (FHSL 25 1/4 - 20 2 inch) cadmium plated expansion anchor screw in one unit (security torx fasteners).

2.6 SUBSTITUTIONS

- A. Products referenced by specific brand names and model numbers have been identified by Owner to match other products in use either completed or in the course of completion. No substitutions permitted per Public Contract Code Section 3400.
 - 1. Otherwise refer to Division 01 for substitutions.

2.7 COMBINE SPECIFICATIONS AND HARDWARE GROUPS/SETS IN SECTION 08 71 00, PART 3

- A. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on drawings and detailed requirements for each type of device. Provide all products and services in specifications even if not written in hardware groups/sets in Part 3.

2.8 HANGING HARDWARE

- A. Butt Hinges:
 - 1. Butt hinges shall be manufactured in accordance with ANSI/BHMA A156.1.
 - 2. Self-closing hinges and pivots shall be manufactured in accordance with ANSI/BHMA A156.17.
 - 3. Acceptable Manufacturers:
 - a. Hager Manufacturing.
 - b. Ives Manufacturing.
 - c. McKinney Products Co.
 - d. Stanley Works.
 - e. Bommer Manufacturing.
 - 4. Where hardware groups/sets have different information (number of hinges and sizing), refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device.
 - a. Provide "weight/strength" as specified in hardware groups/sets in Part 3 (hinge nomenclature basis-of-design weight/strength).
 - b. Quantity of hinges per door leaf (combine the following for total quantity of hinges required per door/opening): Provide two butts for doors up to 60 inches high and one additional butt for each 30 inches of height or fraction thereof. For doors 42 inches wide or wider, provide an additional hinge.

- c. Provide widths sufficient to clear trim projection when door swings 180 degrees. Confirm hinge sizing with frame details. All doors shall swing 180 degrees if opening will allow. Provide wide throw hinges where required.
- d. Provide non-removable pins at all doors for security reasons.

B. Continuous Hinges:

- 1. Hinges shall meet abuse test (ASTM F-1450-A).
- 2. Acceptable Manufacturers, Stainless Steel Continuous Hinges:
 - a. Markar Manufacturing.
 - b. McKinney Products Co.
 - c. Hager Manufacturing.
 - d. Select Hinges.
 - e. Bommer Manufacturing.
- 3. Aluminum Continuous Hinge Acceptable Manufacturers, Aluminum Continuous Hinges:
 - a. Pemko Manufacturing.
 - b. Bommer Manufacturing.
 - c. Select Hinges.
 - d. McKinney Products Co.
 - e. Stanley Works.
 - f. Ives Manufacturing by Allegion.
 - g. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:
 - 1) Provide widths sufficient to clear trim projection when door swings 180 degrees. Confirm hinge sizing with frame details. All doors shall swing 180 degrees if opening will allow. Provide wide throw hinges where required.
 - 2) Material: Extruded tempered aluminum. Material Standard: 6063-T6 alloy. Configuration: Three interlocking extrusions in pinless assembly, installed to full height of door frame. Electrical Modifications: SUR specified electrical modifications, no substitution. Testing Standard: Tested according to ANSI/BHMA A156.26.
 - 3) Electric Hinges: Provide electrified hinges with certified UL Listed, concealed wires. Provide electric hinges with standardized wire colors to accommodate up to 12 wires (4, 6, 8 or 12 as required per to provide sufficient number of concealed wires to accommodate electric function of specified hardware).

C. Gate Hanging Devices:

- 1. Offset Gorilla-type hinge, high capacity surface x surface-type, standard BHMA butt-type hinge and/or BHMA Continuous-type hinge.
- 2. Heavy duty offset hinge, flat mount hinges:
 - a. Where "Gorilla-Device, Offset Hinges" are specified in hardware group/sets, provide Gorilla-Device, Offset Hinges by Guardian Gate Manufacturing, Tucson, AZ; (800) 213-9525, or accepted equal.
 - b. Provide at least three offset hinges per gate leaf.

- 1) Provide two Gorilla-Device offset hinges for doors up to 60 inches high and one additional Gorilla-Device offset hinge for each 30 inches of height or fraction thereof.
- 2) Furnish three Gorilla-Device offset hinges for doors over 36 inches wide, regardless of the gate height.
- 3) Provide additional number of offset hinge devices to meet offset hinge manufacturer device warranty as well as gate warranty.
- c. Provide widths sufficient to clear trim projection when door swings 180 degrees. Confirm hinge sizing with frame details. All doors shall swing 180 degrees if opening will allow. Provide wide throw hinges where required.
- d. Provide non-removable pins at exterior doors and where required by Owner for security reasons.
- e. Where "Gorilla-Device, Offset Hinges" are specified in hardware group/sets, provide Gorilla-Device, Offset Hinges by Guardian Gate Manufacturing, Tucson, AZ; (800) 213-9525, or accepted equal. Gorilla-Device offset gate hinges shall be mounted with the yoke welded to the gate and the channel welded to the post. The hinges shall be installed with the hinge pins in a straight line. Weld only on the vertical portions of the yoke and plate. Do not weld the top and bottom of the hinges. Provide devices ground smooth and painted to match gate/fence system – see Section 09 91 00 for paint and primer requirements.
 - 1) For all other manufacturers: Gate hinges shall be mounted and welded in accordance with manufacturer's recommendations.
 - 2) Coordinate with welding requirements in Contact Documents.
- f. Products by the following manufacturers will be considered for acceptance providing all specified criteria have been met in full. Furnish all items and components of hardware required to complete the work in accordance with specifications, Contract Documents, and intended operation.
 - 1) Crown Industrial; <http://www.crown-industrial.com/>.
 - 2) Ameristar.
 - 3) Monumental Iron Works.
 3. Heavy duty full surface mounted hinge:
 - a. Where "CBW-HD Series" hinge-type devices are specified in hardware group/sets, provide CBW-HD Series, full surface hinges by Crown Industrial, South San Francisco, CA; (650) 952-5150; <http://www.crown-industrial.com/>, or accepted equal.
- b. Provide at least two hinges per gate leaf.
 - 1) Provide two CBW-HD Series hinges for doors up to 72 inches high and one additional CBW-HD Series hinge for each 30 inches of height or fraction thereof.
 - 2) Furnish three CBW-HD Series hinges for doors over 36 inches wide regardless of the gate height.
 - 3) Provide additional number of offset hinge devices to meet hinge manufacturer device warranty and gate warranty.
- c. Provide widths sufficient to clear trim projection when door swings 180 degrees. Confirm hinge sizing with frame details. All doors shall swing 180 degrees if opening will allow. Provide wide throw hinges where required.

- d. Provide non-removable pins at exterior doors and where required by Owner for security reasons.
- e. Gate hinges shall be mounted and welded in accordance with manufacturer's recommendations.
 - 1) Coordinate with welding requirements in Contact Documents.
 - 2) Provide devices ground smooth and painted to match gate/fence system – see Section 09 91 00 for paint and primer requirements.
- f. Products by the following manufacturers will be considered for acceptance providing all specified criteria have been met in full. Furnish all items and components of hardware required to complete the work in accordance with specifications, Contract Documents, and intended operation.
 - 1) Guardian Gate; www.guardiangatehardware.com.
 - 2) Ameristar.
 - 3) Monumental Iron Works.

2.9 SECURING DEVICES (LATCHING SYSTEMS)

A. Mortise Locksets, Latchsets, and Deadbolts:

- 1. Acceptable Manufacturers:
 - a. Schlage Lock Co. L9000 Series.
 - b. Owner's standard, no substitutions permitted.
- 2. Levers:
 - a. Provide levers to return to door within 1/2 inch.
 - b. Lever Style: Traditional Square Style as specified.
 - c. Provide lever trim with vandal resistant feature (heavy duty lever trim designed to withstand abuse and vandalism):
 - 1) Schlage L9000 series Vandlgard™. Vandlgard example nomenclature: Storeroom Lockset LV9080 (added "V" nomenclature after the "L" nomenclature for lockset to have increased strength against abuse or vandalism) Locked lever freely rotates up and down while remaining securely locked. Provide seven-year warranty.
- 3. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:
 - a. Locksets shall meet the requirements of ANSI/BHMA A156.13-1994, Operational Grade 1.
 - b. Provide only thumbturn devices that meet accessibility requirements. Example: Schlage L583-363 devices. No center pivoting thumbturns allowed.
 - c. If deadbolts or lockbolts are utilized on the project, devices shall be interconnected with the latching mechanism on all egress doors to provide single movement function to unlatch doors.
 - d. Backset: 2-3/4 inches. Provide minimum 1 inch throw stainless steel deadbolt. Provide minimum 3/4 inch throw for latch bolt.

e. Strikes:

- 1) Provide ANSI 4-7/8 inch standard strike.
- 2) Provide curved lip-type strike at all locations if possible to prevent catching clothing or other objects on strike. Where required, provide detail and flat strike.
- 3) Where required, provide extended lip strike so that the lock or latchset latch will not come in contact with frame or added trim on or adjacent to the frame. Example: Don Jo device #MEST-104, but provide submitted manufacturer equivalent extended lip strike.
- 4) Where required, provide open back strike and protected to allow practical and secure operation.

B. Exit Devices:

1. Acceptable Manufacturers:

- a. Von Duprin.
- b. Owner's standard, no substitutions permitted.

2. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:

- a. Provide ANSI A156.3, Grade 1; UL Listed device
- b. Where specified, provide specified 9949, concealed vertical cable system in the exit/panic devices no substitution.
- c. All exit devices shall be UL listed for panic. Exit devices for labeled doors shall be UL listed as "Fire Exit Hardware".
- d. Provide cylinders for exit devices with locking trim and cylinder dogging. Provide cylinder dogging feature for non-rated exit devices.

3. The unlatching force of panic hardware shall not exceed 5 pounds, applied in the direction of travel, certified by UL to meet requirements of CBC Section 11B-309.4.

C. Flush Bolts and Dust Proof Strikes:

1. Acceptable Manufacturers:

- a. Triangle Brass Manufacturing Company, Inc. (Trimco).
- b. McKinney Products.
- c. Rockwood.
- d. Hager Manufacturing.
- e. Ives Manufacturing.

2. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:

- a. Non-rated Openings: Where not specified in hardware sets provide supply two flush bolts for inactive leaf of pairs of locked and latched doors. Locate centerline of top bolt not more than 78 inches from finished floor. Provide dustproof strike for bottom bolts, type as required for floor condition.

- b. Rated Openings: Where not specified in hardware sets provide automatic flush bolt set as applicable for inactive leaf of pairs of doors. Provide dustproof strike for bottom bolts, type as required for floor condition.

D. Coordinators:

1. Manufacturers:

- a. Triangle Brass Manufacturing Company, Inc. (Trimco).
- b. McKinney Products.
- c. Rockwood.
- d. Hager Manufacturing.
- e. Ives Manufacturing.

2. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:

- a. Provide coordinator for fire rated or smoke labeled pairs of doors equipped with automatic flush bolts and those with vertical rod/mortise lock fire exit device combinations with astragals.
- b. Provide filler bars for total opening width, closer mounting brackets to allow proper installation of stop mounted hardware without damaging coordinator, carry bars, and special preparation for top latches where applicable.

2.10 KEY SYSTEMS (CYLINDERS, CORES AND KEYS.)

A. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on drawings and detailed requirements for each type of device (keying specifications below override hardware set/group nomenclature):

B. Key Systems (Cylinders, Cores and Keys):

1. Manufacturers:

- a. Schlage Lock Co. 6 pin, existing building site standard, no substitutions.

2. For all locking or dogging devices:

- a. Provide complete keying system whether or not specified in Section 08 71 00, Part 3 hardware sets including gun locker cylinders/cores, lock cores, mortise cylinders, and rim cylinders keyed as directed by Owner in submittal process.
- b. to the devices specified in hardware group/sets below, coordinate devices in specification Section 12 55 00 "Detention Furnishings (Gun Locker permanent cylinders and keys in the following quantities (total quantity of keys part of bid package):
 - 1) 6 each: Rim or Mortise x appropriate cam x blocking rings as required (rim or mortise type and quantity as required by locking device). For pricing use 20-757 or 20-763 system (provide credit when the less expensive keying system submitted).
 - 2) 6 each: Include cylinders above and Schlage 20-765 final cores also (provide credit when the less expensive keying system submitted).

C. Keying Requirements:

1. Provide keyed, construction cores and keys during the construction period.
 - a. Provide full sized cylinders or brass construction cores and brass keys at all interior and exterior doors. Plastic cores are not permitted.
 - b. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway or key section as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) shall be furnished to the Owner.
2. Keying Meeting and Programming Schedule:
 - a. After hardware has been submitted and reviewed in accordance with Division 01 requirements and Section 08 71 00, arrange a keying matrix/programming meeting with Owner and hardware supplier/Vendor representing the Schlage Restricted Keyway system.
 - 1) Copies of the reviewed door and frame submittals shall be brought to the meeting with card reader and keyed doors highlighted for review.
 - 2) Follow procedures for keying meeting and programming schedule as outlined by the Door Hardware Institute. DHI procedures are based on example Door Hardware Institute core class entitled Masterkeying class #AHC200.
 - b. Keying meeting to produce a programming schedule/matrix based on the following:
 - 1) Furnish keys in the following quantities (total quantity of keys part of bid package):
 - a) 5 each Grand master-keys per set.
 - b) 6 each Masterkeys per set.
 - c) 3 each Change keys each lock, core or cylinder.
 - d) 5 each Permanent Extractor keys.
 - e) 9 each Construction masterkeys.
 - f) 2 each Construction Core Extractor keys.
 - g) Include 3 each change keys each lock, core or cylinder for gun lockers.
 - 2) Provide keying system expansion parameters.
 - a) Plan twenty changes directly under the grand.
 - b) Plan ten master keys.
 - c) Plan fifty changes each for each master
 - 3) Permanent keys and cores shall be stamped with the applicable key mark for identification. The visual key control marks or codes shall not include the actual key cuts.
 - 4) Permanent keys shall be stamped "Do Not Duplicate".
 - c. Furnish meeting notes and three compete, typed copies of keying and programming schedule to Owner for final review.
 - d. Furnish keying and programming schedule to Schlage manufacturing factory for production of cores, cylinders and other keyed devices.
3. Transmit pinned cores/cylinders as well as cut grand masterkeys, masterkeys, change keys and other security keys to Owner by Registered Mail, return receipt requested.
4. Install permanent cores in presence of Owner.

D. Fire Control Key Boxes:

1. Product: Rapid Entry System.
2. Manufacturer and Product: Basis-of-Design: Knox Box 3200 Series x The Knox Co.
3. Recessed mount, UL-listed, heavy-duty unit; fabricate from 1/4-inch-thick steel plate.
4. Provide with restricted keying as required by Local Fire Department.
5. Provide one box at each main entry from each parking area designated with a fire emergency lane.
6. Provide tamper alarm switch with each box.
7. Provide outlet boxes, conduit, wiring, and connections as specified in appropriate Division 25-28 Sections.

2.11 CLOSING DEVICE

A. Surface Mounted Closers:

1. Acceptable Manufacturers:
 - a. LCN Manufacturing – 4040 XP Series or 2215DPS as scheduled.
 - b. Owner's standard, no substitutions permitted.

B. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on drawings and detailed requirements for each type of device:

1. ANSI A156.4, Grade 1; UL Listed; meets UL 10C and SFM Standard 12-7-4 for positive pressure fire test.
2. Closers shall have multi-size spring power adjustment to permit setting of spring from 1 through 6 with additional spring power available. Provide ADA compliant setting nomenclature during submittals as recommended by closer manufacturer.
3. Submit correct closer type as to be able to install closers on non-public side of doors (examples include but are not limited to 1) interior side of storage/electrical type rooms; 2) not in corridors/public areas 3) stair side of stairway doors; and at exterior locations, install closers inside of building (in conditioned spaces)
4. Installation Plates, Brackets, and Miscellaneous Adapters:
 - a. Existing Closer Covers: At door/opening locations where closer cover is missing, provide new closer cover.
 - b. Provide drop plates, brackets, or adapters for arms as required to suit details and install as directed by manufacturer's templates.
 - 1) Furnish and install drop plates at reverse bevel doors and at doors with 170 degrees to 180 degrees swing.
 - 2) Furnish and install blade, angle or applied stops as required where frame does not permit installation of the standard soffit plate.

2.12 STOPS AND HOLDERS

A. Floor and Wall Door Stops/Holders and Bumpers:

1. Acceptable Manufacturers:
 - a. Triangle Brass Manufacturing Company, Inc. (Trimco).
 - b. ABH Manufacturing.
 - c. Ives Manufacturing.
 - d. Rockwood.
 - e. Hager Manufacturing.
 - f. McKinney Products.
2. Where hardware groups/sets have different information, refer to the following for clarification. Provide hardware groups/sets devices along with added devices as indicated on Drawings and detailed requirements for each type of device:
 - a. Stops, Bumpers and/or Holders shall meet the requirements of BHMA A156.16, Grade 1.
 - b. Coordinate with specifications in Division 05, 06, and/or 09 for required wall backing.

2.13 ACCESSORIES

A. Kick/Mop Plates:

1. Acceptable Manufacturers:
 - a. Ives Manufacturing.
 - b. Triangle Brass Manufacturing Company, Inc. (Trimco).
 - c. Rockwood.
 - d. Hager Manufacturing.
 - e. McKinney Products.
2. Size at single doors:
 - a. Push side of door two inch less than door width. Hardware set/group nomenclature: 2 inches LDW.
 - b. Pull side and one inch less than door width. Hardware set/group nomenclature: 1 inch LDW.
3. At pairs of doors, width shall be one inch less than door width on both sides.
4. Height shall be 10 inches, unless otherwise indicated.

B. Smoke Seals, Intumescent Seals, Sound Seals, and/or Weatherstripping.

1. Acceptable Manufacturers:
 - a. Pemko Manufacturing, Inc.
 - b. National Guard.
 - c. Zero International.
 - d. McKinney Products.

2. No intumescent material is allowed on door frames. Where CBC requirements for positive pressure must be met, doors shall include all requirements as part of the door construction per 'Category A' guidelines as published by ITS/Warnock-Hersey. Only smoke gasketing applied around the perimeter of the frame to meet the 'S' smoke rating is permissible in instances where smoke control is required.

C. Door Silencers:

1. Acceptable Manufacturers:
 - a. Ives Manufacturing.
 - b. Triangle Brass Manufacturing Company, Inc. (Trimco).
 - c. Rockwood.
 - d. Hager Manufacturing.
 - e. McKinney Products.

D. Astragals, Door Bottoms, and Thresholds:

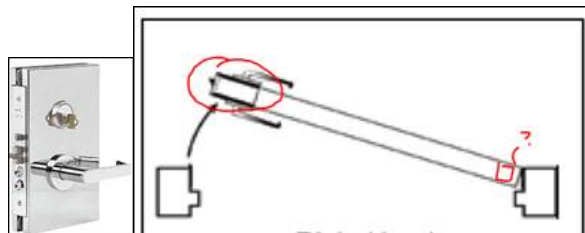
1. Acceptable Manufacturers:
 - a. Pemko Manufacturing, Inc.
 - b. National Guard.
 - c. Zero International.
 - d. McKinney Products.
2. Thresholds shall comply with CBC Sections 1008.1.7 and 11B-404.2.5 and shall not exceed 1/2 inch in height.

E. Drip Guard:

1. Provide at exterior doors exposed to rain.
2. Size: Full Frame Width (FFW).
3. Provide devices painted to match adjacent frame. See Section 09 91 00 for paint and primer requirements.

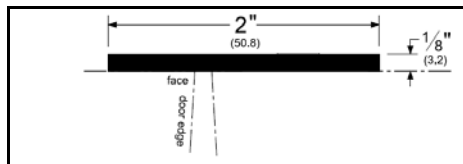
F. Gates and Gate Hardware Accessories:

1. Provide welded astragals, lock patches (templates), and/or welded mounting devices required for a complete installation of specified hardware, whether or not shown on Drawings and details. Weld in accordance with manufacturer's recommendations. Provide devices ground smooth and paint to match gate/fence system. See Section 09 91 00 for paint and primer requirements. Inserted pictures below are examples of lock patches and/or welded mounting devices. Template gates for each type of hardware device:



2. Gate Astragal:

- a. Provide fully welded astragal full height of gate to overlap either adjacent fence post or the adjacent gate at pair of gates.
 - 1) Provide full height astragal in width indicated on Drawings. If not indicated, provide astragal width no less than 2 inches wide. See inserted picture below.
 - 2) Provide full height astragal overlap width per details. If not indicated, provide overlap of astragal no less than 3/4 inch wide.
 - 3) Provide 1/8 inch astragal thickness. See inserted picture below.
 - 4) Where Pemko Manufacturing 357 Series astragal is utilized by gate manufacturer, do not use screws or order with screw holes. Nomenclature: ND prefix or suffix required by Pemko on 357 Series astragal.



- b. Provide devices ground smooth and painted to match gate/fence system. See Section 09 91 00 for paint and primer requirements.

3. Gate Cainbolts:

- a. Where nomenclature or device "524 Series" non-padlock cainbolt-type devices are specified in hardware group/sets, provide by Crown Industrial, South San Francisco, CA; (650) 952-5150; <http://www.crown-industrial.com/>, or accepted equal.
- b. Where nomenclature or device "stock #0524PL and/or part #0000478" series padlockable cainbolt-type devices are specified in hardware group/sets, provide series by Crown Industrial, South San Francisco, CA; (650) 952-5150; <http://www.crown-industrial.com/>, or accepted equal.
- c. On pairs of gates that have egress lever trim and or exit/panic device push-pad trim on active side gate, install cainbolt away from the door edge so that both the cainbolt and supplied the padlock cannot not impede the active gate from opening at any time, providing free egress.
- d. Provide compatible galvanized steel pipe canebolt receptor and strike plate mounted in concrete slab as required.
 - 1) At padlockable canebolts, provide sufficient canebolt receptor depth to enable use of padlock.
 - 2) Provide canebolt receptors at both closed position of gate and open position of gate at 90 degrees, unless shown differently on Drawings.
- e. Cainbolts shall be mounted and welded in accordance with manufacturer's recommendations.
 - 1) Coordinate with other welding requirements in Contact Documents.
 - 2) Provide devices ground smooth and painted to match gate/fence system. See Section 09 91 00 for paint and primer requirements.
- f. Products by the following manufacturers will be considered for acceptance providing all specified criteria have been met in full. Furnish all items and components of hardware required to complete the work in accordance with specifications, Contract Documents, and intended operation.

- 1) Guardian Gate; www.guardiangatehardware.com.
- 2) Ameristar.
- 3) Monumental Iron Works.

2.14 POWER SUPPLIES, ELECTRIFIED HARDWARE, AND WIRES

A. Door Position Switches

1. Refer to and coordinate with Security Drawings

B. Power Supplies, Wires, and Relays:

1. Where hardware groups/sets have different information (number of hinge wires and power supply information), refer to the following specifications for clarification and submit according to complete and intended electrified system per Contract Documents. See Architectural and Security drawings and specifications.
 - a. Coordinate use of power supplies with door and frame locations. Provide power supplies, relay, and battery backup units as part of the overall system in accordance with the manufacturer's warranty and system requirements. UL listed for applicable use; housed in an approved enclosure; and provide both Class 1 and Class 2 outputs.
 - b. Output shall be filtered and regulated. Relay, timer, and logic modules shall be provided as required for interface to indicated security components, and shall be assembled, connected and fully contained within the power supply enclosure.
 - c. Provide required connections to accommodate fire alarm/life safety system and/or security electronics for remote site monitoring of all electrified components and functions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames and verify mounting locations as indicated on shop drawings.
- B. Report unacceptable conditions to the Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions and approved shop drawings.
- B. Door-Floor Clearances: Unless otherwise shown, provide the following door-floor clearances:
 1. Labeled doors: 3/8 inch maximum over floor or threshold.
 2. No threshold: 3/8 inch maximum for metal and wood doors.
 3. With threshold: 1/8 inch.
 4. Carpet: 1/8 inch over top of nap.
- C. Hardware Placement:
 1. Unless otherwise shown or required by CBC 2013, ADA Act - 2010 Standards for Accessible Design and/or Title 24, place hardware at the following heights:

- a. Hinges: Door and frame manufacturer's standard scope per additional specifications and plans.
 - b. Lever handles for latchsets, lockset and panic/exit device pull, lever trim:
 - 1) 38 inches above finish floor/surface.
 - 2) Verify manufacturer's template with door design.
 - c. Panic devices push bar:
 - 1) Panic hardware shall be so mounted / centered between 36 inches and 44 inches above finished floor or ground.
 - 2) Verify manufacturer's template with door design to meet CBC 2013 exterior, pull side trim.
 - d. Door Pulls and Push Bars (centerline): mounted / centered 42 inches above finished floor or ground.
 - e. Door Push Plates (centerline): mounted / centered 42 inches above finished floor or ground.
 - f. Where slider doors are in the fully open position, operating hardware shall be fully exposed and usable from both sides (CBC Sections 11B-404.2.7).
2. Hardware for door handles, pulls, latches, locks and other operating devices for use on means of egress doors shall comply with SFM Standard 12-10-2, Section 12-10-202 as contained in CCR Title 24, Part 12.

D. Installation:

1. Except for hinges, do not install hardware until painting and finishing work is completed.
2. Pre-drill pilot holes in wood for screws. Drill and tap for surface mounted hardware on metal.
3. Hinges: Set hinges snug and flat in mortises. Hand turn screws to flat seat – do not drive.
4. Locksets: Install locks with keyways in proper position. Install levers, escutcheon, and escutcheons firmly affixed.
5. Closers: Mount door closers for maximum swing of door before setting stops. Adjust closers so that from open position of 70 degrees, the door will take at least three seconds to move to a point 3 inches from the latch.
6. Floor Stops: Floor stops shall be installed a maximum of 4 inches from adjacent walls.
7. Silencers: Set in place before adjusting strikes.
8. Thresholds and Raindrips: Set in waterproof sealant and fasten anchors in pre-drilled countersunk holes 18 inch on center maximum spacing and within 3 inches of each end. Minimum three anchors per threshold.

3.3 PAINT OR FIELD FINISHES

- A. Coordinate with Contact Documents including, but not limited to, Section 09 91 00 for paint and primer requirements.
- B. Fire rated labels on doors and frames shall not be painted.

3.4 ADJUSTING

- A. Adjust parts for smooth, uniform operation.
- B. Lubricate moving parts with manufacturer recommended lubricant.
- C. Replace units that cannot be adjusted and lubricated to operate freely and smoothly as intended for the application.
- D. Adjust door closer devices:
 - 1. Adjust closer operating effort.
 - a. Interior and Exterior Doors: not to exceed 5.0 pounds force.
 - b. When fire doors are required, the maximum effort to operate the door may be increased to the minimum allowed by the appropriate administrative authority, not to exceed 15 pounds opening force.
 - 2. Adjust closer delay and operating speeds to comply with requirements of 2013 CBC and ADA – Americans with Disabilities Act - 2010 Standards for Accessible Design.
 - a. Door closers shall have sweep period adjusted so that from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the strike.

3.5 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.

3.6 HARDWARE SCHEDULE

A. Manufacturers Legend:

<u>Code</u>	<u>Name</u>
MK	McKinney Manufacturing
SC	Schlage Manufacturing
LC	LCN Closers
VO	Von Duprin Manufacturing
AB	ABH Manufacturing
IV	H.B. Ives Manufacturing
AI	Airteq Manufacturing
TR	Trimco Manufacturing
PE	Pemko Manufacturing
RX	Rixson Manufacturing
SN	Securitron Manufacturing

B. Hardware Columns - Example (Legend):

<u>Qty.</u>	<u>Device Description</u>	<u>Device Part #</u>	<u>Finish</u>	<u>Manufacturer</u>
1	-----	-----	--	--

- C. The following hardware sets are intended to establish type and standard of quality when used together with the requirements of this Section (see above Section and related Sections including Division 01).
1. Examine Contract Documents and furnish proper hardware for door openings.
 2. Refer to Door Schedule on the Drawings for Hardware Group/Set assignments for each opening.
 3. Blank space below and after a Group/Set is intentional to avoid, if possible, splitting a Hardware Group/Set onto two pages.

Exterior Hardware Sets (Two-Digit Set Numbers)

Hardware Group/Set #01

In addition to the devices specified in hardware group/set below, also coordinate devices in specification Section 08 71 13 "Automatic Door Operators" and Electrical/Security (furnish & install doors, frames and related scope per complete Contract Documents):					
-	Ea.	Hinges	T4A3386 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
2	Ea.	Electrified Hinges	T4A3386 5" tall x 8-wire x 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Electrified Latch Retraction Concealed Vertical Rod Exit/Panic Device (Key Override)	RX QEL 9949NL x 110NL x security torx fasteners (SD tbd)	626	VO
1	Ea.	Electrified Latch Retraction Concealed Vertical Exit Device	RX QEL 9949EO series x security torx fasteners	626	VO
1	Ea.	Power Supply	PS914-2Q-4RL		VO
2	Ea.	Pull	7160 Focal Offset	630	TR
3	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
3	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Surface Overhead Low Energy Operator System	See Section 08 71 13		
1	Ea.	Closer at right hand reverse (RHR) door only	4040XP EDA x security torx fasteners	689	LC
2	Ea.	Door Stop	#1209	630	TR
2	Ea.	Concealed Door Bottom Sweep	90100CNB		PE
1	Ea.	Threshold	2727A or 176A or per detail (sized to fit the condition) x FHSL25 x security torx fasteners		PE
1	Ea.	Seal	Seals are to be furnished by aluminum frame manufacturer to meet no water penetration warranties.		
1	Ea.	Overhead Rain Drip	Per architectural details and flashing at uncovered areas (or by door manufacturer to meet no water penetration warranties – verify before submittals).		
-	Ea.	Door Position Switch (also known as Alarm Contact, Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
2	Ea.	Request-to-Exit Sensor (see free egress note in above specifications)	Device/parts specified in above locking device (-RX): Coordinate Request-to-Exit Sensor devices with security or electrical per Contract Documents (divisions 25-28 & applicable drawings)		
1 or	Ea.	Coordinate with security or electrical design for	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for card reader		

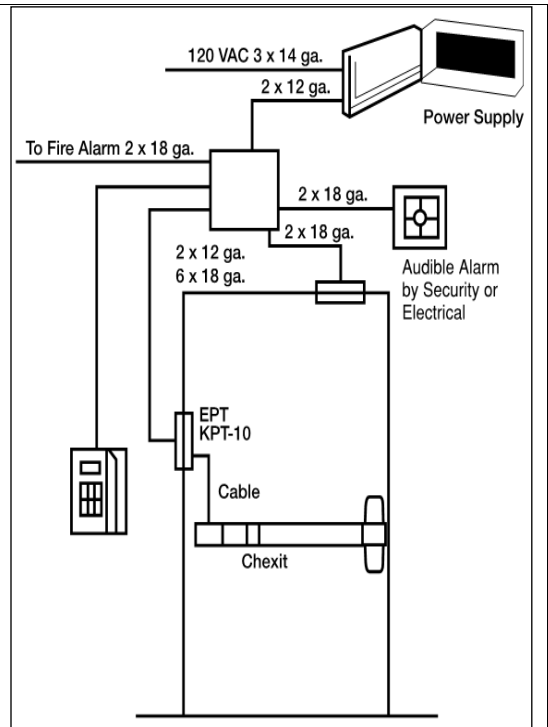
2		card reader or remote entry locations and additional non-08 71 00 scope (including but not limited to wire / connectivity from ground or ceiling through frame to electrified hardware)	locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). <ul style="list-style-type: none">- If specified, coordinate door & frame preparation/templates for devices ordered & installed by others.- The electrified hardware specified above can be utilized for #1) non-card reader, remote access control applications (unlocked / locked remotely for open during business hours / locked after-hours) and #2) local card readers at specific openings. 08 71 00 scope does not include card readers locations.
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).			

Hardware Group/Set #02

-	Ea.	Hinges	T4A3386 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Electrified Hinges	T4A3386 5" tall x 8-wire x 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Delayed Egress Electrified Rim-Type Exit/Panic Device	CX 99EO x security torx fasteners (no exterior trim)	626	VO
1	Ea.	Power Supply	PS914		VO
1	Ea.	Primus I/C Cylinders (Rim or Mortise) to control CX switch on interior of door	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Closer	4040XP EDA x security torx fasteners	689	LC
1	Ea.	Kick Plate	8400 10" X 2" LDW X B4E X CS	630	IV
1	Ea.	Door Stop	#1209	630	TR
1	Ea.	Concealed Door Bottom Sweep	90100CNB		PE
1	Ea.	Threshold	2727A or 176A or per detail (sized to fit the condition) x FHSL25 x security torx fasteners		PE
1	Ea.	Seal	If frame is aluminum, then seals are to be furnished by aluminum frame manufacturer. If frame is hollow metal, furnish S88D seals (head & jambs) by Pemko or approved seal manufacturer.		
1	Ea.	Overhead Rain Drip	Per architectural details and flashing at uncovered areas (or by door manufacturer to meet no water penetration warranties – verify before submittals). For hollow metal doors, provide 346C x FFW full raindrips by Pemko or approved equal		
-	Ea.	Door Position Switch (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
1 or 2	Ea.	Coordinate with security or electrical design for remote access or egress controlled locations and additional non-08 71 00 scope (including but not limited to wire / connectivity from ground or ceiling through frame to electrified hardware)	By security or electrical as required per Contract Documents: - If specified, coordinate door & frame preparation/templates for devices ordered & installed by others (see Divisions 25-28 and applicable drawings). - Coordinate with Divisions 25-28 and applicable drawings.		

NOTE 1: Example wiring (to be detailed at next submittal/printing).

NOTE 2: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

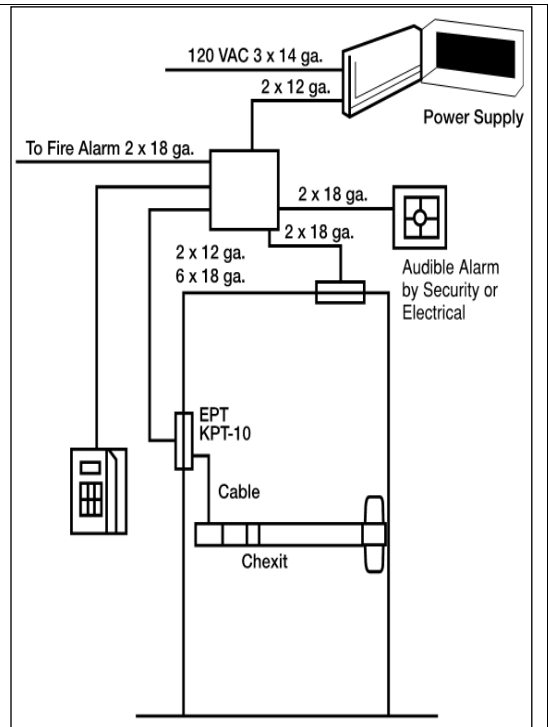


Hardware Group/Set #03

-	Ea.	Hinges	T4A3386 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Electrified Hinges	T4A3386 5" tall x 8-wire x 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Delayed Egress Electrified Rim-Type Exit/Panic Device	CX 99EO x security torx fasteners (no exterior trim)	626	VO
1	Ea.	Power Supply	PS914		VO
1	Ea.	Primus I/C Cylinders (Rim or Mortise) to control CX switch on interior of door	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Closer	4040XP EDA x security torx fasteners	689	LC
1	Ea.	Door Stop	#1209	630	TR
1	Ea.	Concealed Door Bottom Sweep	90100CNB		PE
1	Ea.	Threshold	2727A or 176A or per detail (sized to fit the condition) x FHSL25 x security torx fasteners		PE
1	Ea.	Seals	Seals are to be furnished by aluminum frame manufacturer to meet no water penetration warranties.		
1	Ea.	Overhead Rain Drip	Per architectural details and flashing at uncovered areas (or by door manufacturer to meet no water penetration warranties – verify before submittals).		
-	Ea.	Door Position Switch (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
1 or 2	Ea.	Coordinate with security or electrical design for remote access or egress controlled locations and additional non-08 71 00 scope (including but not limited to wire / connectivity from ground or ceiling through frame to electrified hardware)	By security or electrical as required per Contract Documents: - If specified, coordinate door & frame preparation/templates for devices ordered & installed by others (see Divisions 25-28 and applicable drawings). - Coordinate with Divisions 25-28 and applicable drawings.		

NOTE 1: Example wiring (to be detailed at next submittal/printing).

NOTE 2: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).



Hardware Group/Set #04

-	Ea.	Hinges	T4A3386 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Electrified Hinges	T4A3386 5" tall x 8-wire x 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Rim-Type Exit/Panic Device (Electrified Lever x Key Override)	RX 99NL x E996NL R/V x security torx fasteners	626	VO
1	Ea.	E996 Power Supply	PS902-4R		VO
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Closer	4040XP EDA x security torx fasteners	689	LC
1	Ea.	Door Stop	#1209	630	TR
1	Ea.	Concealed Door Bottom Sweep	90100CNB		PE
1	Ea.	Threshold	2727A or 176A or per detail (sized to fit the condition) x FHSL25 x security torx fasteners		PE
1	Ea.	Seal	Seals are to be furnished by aluminum frame manufacturer to meet no water penetration warranties.		
1	Ea.	Overhead Rain Drip	Per architectural details and flashing at uncovered areas (or by door manufacturer to meet no water penetration warranties – verify before submittals).		
-	Ea.	Door Position Switch (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
1	Ea.	Request-to-Exit Sensor (see free egress note in above specifications)	Device/parts specified in above locking device (-RX): Coordinate Request-to-Exit Sensor devices with security or electrical per Contract Documents (divisions 25-28 & applicable drawings)		
1	Ea.	Coordinate with security or electrical design for card reader or remote entry locations and additional non-08 71 00 scope (including but not limited to wire / connectivity from ground or ceiling through frame to electrified hardware)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for card reader locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). - If specified, coordinate door & frame preparation/templates for devices ordered & installed by others. - The electrified hardware specified above can be utilized for #1) non-card reader, remote access control applications (unlocked / locked remotely for open during business hours / locked after-hours) and #2) local card readers at specific openings. 08 71 00 scope does not include card readers locations.		

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #05

—	Ea.	Hinges	T4A3386 x NRP (size & quantity per 08 71 00) x security torx fasteners	630	MC
2	Ea.	Manual Flush Bolts (with dust proof strike)	FB457 x DP2 dust proof strike x security torx fasteners	630	IV
1	Ea.	Storeroom-Type Lockset	LV9080T X 06L x Less Outside Trim (interior lever only with Z pull at exterior) x cylinder length and size required for Z-pull x security torx fasteners	630	SC
1	Ea.	Z Pull	1822-1 series as required (prep/template for keyed cylinder to be installed over 1822-1)	630	TR
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device). Cylinder length, size and rings required for Z-pull	626	SC
1	Ea.	Permanent Core	20-740	626	SC
2	Ea.	Overhead Stop	9ADJ SERIES (-336 or size as required) x security torx fasteners	630	RX
2	Ea.	Kick Plate	8400 16" X 2" LDW x B4E x security torx fasteners	630	IV
1	Ea.	Seal (weatherstripping)	S88D Perforation Feature (head and jambs)		PE
1	Ea.	Astragal Seal (weatherstripping)	S77D Perforation Feature seal		PE
1	Ea.	Astragal	Furnish and install welded, ground smooth and prime/painted astragal by door manufacturer x S77 seal		PE
2	Ea.	Door Bottom Sweep	216A x security torx fasteners		PE
1	Ea.	Threshold	2727A or 176A (see detail or verify in field if existing sill condition: provide in-kind replacement sized to fit the condition) x FHSL25 x security torx fasteners		PE
1	Ea.	Overhead Rain Drip	Per architectural details and flashing at uncovered areas (or by door manufacturer to meet no water penetration warranties – verify before submittals). For hollow metal doors, provide 346C x FFW full raindrips by Pemko or approved equal.		

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #06

—	Ea.	Hinges	T4A3386 x NRP (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Storeroom-Type Lockset	LV9080T X 06L x Less Outside Trim (interior lever only with Z pull at exterior) x cylinder length and size required for Z-pull x security torx fasteners	630	SC
1	Ea.	Z Pull	1822-1 series as required (prep/template for keyed cylinder to be installed over 1822-1)	630	TR
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device). Cylinder length, size and rings required for Z-pull	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Overhead Stop	9ADJ SERIES (-336 or size as required) x security torx fasteners	630	RX
1	Ea.	Kick Plate	8400 16" X 2" LDW x B4E x security torx fasteners	630	IV
1	Ea.	Seal (weatherstripping)	S88D Perforation Feature (head and jambs)		PE
1	Ea.	Door Bottom Sweep	216A x security torx fasteners		PE
1	Ea.	Threshold	2727A or 176A (see detail or verify in field if existing sill condition: provide in-kind replacement sized to fit the condition) x FHSL25 x security torx fasteners		PE
1	Ea.	Overhead Rain Drip	Per architectural details and flashing at uncovered areas (or by door manufacturer to meet no water penetration warranties – verify before submittals). For hollow metal doors, provide 346C x FFW full raindrips by Pemko or approved equal.		
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).					

Hardware Group/Set #07

—	Ea.	Hinges	T4A3386 x NRP (size & quantity per 08 71 00) x security torx fasteners	630	MC
2	Ea.	Manual Flush Bolts (with dust proof strike)	FB457 x DP2 dust proof strike x security torx fasteners	630	IV
1	Ea.	Mortise-Type Exit/Panic Device x Keyed Pull Trim	9975NL x 990NL-M x security torx fasteners	626	VO
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device).	626	SC
1	Ea.	Permanent Core	20-740	626	SC
2	Ea.	Overhead Stop	9ADJ SERIES (-336 or size as required) x security torx fasteners	630	RX
2	Ea.	Kick Plate	8400 16" X 2" LDW x B4E x security torx fasteners	630	IV
1	Ea.	Seal (weatherstripping)	S88D Perforation Feature (head and jambs)		PE
1	Ea.	Astragal Seal (weatherstripping)	S77D Perforation Feature seal		PE
1	Ea.	Astragal	Furnish and install welded, ground smooth and prime/painted astragal by door manufacturer x S77 seal		PE
2	Ea.	Door Bottom Sweep	216A x security torx fasteners		PE
1	Ea.	Threshold	2727A or 176A (see detail or verify in field if existing sill condition: provide in-kind replacement sized to fit the condition) x FHSL25 x security torx fasteners		PE
1	Ea.	Overhead Rain Drip	Per architectural details and flashing at uncovered areas (or by door manufacturer to meet no water penetration warranties – verify before submittals). For hollow metal doors, provide 346C x FFW full raindrips by Pemko or approved equal.		
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).					


Interior Hardware Sets (Three-Digit Set Numbers)

Hardware Group/Set #101

-	Ea.	Hinges	T4A3386 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Electrified Hinges - tbd	T4A3386 5" tall x 8-wire x 5" tall x NRP (width size & quantity per 08 71 00)	630	MC
1	Ea.	Rim-Type Exit/Panic Device (Electrified Lever x Key Override)	RX 99NL x E996NL R/V x security torx fasteners or -CD tbd	626	VO
1	Ea.	E996 Power Supply tbd	PS902-4R		VO
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Closer	4040XP EDA x security torx fasteners	689	LC
1	Ea.	Door Stop	#1209	630	TR
1	Ea.	Seal	Seals are to be furnished by aluminum frame manufacturer to meet no water penetration warranties.		
-	Ea.	Door Position Switch tbd (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
1	Ea.	Request-to-Exit Sensor tbd (see free egress note in above specifications)	Device/parts specified in above locking device (-RX): Coordinate Request-to-Exit Sensor devices with security or electrical per Contract Documents (divisions 25-28 & applicable drawings)		
1	Ea.	Coordinate with security or electrical design for card reader or remote entry locations and additional non-08 71 00 scope (including but not limited to wire / connectivity from ground or ceiling through frame to electrified hardware)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for card reader locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). - If specified, coordinate door & frame preparation/templates for devices ordered & installed by others. - The electrified hardware specified above can be utilized for #1) non-card reader, remote access control applications (unlocked / locked remotely for open during business hours / locked after-hours) and #2) local card readers at specific openings. 08 71 00 scope does not include card readers locations.		

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #102

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Privacy x Occupancy Indicator (exterior side lever can be left unlocked. Emergency Cointurn / Slot override).	L9444T x 06N x #L283-722 (interior ADA thumbturn and exterior side emergency cointurn / slot override) x security torx fasteners	630	SC
					
1	Ea.	Closer x Stop Arm	4040XP CUSH x security torx fasteners	689	LC
1	Ea.	Kick Plate	8400 16" X 2" LDW x B4E x security torx fasteners	630	IV
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
1	Ea.	Door Bottom	2343AV (will allow for required mechanical undercut, final tbd)		PE
1	Ea.	Threshold	173A (flat) or 270A (4" with non-slip groove) x sized to fit the condition x FHSL25 TBD by design team		PE
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).					

Hardware Group/Set #103

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Passage Latchset	L9010 x 06L x security torx fasteners	630	SC
1	Ea.	Closer x Stop Arm	4040XP CUSH x security torx fasteners	689	LC
2	Ea.	Kick Plate	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
1	Ea.	Door Bottom	2343AV - tbd		PE
1	Ea.	Threshold	173A (flat) or 270A (4" with non-slip groove) x sized to fit the condition x FHSL25 TBD by design team		PE
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).					

Hardware Group/Set #104

-	Ea.	Hinges	T4A3386 5" tall x NRP (width size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Electrified Hinges	T4A3386 5" tall x 8-wire x 5" tall x NRP (width size & quantity per 08 71 00)	630	MC
1	Ea.	Electrified Storeroom-Type Lockset	L9092T x EU X 06L x RX x security torx fasteners	630	SC
1	Ea.	Power Supply tbd	By security or electrical as required (non-08 71 00, see Divisions 25-28 and applicable drawings).		
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Closer	4040XP EDA x security torx fasteners	689	LC
2	Ea.	Kick Plate	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Door Stop	#1209	630	TR
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
-	Ea.	Door Position Switch tbd (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
1	Ea.	Request-to-Exit Sensor tbd (see free egress note in above specifications)	Device/parts specified in above locking device (-RX): Coordinate Request-to-Exit Sensor devices with security or electrical per Contract Documents (divisions 25-28 & applicable drawings)		
1	Ea.	Coordinate with security or electrical design for card reader or remote entry locations and additional non-08 71 00 scope (including but not limited to wire / connectivity from ground or ceiling through frame to electrified hardware)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for card reader locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). - If specified, coordinate door & frame preparation/templates for devices ordered & installed by others. - The electrified hardware specified above can be utilized for #1) non-card reader, remote access control applications (unlocked / locked remotely for open during business hours / locked after-hours) and #2) local card readers at specific openings. 08 71 00 scope does not include card readers locations.		

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #105

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Office-Type Lockset	L9050T X 06L x security torx fasteners	630	SC
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Overhead Stop	9ADJ SERIES (-336 or size as required) x security torx fasteners	630	RX
2	Ea.	Kick Plate	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Seal (sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #106

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Office-Type Lockset	L9050T X 06L x security torx fasteners	630	SC
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
2	Ea.	Kick Plate	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Wall Stop	#1270CV x security torx fasteners	626	TR
1	Ea.	Seal (sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #107

-	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Classroom-Type Lockset	L9070T X 06L x security torx fasteners	630	SC
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Closer	4040XP EDA (installed push-side of door if door swings out) or 4040XP x REG (installed pull-side of door if door swings in) per specifications x security torx fasteners	689	LC
2	Ea.	Kick Plate	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Door Stop	#1209	630	TR
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
-	Ea.	Door Position Switch tbd (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).					

Hardware Group/Set #108

-	Ea.	Hinges	T4A3386 x NRP (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Storeroom-Type Lockset	L9080T X 06L x security torx fasteners	630	SC
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device)	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Closer (stop arm ay doors that swing out preferable with alternate REG arm for inswinging doors)	4040XP CUSH (installed push-side of door if door swings out) or 4040XP x REG (installed pull-side of door if door swings in) per specifications x security torx fasteners	689	LC
2	Ea.	Kick Plate	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Door Stop	#1209	630	TR
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
—	Ea.	Door Position Switch tbd (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).					

Hardware Group/Set #109

-	Ea.	Hinges	T4A3386 x NRP (size & quantity per 08 71 00) x security torx fasteners	630	MC	
1	Ea.	Storeroom-Type Lockset	LV9080T X 06L x Less Outside Trim (interior lever only with Z pull at exterior) x cylinder length and size required for Z-pull x security torx fasteners	630	SC	
1	Ea.	Z Pull	1822-1 series as required (prep/template for keyed cylinder to be installed over 1822-1)	630	TR	
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device). Cylinder length, size and rings required for Z-pull	626	SC	
1	Ea.	Permanent Core	20-740	626	SC	
1	Ea.	Closer	2215DPS x 180 degree swing arm x security torx fasteners per specifications.	689	LC	
2	Ea.	Kick Plate	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV	
1	Ea.	Door Stop	#1209	630	TR	
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)			PE
-	Ea.	Door Position Switch tbd (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.			
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).						

Hardware Group/Set #110

-	Ea.	Hinges	T4A3386 x NRP (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Storeroom-Type Lockset	LV9080T X 06L x Less Outside Trim (interior lever only with Z pull at exterior) x cylinder length and size required for Z-pull x security torx fasteners	630	SC
1	Ea.	Z Pull	1822-1 series as required (prep/template for keyed cylinder to be installed over 1822-1)	630	TR
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device). Cylinder length, size and rings required for Z-pull	626	SC
1	Ea.	Permanent Core	20-740	626	SC
1	Ea.	Closer	2215DPS x 180 degree swing arm x security torx fasteners per specifications.	689	LC
2	Ea.	Kick Plate (delete kickplates at all chase door locations)	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Door Stop	#1209	630	TR
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
-	Ea.	Door Position Switch tbd (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Coordinate with security or electrical design for DPS devices, locations and wire/connectivity scope (non-08 71 00, see Divisions 25-28 and applicable drawings). If DPS devices are required, coordinate door & frame preparation/templates). - Quantity: For pair doors provide two DPS devices and single doors provide one device.		
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).					

Hardware Group/Set #111

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
2	Ea.	Manual Flush Bolts (with dust proof strike)	FB457 x DP2 dust proof strike x security torx fasteners	630	IV
1	Ea.	Storeroom-Type Lockset	LV9080T X 06L x Less Outside Trim (interior lever only with flush pull at exterior side) x security torx fasteners	630	SC
1	Ea.	Flush Pull	1111A x security torx fasteners	626	TR
1	Ea.	Primus I/C Cylinders (Rim or Mortise)	20-757 or 20-763 x appropriate cam x blocking rings as required (rim or mortise type & quantity as required by locking device).	626	SC
1	Ea.	Permanent Core	20-740	626	SC
2	Ea.	Overhead Stop	9ADJ SERIES (-336 or size as required) x security torx fasteners	630	RX
2	Ea.	Kick Plate	8400 16" X 2" LDW x B4E x security torx fasteners	630	IV
2	Ea.	Door Silencers	SR64 or SR65 (as required)	GR	IV
1	Ea.	Astragal	355CS		PE


NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #112

—	Ea.	Hinges	BB1199 (quantity & size per 08 71 00) x security torx fasteners	630	HA
1	Ea.	Push Plate	1001-3-20" x custom 20" high plate (total size 4" wide x 20" tall) (4" x 16")	630	TR
1	Ea.	Pull plate	1017-3 (4" x 16")	630	TR
1	Ea.	Closer	4040XP EDA (installed push-side of door if door swings out) or 4040XP x REG (installed pull-side of door if door swings in) per specifications x security torx fasteners	689	LC
2	Ea.	Kick Plate (delete kickplates at all chase door locations)	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Wall Stop	#1270CV	626	TR
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #113

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Privacy x Occupancy Indicator (exterior side lever locked at all times, with emergency cylinder/key override).	L9485T x 17A x #L283-722 (interior ADA thumbturn and exterior side emergency cylinder/key override) x security torx fasteners 	630	SC
1	Ea.	Closer x Stop Arm	4040XP CUSH x security torx fasteners	689	LC
1	Ea.	Kick Plate	8400 16" X 2" LDW x B4E x security torx fasteners	630	IV
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).


Hardware Group/Set #114

-	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
2	Ea.	Concealed Vertical Exit Device	9949EO series x LBR x Fire Bolt x security torx fasteners	626	VO
2	Ea.	Closer	2215DPS x 180 degree swing arm x security torx fasteners per specifications.	689	LC
2	Ea.	Wall Mag Holder Device	2100 series x armature extension	689	AB
2	Ea.	Wall Mag Armature Extension	S20020 (or length as required for 90 or 180 degree swing parallel to adjacent wall) - tbd	689	AB
4	Ea.	Kick Plate (delete kickplates at all chase door locations)	8400 16" tall x B4E x security torx fasteners (pull-side to be 1" LDW and push-side to be 2" LDW)	630	IV
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
1	Ea.	Astragal Seal (weatherstripping)	S77D Perforation Feature seal		PE
1	Ea.	Astragal	Furnish and install welded, ground smooth and prime/painted astragal by door manufacturer x seal		

NOTE 1: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).


NOTE 2 - Description of Operation: When door is placed in opened position, Magnetic Holder will automatically engage hold open mechanism (magnet). Door releases hold open and fully closes door by manual pulling of door or by the following, self-closing functions: 1) Close on fire alarm activation (Verify voltage and coordinate integration with fire alarm system; or 2) Close due to loss of power (coordinate integration with local power system). Coordinate with divisions 25-28 and applicable FLS drawings.

Hardware Group/Set #115

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Privacy x Occupancy Indicator (exterior side lever can be left unlocked. Emergency Cointurn / Slot override).	L9444T x 06N x #L283-722 (interior ADA thumbturn and exterior side emergency cointurn / slot override) x security torx fasteners	630	SC
					
1	Ea.	Closer x Stop Arm	4040XP CUSH x security torx fasteners	689	LC
1	Ea.	Kick Plate	8400 16" X 2" LDW x B4E x security torx fasteners	630	IV
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #115

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Privacy x Occupancy Indicator (exterior side lever can be left unlocked. Emergency Cointurn / Slot override).	L9444T x 06N x #L283-722 (interior ADA thumbturn and exterior side emergency cointurn / slot override) x security torx fasteners	630	SC
					
1	Ea.	Closer x Stop Arm	4040XP CUSH x security torx fasteners	689	LC
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #116

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Passage Latchset	L9010 x 06L x security torx fasteners	630	SC
1	Ea.	Closer x Stop Arm	4040XP CUSH x security torx fasteners	689	LC
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
1	Ea.	Threshold	173A (flat) or 270A (4" with non-slip groove) x sized to fit the condition x FHSL25 TBD by design team		PE

NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

Hardware Group/Set #117

—	Ea.	Hinges	T4A3386 (size & quantity per 08 71 00) x security torx fasteners	630	MC
1	Ea.	Passage Latchset	L9010 x 06L x security torx fasteners	630	SC
1	Ea.	Closer	2215DPS x 180 degree swing arm x security torx fasteners per specifications.	689	LC
1	Ea.	Wall Mag Holder Device	2100 series x armature extension	689	AB
1	Ea.	Wall Mag Armature Extension	S20020 (or length as required for 90 or 180 degree swing parallel to adjacent wall) - tbd	689	AB
1	Ea.	Seal (for rated or sound dampening conditions)	S88D Perforation Feature (head and jambs)		PE
1	Ea.	Threshold	270A (4" with non-slip groove) or 276A (7" with non-slip groove) x sized to fit the condition x FHSL25 TBD by design team		PE

NOTE 1: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).

NOTE 2 - Description of Operation: When door is placed in opened position, Magnetic Holder will automatically engage hold open mechanism (magnet). Door releases hold open and fully closes door by manual pulling of door or by the following, self-closing functions: 1) Close on fire alarm activation (Verify voltage and coordinate integration with fire alarm system; or 2) Close due to loss of power (coordinate integration with local power system). Coordinate with divisions 25-28 and applicable FLS drawings.

END OF SECTION

SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 GENERAL

1.1 SUMMARY / SECTION INCLUDES:

- A. Electric, swinging automatic entrances, full energy and low energy with concealed and surface mounting.
- B. Actuating controls and safety sensors at designated doors.

1.2 RELATED SECTIONS

- A. Section 07 92 00 - Joint Sealants.
- B. Section 08 11 13 - Hollow Metal Doors and Frames.
- C. Section 08 14 00 - Wood Doors.
- D. Section 08 41 13 - Aluminum Framed Entrances and Storefronts.
- E. Section 08 71 00 - Door Hardware.
- F. Section 26 and 28 - Electrical rough in, wiring and connectors for electrified hardware and card readers.

1.3 ADMINISTRATIVE REQUIREMENTS

- A. Submittal Procedures:
 - 1. Action Submittals and Informational Submittals shall be submitted in accordance with Division 01 and specifications below.
 - 2. Closeout Submittals shall be submitted in accordance with Division 01.

1.4 ACTION SUBMITTALS

- A. Hardware Schedule: Submit detailed schedule in vertical format as illustrated by the Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute.
 - 1. Schedules which do not comply will be returned for correction before checking. Horizontal-type schedules will be returned for correction before checking.
 - 2. Hardware schedule shall clearly indicate hardware group and manufacturer of each item proposed.
- B. Wiring Diagrams: Provide complete and detailed system operation and elevation diagrams specially developed for each opening requiring electrified hardware, except openings where only magnetic hold-opens or door position switches are specified.
 - 1. Provide these diagrams with hardware schedule submittal for approval.
 - 2. Provide detailed wiring diagrams with hardware delivery to jobsite.

C. Product Data:

1. Provide two copies (or copies as required by Division 01) of illustrations from manufacturer's catalogs and data in brochure form.
2. Include labeling and listing information per CBC 2013. Include NFPA 80 (fire rated and smoke-type doors) if applicable.

D. Templates:

1. Provide listing of manufacturer's template numbers for each item of hardware in hardware schedule.
2. Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

E. Installation Instructions:

1. Provide manufacturer's written installation and adjustment instructions for finish hardware.
2. Send installation instructions to site with hardware.

F. Conform to the following Referenced Standards and Regulatory Requirements:

1. CBC – 2013 California Building Code.
2. NFPA 80 – Standard for Fire Doors and other Opening Protectives.
3. NFPA 101 – Life Safety Code.
4. ANSI/BHMA 156.19 American National Standard for power high and low energy operated doors.
5. ANSI A156 Series – Builders Hardware Manufacturers Association (BHMA) Standards Set.
6. ADA – Americans with Disabilities Act - 2010 Standards for Accessible Design.
7. All hardware for accessible doors shall meet the requirements of CBC Sections 11B-404.2.7, 11B-404.2.9, and 1008.1.9.
8. Hand-activated door opening hardware, handles, pulls, latches, locks, and other operating devices on accessible doors shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate controls shall be no greater than 5 pounds per CBC Section 11B-309.4.
9. Door closers, when provided, shall have sweep period meeting the requirements of CBC Section 11B-404.2.8.
 - a. Door closers and gate closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.

1.5 COORDINATION

- A. Coordinate work of this Section with Sections involving manufacturer of internal reinforcement for doors, frames, and hardware. Coordinate work in this Section with work in related Sections.
- B. This Section's hardware sets/groups as specified in Part 3 are intended to establish type and design standard when used together with the requirements of specifications, drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections. Where hardware sets/groups have different information than the specifications refer to the specifications and drawings for clarification and bid combined hardware sets/groups and Contract Documents/specifications (provide combined materials/devices at time of submittals).
- C. Provide hardware templates to door and frame manufacturer. Provide two templates to those manufacturers who are not currently registered template book holders. Contractor shall be responsible for verifying that the door hardware accepted for installation is compatible for use with the doors and door frames.
- D. Coordinate keying requirements as specified in this Section.
- E. Convene coordination meeting between all opening vendors and installers at least two weeks prior to purchasing doors, frames, door hardware and electrical devices required for complete systems.
 - 1. Required attendance includes but is not limited to the following: Contractor; hardware supplier and/or installer; door supplier and/or installer; frame supplier and/or installer; auto operator vendor and/or installer; security card reader vendor and/or installer; and electrical.
 - 2. Contractor shall be responsible for verifying that the door hardware accepted for installation is compatible for use with the doors and door-frames.
 - 3. For card reader interface with applicable door devices, security vendor and/or installer (coordinate accordingly) to have a written agenda and plan on how scope related to electrified devices will be installed to have a complete wired and operational card access system. The card reader interface scope includes but is not limited to card reader inputs and output coordination on the electric locking device power supply, electric locking devices and connectivity as well as confirmation of a complete, wired and operational card access system. Provide all required relays and devices as part of the overall system in accordance system requirements at no additional cost to Owner.
 - 4. For auto operator interface with applicable door devices, auto operator vendor and/or installer (coordinate accordingly) to have a written agenda and plan on how scope related to electrified devices will be installed to have a complete wired and operational auto operator system. The auto operator interface scope includes but is not limited to connectivity and inputs for push-plates, BEA BR3 (or approved equal required auto operator relays), electric locking devices, as well as confirmation of the complete, wired and operational auto operator system. Provide all required relays and devices as part of the overall system in accordance system requirements at no additional cost to Owner.
 - 5. Vendor and/or installer (coordinate accordingly) not responsible for electrical-power (see electrical drawings) or FLS (fire/life safety) connectivity to above frame or back-of-house power supply (back-of-house meaning remote low voltage power). FLS connectivity only required for fire or smoke rated opening in particular functions to meet code as scheduled.

- F. Examine Contract Documents and furnish proper hardware for door openings. Example includes, but is not limited to system integration:
1. Provide electrical interface control capability for card reader or keypad operation of swinging automatic entrances on doors with electric locking. Integrate swinging automatic entrances with other systems as required for a complete working installation.
 2. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.
 3. Electrical System Roughing-in: Coordinate layout and installation of swinging automatic entrances with connections to, power supplies and remote activation devices. Review details and conditions prior to ordering material.

1.6 QUALITY ASSURANCE

- A. Operator Device Supplier Qualifications: Firm specializing in the supply and servicing of institutional and commercial low energy operator devices and sliding automatic doors; accredited by manufacturers; and having a minimum of three years documented experience. Hardware supplier to furnish list of at least ten completed projects complete with date completed, project location and project contact information.
- B. Manufacturer Qualifications and Documentation:
1. Operator Device Manufacturer Qualifications: Manufacturer specializing in manufacturing institutional and commercial high and low energy operator devices with a minimum five years with the following documented experience. Furnish list of at least ten projects (past, finished projects). Include date completed, project location and references (past project contact information to determine if commercial high and low energy operator devices are acceptable).
 2. Manufactured devices submitted must have a factory certified central dispatch service for warranty. System to be available 24 hours a day, 365 days per year to obtain malfunction information and dispatch appropriate service agency to the customer location.
- C. Installer Qualifications and Documentation:
1. Company specializing in installing the products specified in this Section shall have minimum ten years experience and be a member of the American Association of Automatic Door Manufacturers (AAADM). A completed AAADM compliance form shall be submitted as proof of compliance with current ANSI/BHMA 156.19 American National Standard for power high and low energy operated doors as well as high energy operators. Doors shall be inspected and form shall be signed by an AAADM certified inspector prior to placing doors in operation.
 2. Operator Device Installer qualifications: The installer of assembly shall be trained in the trade of installing and start-up of commercial high or low energy operator devices and sliding automatic doors. Supplier and Installer of door assemblies shall be authorized representative of manufacturers and have minimum of five years successful experience in detailing, supplying and installing commercial high and low energy operator devices and sliding automatic doors specified on projects of similar size, complexity and type to this Project.

3. Local certified distributor to install operator in accordance with current ANSI/BHMA 156.19 American National Standard for High and Low Energy Power Operated Doors and local applicable codes. For low energy applications, local certified distributor to install operator in accordance with ANSI 156.19, ANSI 117.1, NFPA 101 and local applicable codes.

D. Pre-Installation Meetings.

1. Conduct pre-installation meeting in accordance with Division 01.
2. Convene pre-installation meeting at least two week prior to commencing work of this Section.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the requirements specified in Division 01.
- B. Deliver hardware to factory, shop, or mill of subcontractors and manufacturers requiring it or directly to the Project site as required.
- C. Each article of hardware shall be individually packaged in manufacturer's original container, properly marked or labeled in conformity with the reviewed Hardware Schedule.

1.8 CLOSEOUT SUBMITTALS

- A. Provide operating and maintenance manual that includes the following:
 1. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
 2. Catalog pages for each product.
 3. Name, address, and phone number of local representative for each manufacturer.
 4. Parts list for each product.
 5. Copy of final approved hardware schedule, edited to reflect "As installed".
- B. Maintenance materials as specified.

1.9 MAINTENANCE MATERIALS

- A. Provide special wrenches and tools applicable to each different or special component.
- B. Provide maintenance tools and accessories supplied by manufacturer.
- C. Maintenance Data: Submit two copies of operator maintenance manuals that include the following items:
 1. Lubrication instructions.
 2. Operator maintenance instructions.
 3. Capability of servicing by local firm. List name, address and phone number of firm.

1.10 WARRANTY

- A. Unless otherwise specified below, furnish to Owner a written manufacturer's two year extended guarantee for automatic door operators against defects in materials and workmanship.

PART 2 PRODUCTS

2.1 MATERIALS: GENERAL REQUIREMENTS

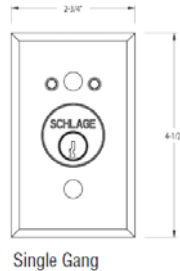
- A. The Specifications are intended to cover all doors in the Project and establish a type and standard of quality, but it is the responsibility of the Contractor to furnish proper hardware for all openings and for a complete installation. Where Hardware Groups/Sets have different information, refer to the following specifications for clarification and detailed requirements (provide all devices whether specified or not in hardware sets/groups).
- B. If there are omissions in Specifications and hardware groups required for a complete installation, it shall be called to the attention of the Owner's Representative when the Hardware Schedule is submitted.

2.2 SURFACE LOW ENERGY AUTOMATIC OPERATORS

- A. Acceptable Manufacturers and Products:
 - 1. Horton 4000LE
- B. Products by the following manufacturers will be considered for acceptance providing all specified criteria have been met in full. Furnish all items and components of hardware required to complete the work in accordance with specifications, Contract Documents and intended operation:
 - 1. LCN Sr. Swing with Reduced Force feature
- C. Where Hardware Groups/Sets have different information, refer to the following specifications for clarification and detailed requirements:
 - 1. Provide required relays and devices as part of the overall system in accordance system requirements. Units shall have relay contact for interfacing products. Door operator shall have input line rating of 120 VAC. unit shall have an internal circuit breaker switch to interrupt input power for servicing. Unit shall be U.L. Listed for automatic closing door. Unit shall be in compliance with the requirements of the Americans with Disabilities Act (ADA) and ANSI standards a117.1 and A156.19.
 - 2. Provide complete with drop plates, brackets, or adapters for arms as required to suit conditions.
 - 3. Provide adjustment for opening, closing, and checking speeds, as well as length of time door remains open. Provide units that can be utilized as a hold open devices (door placed in opened position when device three-way switch is engaged to "hold open" position).
 - 4. Provide Automatic Operators with external "On/Off/Hold-Open three-way switch" as part of overall/complete system (coordination per Section 08 71 13).
 - a. Low energy operator manufacturer to have hold open toggle as part of overall system and installed on auto operator external body above frame (door placed in opened position when toggle three-way switch is engaged to "hold open" position (On/Off/Hold Open). Basis of design below (example only):

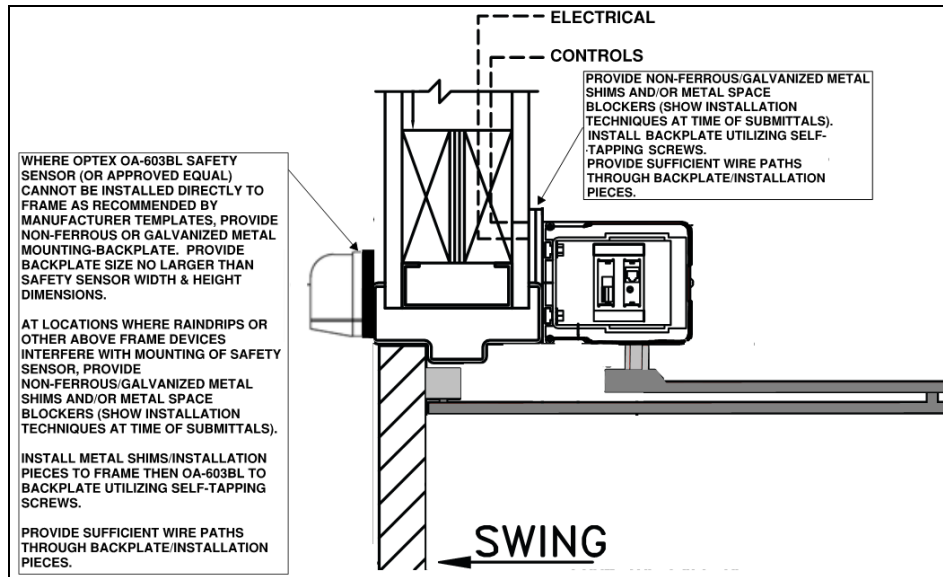


- b. Provide Automatic Operators with external On/Off two-way switch to be installed at ADA height of between 38 and 44 inches Above Finish Floor (AFF): #653-14 DPDT maintained single direction x SF-626 by Locknetics manufacturing (coordinate with Electrical).



- c. Where pairs of doors have two separate Automatic Operators provide one external On/Off/Hold-Open three-way switch to operate both doors/operators.
5. Fire, Life and Safety (FLS) systems coordination/description of operation: during fire alarm activation or loss of building power auto operator devices at fire rated doors to automatically close doors (coordinate integration with fire alarm system and local power system). Wiring by Divisions 26 and 28.
6. Safety Sensor Devices:
- a. At low energy LCN operators provide OPTEX OA-603BL sensor devices (Pro-Swing Premier) by #OPTEX as scheduled, or equal. Safety sensor devices to be installed above door or above rated frame as shown.
- 1) Safety sensor devices are not to be utilized for opening sensors (opening actuation by wall mounted push plates or separate infrared presence sensor as scheduled).
 - 2) Sensor devices are to be active infrared presence/safety sensor. The function of device is to protect the door from closing on a person or object that is standing in the swing-area detection zone. The device is to prevent a closed door from opening if a person or object is standing in the swing area zone. Devices are to prevent a door from closing on a person or object that is standing in the swing area zone while in the fully open position.
 - 3) On double door/simultaneous pair openings with door leafs larger than 44 inches, provide two OA-603BL devices at each door leaf to provide minimum protection under ANSI 156.10.
 - 4) Provide additional lockout module devices as required as some of the newer auto operator device manufacturers have a built in lockout (provide a fully functional system to meet design intent). Lockout module is typically determined by the door controller/control box).

5) Safety sensor devices to be installed as shown:



7. Relays, timer, and logic modules devices:

- a. At all auto door operators locations, provide BEA device # BR3 relay, timer, and logic modules (required for interface to indicated security components; and shall be assembled, connected, and fully contained within the power supply enclosure).

D. Push Plates and Touch-Activated Automatic Door Controls:

1. Provide Automatic Operators devices with external Actuators. Card readers also to be utilized at exterior doors where indicated in drawings and as scheduled. Push-and-Go type features are not acceptable.
2. Acceptable Manufacturers: Wikk Industries, Inc., Greendale, WI, 877-421-9490, or accepted equal.
3. Products:
 - a. Bar Actuator: Wikk Touch-Activated "INGRESS'R" device as scheduled, or accepted equal.
4. Where Hardware Groups/Sets have different information, refer to the following specifications for clarification and detailed requirements:
 - a. Provide all touch-activated automatic door controls in Type 304 stainless steel finishes with international symbol of accessibility and lettering "push to open" engraved and applied in permanent blue enamel.
 - b. Mounting: flush-type compatible with touch-activated automatic door controls. Provide complete installation brackets or adapters for automatic operator actuators to suit application.
 - c. Provide weather resistant devices with no gaps for water or ice to penetrate.
 - d. Micro-Switch to be single-pole, double-throw, dry-contact, momentary-action micro-switch.

2.3 POWER SUPPLIES

- A. Where Hardware Groups/Sets have different information (number of wires and missing power supply devices and information), refer to the following for clarification and submit according to complete and intended electrified system.
 - 1. Coordinate use of power supplies with door and frame locations. Provide power supplies, relays and battery backup units as part of the overall system in accordance with the manufacturer's warranty and system requirements.
 - 2. Output shall be filtered and regulated. Relay, timer, and logic modules shall be provided as required for interface to indicated security components; and shall be assembled, connected, and fully contained within the power supply enclosure.
 - 3. Provide required connections to fire alarm/life safety system and for remote site activation of all electrified components and functions.

2.4 ELECTRONIC KEYSWITCH DEVICES:

- A. Acceptable Manufacturers:
 - 1. Locknetics/Schlage as scheduled
 - 2. Securitron.
 - 3. SDC.
 - 4. Camden Door Controls.

2.5 FASTENINGS

- A. Fastenings shall match hardware material and finish.
- B. Use screws, bolts, washers, grommets, nuts, and other fastening devices of appropriate size, length, type, head, metal and finish as necessary for proper match and application of hardware. Use machine screws and tamping shields for attaching hardware to concrete or masonry.
- C. Provide nonferrous or corrosion-resistant steel fasteners exposed to weather.

2.6 FINISHES

- A. BHMA Finish Codes:
 - 1. BHMA 626 – Satin chromium plated brass or bronze.
 - 2. BHMA 628 – Satin or dull aluminum, clear anodized (uncoated).
 - 3. BHMA 630 – Satin stainless steel.
 - 4. BHMA 652 – Satin or dull chromium plated steel.
 - 5. BHMA 689 – Sprayed aluminum paint finish.
- B. Finishes: Unless otherwise specified, finishes shall be as follows:
 - 1. Exposed items, unless otherwise specified or scheduled: satin stainless steel 630 (US32D). Satin chrome 626 (US26D).
 - 2. Thresholds: Mill finish.
 - 3. Closers: Factory-painted finish shall match adjacent hardware finish, unless specified or scheduled otherwise.

PART 3 EXECUTION

3.1 EXAMINATION

- A. The operator installer shall examine the areas and conditions under which the automatic operators are to be installed, and notify the Architect in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until satisfactory conditions have been corrected.
- B. Measurements: Verify all dimensions by taking field measurements before any material is fabricated and shipped to the job site.

3.2 INSTALLATION

- A. Install all devices in accordance with manufacturer's printed instructions and approved shop drawings. Install all devices level and plumb.
- B. Projecting Items: Install or re-install wrappings furnished by the manufacturer.
- C. Coordinate operator installation with electrical connection requirements.
- D. Sealants: Furnish and install all sealants indicated or required to complete installation per Division 7.
- E. Install equipment per current ANSI/BHMA A156.19 American National Standard for Power Assist and Low Energy Power Operated Doors and as directed by American Association of Automatic Door Manufacturers (AAADM) recommendations.
- F. Push plates and touch-activated automatic door controls:
 - 1. Install touch-activated automatic door controls at mounting height 3 inches above finished floor or as indicated on the Drawings.
 - 2. Mount touch-activated automatic door controls securely in place to supports with fasteners supplied by manufacturer.

3.3 TESTING, ADJUSTING AND INSPECTION

- A. Repair or replace installations which do not perform according to manufacturer's printed instructions and approved shop drawings.
- B. Adjust parts for smooth, uniform operation. Lubricate moving parts with manufacturer recommended lubricant. Replace units that cannot be adjusted and lubricated to operate freely and smoothly as intended for the application.
- C. Adjust door closer devices (inner unit within Auto Operator devices):
 - 1. Adjust closer operating effort to conform to CBC.
 - a. Interior and Exterior Doors: Not to exceed 5.0 pounds force.
 - b. When fire doors are required, the maximum effort to operate the door may be increased to the minimum allowed by the appropriate administrative authority, not to exceed 15 pounds opening force.
 - 2. Adjust closer delay and operating speeds to comply with requirements of CBC Section 11B-404.2.8 and the Americans with Disabilities Act Architectural Guidelines, Article 4.13.10.

- a. Door closers shall be adjusted so that from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.

3.4 CLEANING

- A. After repeated operation of completed installation, readjust door operators and controls for smooth, quiet and optimum operating condition and safety. Clean surfaces promptly after installation. Provide protective treatment and other precautions required through the remainder of the construction period to ensure that automatic operators will be without damage or deterioration.
- B. Defective Work: Remove and replace any defective work that cannot be properly repaired, cleaned or touched up.
- C. Just prior to final acceptance of building or as directed, remove protective paper coverings and clean and polish hardware.

3.5 HARDWARE GROUP/SETS

A. Manufacturer Abbreviations:

Manufacturer	Abbreviation
Locknetics Manufacturing	LO
Wikk Manufacturing	WI
Horton Manufacturing	HO
Optex	OP

B. Hardware Columns - Example (Legend):

<u>Qty.</u>	<u>Device Description</u>	<u>Device Part #</u>	<u>Finish</u>	<u>Manufacturer</u>
1	-----	-----	--	--

- C. The following hardware sets are intended to establish type and standard of quality when used together with the requirements of this Section (see above Section and related Sections including Division 01).
 1. Examine Contract Documents and furnish proper hardware for door openings.
 2. Refer to Door Schedule on the Drawings for Hardware Group/Set assignments for each opening.
 3. Blank space below and after a Group/Set is intentional to avoid, if possible, splitting a Hardware Group/Set onto two pages.

Hardware Group/Set #01

In addition to the devices specified in hardware group/set below, coordinate hardware within Section 08 71 00 "Door Hardware" for complete installation of the opening/door.				
1	Ea.	Overhead, Surface Low Energy Operator at left hand reverse (LHR) door only	Push-side, single acting, non-hold open applications device #4000LE x 689 finish	HO
1	Ea.	Offset or Special Application Arm	Furnish and install Operator arm(s) as required for door and frame application	HO
1	Ea.	Surface Mounted, Operator Installation / Mounting Plates	Furnish and install Operator Installation / Mounting devices as required for door and frame application (length 33" to 98" or as required)	HO
1	Ea.	Single Gang Elec. Keyswitch	653-14 DPDT maintained single direction x SF-626 by Locknetics or approved equal. - Keyed on/off switch to drop power to electric latch retraction and auto operator to closing and fail-securing doors in emergency or after business hours to secure doors. - Coordinate with security or electrical design for card reader locations and wire/connectivity scope (see Divisions 25-28 and applicable drawings).	LO
2	Ea.	Surface Mount Bollard x Push-Plate/Actuator	Furnish & install Bollard RT1 14"x3.5"x48" Tall, x 7ga. Formed 304 Satin Stainless Steel US32D (630), Removable bollard for concealed sleeve (CS) and base plate with 7" bolts for mounting, 2 Preps for Card reader and Ingress'r model #136-5 devices (hardwired, stainless steel with blue wheelchair logo and added text "PUSH TO OPEN" ADA switch x Welded flat top x smooth welded raindrip for Card Reader	
1	Ea.	Safety Sensors	OPTEX Pro-Swing Premier #OA-603BL x required relays x installation brackets	
1	Ea.	Relay Device (or submit approved relay by auto operator vendor)	Provide BEA BR3, 10-BR3 or approved equal relay device: operator vendor/installer to interface all inputs and outputs on the power supply (interfaces to all applicable devices)	
1	Ea.	Various inputs & outputs interface task (required connectivity & required wires/devices per manufacturers recommendations)	Operator vendor/installer to interface all inputs & outputs (including but not limited to power supplies & BR3-type devices to all other inputs & output devices)	
—	Ea.	Door Position Switch (also known as Alarm Contact , Door Contact or DPS devices)	By security or electrical as required per Contract Documents: - Furnish and install DPS devices only if device is specified by security or electrical (non-08 71 00). - If specified, coordinate door & frame preparation/templates for DPS devices ordered & installed by others (see Divisions 25-28 and applicable drawings). - Quantity: For pair doors provide two DPS devices and single doors provide one device.	
2	Ea.	Request-to-Exit Sensor (see free egress note in above specifications)	Device/parts specified in Section 08 71 00 "Door Hardware" locking devices: Coordinate Request-to-Exit Sensor devices with security or electrical per Contract Documents (divisions 25-28 &	

			applicable drawings).
1 or 2	Ea.	Coordinate with security or electrical design for card reader or remote entry locations and additional non-08 71 00 scope (including but not limited to wire / connectivity from ground or ceiling through frame to electrified hardware)	<p>By security or electrical as required per Contract Documents:</p> <ul style="list-style-type: none"> - Furnish and install card reader or access control devices only if devices are specified by security or electrical (non-08 71 00). - If specified, coordinate door & frame preparation/templates for devices ordered & installed by others (see Divisions 25-28 and applicable drawings). - The electrified hardware specified above can be utilized for #1) non-card reader, remote access control applications (unlocked / locked remotely for open during business hours / locked after-hours) and #2) local card readers at specific openings. 08 71 00 scope does not include card readers locations. - Coordinate with security or electrical design for card reader locations and wire/connectivity scope (examples: see Divisions 25-28 and applicable drawings).
NOTE: Furnish all devices & components for hardware groups/set above in accordance with Contract Documents (including but not limited to additional hardware devices requirements in the above specification language, architectural plans & full specification documents).			

END OF SECTION

SECTION 08 71 63
DETENTION DOOR HARDWARE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Hardware for Security Doors.
- B. Gasketing.
- C. Accessories.

1.2 RELATED SECTIONS

- A. Section 08 34 63 – Detention Doors and Frames.
- B. Section 08 71 00 – Door Hardware (Non-Security).
- C. Section 11 19 00 – Detention Equipment Contractor.
- D. Section 11 19 23 – Detention Fasteners.
- E. Divisions 26-28 – Electrical: Power Requirements.

1.3 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Submit product data identifying each item, installation instructions and general recommendations for proprietary products as required, including hinges, lock mounts, closures, knob pulls, door position indicator switches, lock mount covers, bolt keepers, wall bumpers, weather-stripping, dead bolts, thresholds, escutcheons, door holders and door silencers.
- C. Submit complete shop drawings, including large-scale details; indicate anchorage, accessory items and required electrical junction boxes, conduit and wiring locations and connections. Failure to submit complete drawings will result in resubmittal.
 - 1. Hardware and Keying Schedules: Submit each schedule type; indicate products by name and number for each separate opening. Reference to Architect's Hardware Schedule Groups.
- D. Submit samples under provisions of Division 01.
- E. Samples shall be furnished only upon request of Architect and prior to submittal of the last draft of the hardware schedule and prior to delivery of hardware; if requested, submit one sample of each hardware product, finished as required and tagged with full description for coordination with hardware schedule. Samples will be returned to supplier.
- F. Templates and Samples of Fabrication: Forward blueprint templates for each type of detention equipment hardware required to fabricators of work in Section 08 34 63, Detention Doors and Frames, within two weeks following final review of hardware and keying schedules. Provide three sets of hardware items to each fabricator. Hardware items are to be actual stock of material to be used on this project and may be used in the final installation if undamaged.

1.4 OPERATION AND MAINTENANCE MANUALS

- A. Submit operation/maintenance data in accordance with Division 01.
- B. Include special tools and operating equipment necessary for maintenance and repair of hardware.

1.5 QUALIFICATIONS

- A. Detention equipment suppliers not listed shall be pre-qualified by Owner and provide the following information:
 - 1. List the last five jobs completed along with Owner's and Contractor's names.
 - 2. Show proof of completed schedule on past jobs.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Door Closer: LCN Closer (no substitutions).
- B. Door Thresholds: Pemko, Reese.
- C. Weather-stripping, Smoke Seals: Pemko, Reese.
- D. Security Hardware Products:

Locks:

Southern Steel Model #'s as shown in schedule.

Hinges:

Southern Steel Cast Institutional Mortise Hinge with Stud 204FMSS

Door Position Switch/Closer (DPS): LCN 2215 DPS

Door Position Switch: Southern 200MRS

Pulls:

Raised Pull: Southern 212C
Flush Pull: Southern 214S

Door Stop: Southern 420 Floor Stop

Kickplates Trimco KOO50 x height as noted. At all kickplate locations provide four beveled edges and provide countersunk screws with factory preparation for a flush surface when screws are installed.

2.2 KEYS, CYLINDER AND KEY CONTROL

- A. Locks: Provide types and functions as scheduled; keyed on one or both sides as scheduled.
- B. Keys:
 - 1. Size bow dimensions as manufactured by ASSA Abloy.

2. Fabricate keys out of heat treated alloy bronze having a tensile strength of not less than 90,000 pounds and a hardness of the Brinell scale of at least 170.
3. Furnish ten mogul keys per each combination.
4. Stamp each key with number or letter as directed by Owner.

C. Keys Furnished:

1. Individual keying master and grand master keying of all security type cylinders shall be only as directed by Owner. It is required that a minimum of two meetings be arranged with Owner and Detention Equipment contractor to lay out the required keying system. A complete keying schedule shall be submitted for Owner's review and approval after this meeting and a minimum of eight weeks prior to keying operations.
2. Furnish six master keys for each individual master key set established.
3. The detention equipment manufacturer shall deliver keys for security locks directly to Owner. The person designated by Owner shall receive, acknowledge receipt and provide for guarded use of these keys during construction to ensure key integrity and security.

D. Pulls: Provide integral recessed flush pulls at inmate side of holding/cell/sleeping room doors unless noted otherwise.

E. Hinges/Butts:

1. Attach hinges to doors and door frames with specified countersunk flat security-head stainless steel metal screws.

F. Other Products: Provide detention equipment hardware products not specifically mentioned but necessary to complete work, matching in quality and finish those products specified.

G. Hardware Finish: Standard 626/US26D and 630/US32D. LCN door closers shall be 689 Aluminum Finish.

H. Electro Bolt Lock for swinging doors:

1. Appearance: System shall have a normal appearance when installed so that there are no cover boxes over the doors, no visible locking pilasters for mechanisms above or beside door jams, and no special "lock pockets" or embedded items around door frames for housing mechanisms, keyed locks or releases. Door shall have lock knobs and hinges as specified, be contained in a normal-appearing mechanism and shall be concealed when door is closed.
2. Electric Operation:
 - a. Under electric operation, it shall be possible to:
 - 1) Unlock the door by means of a push button switch located on the control panel. After being electrically unlocked, door shall automatically relock and deadlock when moved to the closed position.
 - b. In case of electrical failure, the lock shall fail in the locked position (secure).
 - c. Detail drawings of panel arrangement showing location of indicator lights, electric switches, manual release and other controls for each door are shown on Drawings and specified in Division 28.
 - d. Electrical Requirements:
 - 1) Lock supplier to verify and/or coordinate electrical requirements.

- 2) All electrical locks are to carry a UL label.
3. Contractor Responsibilities:
 - a. Detention Equipment Contractor shall provide and coordinate all doors, door frames, detention hardware, manual controls and factory-wired electrical units for each door and factory-wired door control panel, including relays, switches and indicator lamps. Detention Equipment Contractor shall also provide necessary raceways for manual controls from control panel to each swinging door operated therefrom.
 - b. Electrical Contractor shall furnish, install and connect to factory-wired terminal blocks all wiring from sources of supply to control panels and wires from control panels to electrical unit at each door. This shall include conduits and all other electrical units at each door, as well as conduits and other electrical equipment incident to power supply.
 - c. Electrical Requirements:
 - 1) Locks to require 24 VDC low voltage power.
 - 2) Sliders to require 115 VAC power.
 - 3) All electrical locks are to carry a UL label.
4. Contractor Responsibilities:
 - a. Detention Equipment Contractor shall provide and coordinate all doors, door frames, detention hardware, manual controls and factory-wired electrical units for each door and factory-wired door control panel, including relays, switches and indicator lamps. Detention Equipment Contractor shall also provide necessary raceways for manual controls from control panel to each swinging door operated therefrom.
 - b. Electrical Contractor shall furnish, install and connect to factory-wired molex connectors pigtails all wiring from sources of supply to control panels and wires from control panels to electrical unit at each door. This shall include conduits and all other electrical units at each door, as well as conduits and other electrical equipment incidental to lock operation and monitoring of door position if required.

2.3 EXTRA STOCK/SPARE PARTS

- A. Provide spare parts for each type of hardware listed in the hardware schedule as follows:
 1. Provide eight each type 10120 locksets (four right hand and four left hand).
 2. Provide two each type 10300 locksets (one right hand and one left hand).
 3. Provide four each 200MRS DPS.
- B. The Detention Equipment Contractor is responsible for making a full accounting of all hardware extra stock.

2.4 ADDITIONAL REQUIREMENTS

- A. With each hardware product, provide suitable recommended plated steel, countersunk, flat, security Torx screws. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

2.5 UNSCHEDULED HARDWARE

A. Rubber Door Silencers:

1. Provide rubber door silencer for each door opening in detention metal frame assemblies that are to be provided with a swing-type door.
2. Three required for each opening where swing-type door is to be installed and four required for each opening where pair of swing-type doors are to be installed.

2.6 DETENTION DOOR HARDWARE

A. Products of certain manufacturers have been used in the preparation of the Detention Hardware and Door Operating Device Schedule. The use of a manufacturer's name or product model is not intended to prohibit use of equal products of other manufacturers, but is intended to establish a standard of quality. See Division 01 for substitutions and product options.

B. General Hardware Requirements:

1. Butts: Full Mortise Institutional Hinge, US32D/630 finish.
 - a. Size: 4-1/2" wide x 4-1/2" high x 3/16" thick leaves.
 - b. Quantity: Four butts for any door more than 85" high or 38" wide; three butts minimum for any door.
2. Stops: Floor or Wall mounted as required at all swing doors. Where exterior doors open out, provide back checks.
3. Thresholds: As listed in schedule.
4. Weather-stripping: Provide for all exterior doors, and all fire-rated doors.
5. Locks: Provide locks complete with strike and keeper. At exterior doors, provide cylinder shields for paracentric Locks. Paracentric Locks shall be supplied with appropriate mounting plates and escutcheons as required. Electric locks to be "fail secure." Raised and Flush Pulls: As listed in schedule.
6. Closer: Full rack and pinion hydraulic closer with adjustable spring; fully concealed. Provide at doors indicated. Manufacturer LCN as indicated in schedule.
7. Door Position Indicator (DPI): As listed in schedule. Install in head of doors.
8. All hardware to be US26D or US32D, unless noted otherwise.
9. Anchor items with security or tamperproof screws. Provide protective cover for all exposed exterior locations.
10. All fire-rated door frame assemblies require smoke seals / weather-stripping around all three sides of the frame.
11. All exposed exterior hardware related items shall be Stainless Steel.

PART 3 EXECUTION

3.1 INSTALLATION PREPARATION

A. Inspection:

1. Examine and inspect all surfaces, anchors and grounds that are to receive material, fixtures, assemblies and equipment specified herein. Report all unsatisfactory conditions.
2. Check location, "roughing-in" and field dimensions prior to beginning work.

3. Do not begin installation until all unsatisfactory conditions have been corrected.
4. Proceeding with installation will be construed as evidence of acceptance of conditions under which work will be done.

B. Protecting: Installer shall advise Contractor of required procedures for surveillance and protection of completed work. Advice shall extend through period of installation of other work near detention equipment work, and also through remainder of construction period for the purpose of ensuring that detention equipment will not be damaged.

3.2 INSTALLATION

- A. Comply with Section 11 19 00 requirements.
- B. Ship prepaid to door/frame manufacturer for factory installation the detention equipment hardware required for all types of detention equipment prison metal frame assemblies; deliver all other detention equipment hardware products to project site.

3.3 FIELD QUALITY CONTROL

- A. Detention equipment hardware manufacturer's representative is to inspect and approve work, in writing, after installation.

3.4 HARDWARE SCHEDULE: Refer to Drawings for keying access.

DH-1

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 10120AM x K1 x 24VDC	US32D
1 ea.	Food Pass Latch	SOUTHERN 1017AM	US32D
1 Pair	Food Pass Hinge	SOUTHERN 203FP	Primed
1 ea.	DPS	SOUTHERN 200 MRS	US32D
1 ea.	Raised Pull	SOUTHERN 212C	US32D
1 ea.	Flush Pull	SOUTHERN 214S	US32D
1 ea.	Floor Stop	SOUTHERN 420	-----

DH-2

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 10120AM x K1 x 24VDC	US32D
2 ea.	Food Pass Latch	SOUTHERN 1017AM	US32D
4 ea.	Food Pass Hinge	SOUTHERN 203FP	Primed
1 ea.	DPS	SOUTHERN 200 MRS	US32D
1 ea.	Raised Pull	SOUTHERN 212C	US32D
1 ea.	Flush Pull	SOUTHERN 214S	US32D
1 ea.	Floor Stop	SOUTHERN 420	-----

Note: Cuff and Angle Ports.

DH-3

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 1051M x K2 x KCE x 24VDC	US32D
1 ea.	Closer/DPS	LCN 2215 W/DPS	ALUM
2 ea.	Raised Pull	SOUTHERN 212C	US32D
1 ea.	Floor Stop	SOUTHERN 420	-----
2 ea.	Kickplates	TRIMCO K0050 x 24" H x Security Fasteners	630
1 ea.	Smoke Seal	PEMKO S88D	-----

Note: Provide two pair hinges at all doors over 38 inches wide.

DH-4

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 1051M x K2 x KCE x 24VDC	US32D
1 ea.	Closer/DPS	LCN 2215 W/DPS	ALUM
2 ea.	Raised Pull	SOUTHERN 212C	US32D
1 ea.	Floor Stop	SOUTHERN 420	-----
2 ea.	Kickplate	TRIMCO K0050 x 24" H x Security Fasteners	630
1 ea.	Threshold	PEMKO 2727A	ALUM
1 ea.	Door Bottom	PEMKO 210APK	ALUM
1 ea.	Weatherstrip	PEMKO S88D	-----

Note: Provide two pair hinges at all doors over 38 inches wide.

DH-5

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 1051M x K1 x KCE x 24VDC	US32D
1 ea.	Closer/DPS	LCN 2215 W/DPS	ALUM
1 ea.	Raised Pull	SOUTHERN 212C	US32D
1 ea.	Flush Pull	SOUTHERN 214S	US32D
1 ea.	Threshold	PEMKO 2727A	ALUM
1 ea.	Door Bottom	PEMKO 210APK	ALUM
1 ea.	Seal	PEMKO S88D	-----
1 ea.	Floor Stop	SOUTHERN 420	-----

Note: Omit floor stop at doors on exterior stair grate/landing.

DH-6

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 1051M x K1 x 24VDC	US32D
1 ea.	DPS	SOUTHERN 200 MRS	US32D
1 ea.	Raised Pull	SOUTHERN 212C	US32D
1 ea.	Flush Pull	SOUTHERN 214S	US32D
1 ea.	Floor Stop	SOUTHERN 420	-----
2 ea.	Kickplate	TRIMCO K0050 x 16" H	630

DH-7

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 10120 x K2 x 24VDC	US32D
1 ea.	Closer/DPS	LCN 2215 W/DPS	ALUM
1 ea.	Floor Stop	SOUTHERN 420	-----
2 ea.	Kickplate	TRIMCO K0050 x 16" H	630
1 ea.	Threshold	PEMKO 2727A	ALUM
1 ea.	Door Bottom	PEMKO 210APK	ALUM

Note: Provide two pair hinges at all doors over 38 inches wide

DH-8

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 10507	US32D
1 ea.	Floor Stop	SOUTHERN 420	----
2 ea.	Kickplate	TRIMCO K0050 x 24" H	630

DH-9

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 10507	US32D
1 ea.	Closer/DPS	LCN 2215 W/DPS	ALUM
1 ea.	Floor Stop	SOUTHERN 420	----
2 ea.	Kickplate	TRIMCO K0050 x 24" H	630
1 ea.	Smoke Seal	PEMCO S88D	----

Note 1: Provide two pair hinges at all doors over 38 inches wide.

Note 2: Provide DPS function where shown on Security Electronics Drawings as monitored.

DH-10

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 10300M x K2 x KCE x 24VDC	US32D
1 ea.	Closer/DPS	LCN 2215 W/DPS	ALUM
1 ea.	Raised Pull	SOUTHERN 212C	US32D
1 ea.	Flush Pull	SOUTHERN 214S	US32D
2 ea.	Kickplates	TRIMCO K0050 x 24" H	630
1 ea.	Smoke Seal	PEMCO S88D	----

DH-11

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 10515 W/ Thumbturn Occupied Indicator	US32D
1 ea.	Closer/DPS	LCN 2215 W/DPS	ALUM
2 ea.	Kickplate	TRIMCO K0050 x 16" H	630
1 ea.	Smoke Seal	PEMCO S88D	----
1 ea.	Threshold	PEMCO 2727A	ALUM
1 ea.	Floor Stop	SOUTHERN 420	----

Note 1: Provide two pair hinges at all doors over 38 inches wide.

Note 2: Provide DPS function where shown on Security Electronics Drawings as monitored.

DH-12

1 ea.	Sliding Device	SOUTHERN 3165LX.BPKM-2 x 115VAC COMPLETE SYSTEM WITH SKIRT, HIP HIGH RELEASE, AND KEY SWITCH	Primed
1 ea.	Raised Pull	SOUTHERN 212C	US32D
1 ea.	Flush Pull	SOUTHERN 214S	US32D

DH-13

1-1/2 Pair	Hinges	SOUTHERN 204FMSS	US32D
1 ea.	Lockset	SOUTHERN 10536	US32D
1 ea.	Closer/DPS	LCN 2215 W/DPS	ALUM
2 ea.	Kickplate	TRIMCO K0050 x 16" H	630
1 ea.	Floor Stop	SOUTHERN 420	----
1 ea.	Smoke Seal	PEMCO S88D	----

DH-14

1-1/2 Pair Hinges
1 ea. Lockset
2 ea. Kickplates
1 ea. Floor Stop

SOUTHERN 204FMSS
SOUTHERN 10505
TRIMCO K0050 x 16" H
SOUTHERN 420

US32D
US32D
630

END OF SECTION

SECTION 08 81 00

GLASS GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Glass and glazing for windows and doors.

1.2 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants: Sealant and back-up material.
- B. Section 08 11 13 – Hollow Metal Doors and Frames: Glazed doors.
- C. Section 08 14 00 – Wood Doors: Glazed doors.
- D. Section 08 41 13 – Aluminum Framed Entrances and Storefronts.
- E. Section 08 44 13 – Glazed Aluminum Curtain Walls.
- F. Section 08 88 13 – Fire Rated Glazing.
- G. Section 08 88 53 – Security Glazing.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. American National Standards Institute (ANSI) – ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings.
 - 2. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 - 3. ASTM C1036 – Standard Specification for Flat Glass.
 - 4. ASTM C1048 – Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.
 - 5. ASTM C1172 – Standard Specification for Laminated Architectural Flat Glass.
 - 6. ASTM C1376 – Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.
 - 7. ASTM E546 – Standard Test Method for Frost Point of Sealed Insulating Glass Units.
 - 8. ASTM E576 – Standard Test Method for Frost Point of Sealed Insulating Glass Units in the Vertical Position.
 - 9. ASTM E1300 – Standard Practice for Determining Load Resistance of Glass in Buildings.

10. ASTM E2190 – Standard Specification for Insulating Glass Unit Performance and Evaluation.
11. Consumer Product Safety Commission (CPSC) – CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials.
12. GANA Glazing Manual.
13. GANA Sealant Manual.
14. NFRC 100 – Procedure for Determining Fenestration Product U-Factors.
15. NFRC 200 – Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
16. NFRC 300 – Standard Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.
17. SGCC – Safety Glazing Certification Council – Certified Products Directory.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, and special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, and special handling or installation requirements. Identify available colors.
- D. Submit documentation indicating that all tempered and laminated glazing to be installed on this project is certified by the Safety Glazing Certification Council.
- E. Samples:
 1. Glass: Submit two samples, 12 inches x 12 inches in size, illustrating each type of glazing.
 2. Glazing Sealant: Submit 3 inch long bead of glazing sealant, color as selected by Architect.

1.5 PERFORMANCE / DESIGN CRITERIA

- A. Glass Strength: Analysis shall comply with ASTM E1300, Determining Load Resistance of Glass in Buildings. Provide glass products in the thickness and strengths (annealed or heat treated) required to meet or exceed the following criteria based on project loads and in-service conditions.
 1. Minimum thickness of annealed or heat-treated glass products to be selected so the worst case probability of failure does not exceed the following:
 - a. Eight breaks per thousand for glass installed vertically or not fifteen degrees or more from the vertical plane and under wind action.
 - b. One break per thousand for glass installed fifteen degrees or more from the vertical plane and under action of wind and/or snow.
 2. Deflection must be limited to prevent disengagement from the frame and be less than or equal to 1 inch.

B. Thermal and Optical Performance: Provide glass products with performance properties specified in this Section. Performance properties shall be manufacturer's published data as determined according to the following procedures:

1. Center of glass U-Value: NFRC 100 methodology using LBNL WINDOW 5.2 computer program.
2. Center of glass solar heat gain coefficient: NFRC 200 methodology using LBNL-35298 WINDOW 5.2 computer program.
3. Solar optical properties: NFRC 300.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual, FGMA Sealant Manual for glazing installation methods.
- B. Installer's Qualifications: The installation shall be performed only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics that specialize in glazing and glass installation.
- C. Safety glazing shall meet the requirements of 2013 CBC Section 2406 and shall be identified in accordance with 2013 CBC Sections 2403.1 and 2406.3, with identification etched in glass.

1.7 JOB AND ENVIRONMENTAL CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 48 hours after installation of glazing compounds.

1.8 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop Drawings.

1.9 COORDINATION

- A. Coordinate Work with glazing frames, wall openings, and adjacent Work.

1.10 WARRANTY

- A. Provide five year limited warranty from date of manufacture for insulating units that are glazed in accordance with manufacturer's glazing instructions.
- B. Provide five year limited warranty for opaque, spandrel, and laminated glass.

PART 2 PRODUCTS

2.1 GENERAL

- A. All glass shall be graded and meet requirements of ASTM C1036 and ASTM C1048, Type 1, quality q3. Each light of glass delivered and installed shall have affixed thereto the manufacturer's grade label.
- B. All Low-E coated glass shall have a permanent marking affixed at the spacer identifying the coated surface.

- C. Glazing material installed in Hazardous Locations, subject to human impact, shall be certified and permanently labeled as meeting applicable requirements referenced in NFPA 80.

1. CPSC 16 CFR 1201, Category I and II.

2.2 GLASS TYPES

A. Type G-1: Low-E Insulating Glass:

1. Acceptable Manufacturers:
 - a. PPG Industries. Product: Solarban 70XL (2) on Azuria.
 - b. Oldcastle Glass.
 - c. Viracon.
 - d. Guardian.
 - e. Substitutions: Under provisions of Division 01.
2. Material: 1 inch thick hermetically sealed assembly consisting of 1/4 inch thick Low-E Azuria tempered glass on the outboard surface (coating on the #2 surface), 1/2 inch air space and 1/4 inch thick clear tempered glass on the inboard surface with a Winter Nighttime U-value of 0.28 or less, Solar Heat Gain Coefficient (SHGC) of 0.25 or less, and Visible Light Transmittance of 52 percent.

B. Type G-2: Low-E Insulating Obscure Glass:

1. Acceptable Manufacturers:
 - a. PPG Industries. Product: Solarban 70XL (2) on Azuria.
 - b. Oldcastle Glass.
 - c. Viracon.
 - d. Guardian.
 - e. Substitutions: Under provisions of Division 01.
2. Material: 1 inch thick hermetically sealed assembly consisting of 1/4 inch thick Low-E Azuria tempered glass on the outboard surface (coating on the #2 surface), 1/2 inch air space and 1/4 inch thick clear tempered glass with opaque acid etch on the #3 surface on the inboard surface.

C. Type G-3: Insulating Spandrel Glass:

1. Acceptable Manufacturers:
 - a. PPG Industries. Product: Solarban 70XL (2) on Azuria.
 - b. Oldcastle Glass.
 - c. Viracon.
 - d. Guardian.
 - e. Substitutions: Under provisions of Division 01.
2. Material: 1-inch hermetically sealed assembly consisting of 1/4-inch Low-E Azuria tempered glass on the outboard surface, 1/2-inch air space, and 1/4-inch clear tempered glass on the inboard surface with ceramic coating (frit) on the #3 surface. Frit color: white.

D. Type G-4: Obscure Laminated Glass:

1. Acceptable Manufacturers:
 - a. PPG Industries.
 - b. Oldcastle Glass.
 - c. Viracon.
 - d. Guardian.
 - e. Substitutions: Under provisions of Division 01.
2. Material: 9/16 inch thick clear laminated architectural glass produced by bonding a 0.060 inch thick Saflex PVB white interlayer between one pane of 1/4 inch thick clear glass and one pane of 1/4 inch thick clear tempered glass under heat and pressure.

E. Type G-5: Float Glass:

1. Acceptable Manufacturers:
 - a. PPG Industries.
 - b. Oldcastle Glass.
 - c. Viracon.
 - d. Guardian.
 - e. Substitutions: Under provisions of Division 01.
2. Material: 1/2 inch thick clear tempered glass.

F. Type G-6: Fire rated glass, refer to Section 08 88 13.

G. Type G-7: Float Glass:

1. Acceptable Manufacturers:
 - a. PPG Industries.
 - b. Oldcastle Glass.
 - c. Viracon.
 - d. Guardian.
 - e. Substitutions: Under provisions of Division 01.
2. Material: 1/4 inch thick clear tempered glass.

2.3 GLAZING SEALANT

- A. Glazing Sealants: ASTM C920, Type S, Grade NS, Uses "G" and "A". Dow Corning 795, Tremco "Proglaze" or GE Silicone Sealants; Tremco "Mono" acrylic sealant or accepted equal. All sealants shall be compatible with the type of glazing and window frame to which they are applied.

2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Neoprene EPDM blocks with a Shore A durometer hardness of 85, ± 5 percent, chemically compatible with sealant used.
- B. Spacer Shims: Neoprene, 50-60 Shore A durometer hardness, minimum 3 inches long by one half the height of the glazing stop by thickness to suit application.

- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10-15 Shore A durometer hardness; coiled on release paper; black color; Tremco No. 440 tape.
- D. Glazing Splines: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot; black color.
- E. Miscellaneous: Furnish all primers-sealers, setting blocks, shims, spacers, compression seals, etc., as required for a first class workmanlike job.

2.5 FABRICATION

A. Flat Glass:

- 1. Comply with ASTM C1036 Standard Specification for Flat Glass, Type 1, Class 1 (clear) or Class 2 (tinted, heat-absorbing and light reducing) and Quality q3.
- 2. ASTM C1048 Heat Treated Flat Glass, Kind HS or FT (remove ASTM Standard C1048 if annealed glass), Condition A (uncoated), B (spandrel glass, one surface coated), or C (other coated glass).
 - a. Heat Treated Flat Glass to be by horizontal (roller hearth) process with inherent rollerwave distortion parallel to the bottom edge of the glass as installed.
 - b. Maximum peak to valley rollerwave 0.003 inch in the central area and 0.008 inch within 10.5 inches of the leading and trailing edge.
 - c. Maximum bow and warp 1/32 inch per lineal foot.
 - d. All tempered architectural safety glass shall conform with ANSI Z97.1 and CPSC 16 CFR 1201.
 - e. For all fully tempered glass, provide heat soak testing conforming to EN14179 which includes a two hour dwell at 290 degrees C, ± 10 degrees C.

B. Insulating Glass:

- 1. Comply with ASTM E2190 Standard Specification for Insulating Glass Unit Performance and Evaluation.
 - a. Units shall be certified for compliance by the IGCC in accordance with the above ASTM test method.
- 2. The unit overall thickness tolerance shall be -1/16 inch / +1/32 inch. Unit constructed with patterned glass shall be $\pm 1/16$ inch.
- 3. Comply with ASTM E546 Standard Test Method for Frost Point of Sealed Insulating Glass Units.
- 4. Comply with ASTM E576 Standard Test Method for Frost Point of Sealed Insulating Glass Units in the Vertical Position.
- 5. Sealed Insulating Glass Units to be double sealed with a primary seal of polyisobutylene and a secondary seal of silicone.
 - a. The minimum thickness of the secondary seal shall be 1/16 inch.
 - b. The target width of the primary seal shall be 5/32 inch.
 - c. There shall be no voids or skips in the primary seal.
 - d. Up to a maximum of 3/32 inch of the airspace may be visible above the primary polyisobutylene sealant.

- e. Gaps or skips between primary and secondary sealant are permitted to a maximum width of 1/16 inch by maximum length of 2 inches with gaps separated by at least 18 inches. Continuous contact between the primary seal and the secondary seal is desired.
 6. Provide a hermetically sealed and dehydrated space. Lites shall be separated by an aluminum spacer with three bent corners and one keyed-soldered corner or four bent corners and one straight butyl injected zinc plated steel straight key joint.
- C. Coated Vision Glass:
1. Comply with ASTM C1376 Standard for Pyrolytic and Vacuum Deposition Coatings on Glass.
 2. Coated products shall be magnetically sputtered vacuum deposition (MSVD).
 3. Edge Deletion: When Low-E coatings are used within an insulating unit, coating shall be edge deleted to completely seal the coating within the unit.
 - a. The edge deletion should be uniform in appearance (visually straight) and remove at least 95 percent of the coating.
- D. Laminated Glass:
1. Comply with ASTM C1172 Standard Specification for Laminated Architectural Flat Glass.
 2. All laminated architectural safety glass shall conform to ANSI Z97.1 and CPSC 16 CFR 1201.
 3. Laminated glass products shall be fabricated free of foreign substances and air or glass pockets in autoclave with heat plus pressure.
- E. Ceramic Coated Glass Products:
1. Comply with ASTM C1048 Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated, Condition B.
 2. Silk-screen pattern should be no more than 0.0625 inch off parallel from locating glass edge and no more than 0.0125 inch from edges other than locating glass edge.
 3. There shall be a maximum of a 0.03125 inch variation in dot, hole or line location.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify prepared openings for adequacy to receive glass.
- B. Verify that openings for glazing are correctly sized and within tolerance.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.
- D. Report in writing any conditions that may be detrimental to the Work.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

- C. Check that glass is free of edge damage or face imperfections.

3.3 INSTALLATION

- A. General: Install glazing types at locations indicated on Drawings, according to glazing manufacturer's recommendations and as specified herein.
- B. Glass Glazing:
 - 1. Positioning Glass: Orient pattern and draw of glass pieces in same direction. Set all sheet glass so that any waves, etc. are horizontal.
 - 2. Do not cut, nip or abrade tempered glass.
 - 3. Watershed: Gunnable sealants, when applied as a cap head, shall form a bevel or watershed away from the glass. When tape is used to the sightline, it shall form a watershed when compressed. Do not undercut a sealant, compound, or tape below the sightline. Tool and finish sealant as required. Used tooling solution recommended by the sealant manufacturer.
 - 4. Positive Contact:
 - a. When applying a heel bead, lap onto the glass a minimum of 3/16 inch.
 - b. When applying a toe bead, whether continuous or a corner seal, make certain it is large enough to contact both the glass and sash. Install the sealant prior to glass placement.
 - 5. Setting blocks shall be 1/16 inch less than the full rabbet width, minimum length of 4 inches and high enough to provide the recommended minimum bite and edge clearance for the glass. Center blocks at 1/4 points unless otherwise recommended by the glass manufacturer.
 - 6. Provide spacer-shims at a maximum of 24 inches on center.
 - 7. Clearances: Observe minimum face clearances, edge clearance and glass bite as recommended by the glass and sealant manufacturers.
 - 8. Tape Installation: Do not install glazing tapes more than one day ahead of glass placement. Remove the paper backing from the tape only when the lite is ready to be installed. Do not stretch the tape to make it fit. Do not overlap the ends of the tape. Instead, butt ends together, and when corners are butted together, daub with sealant to assure a positive seal.
 - 9. Glazing tapes must be kept under proper compression.
 - 10. Glazing stops shall be installed so that stop or frame does not bear directly against glass.

3.4 CLEANING

- A. Clean work under provisions of Division 01.
- B. Remove glazing materials from finish surfaces.
- C. Remove temporary labels after work is complete.
- D. Clean glass.

3.5 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Division 01.

- B. Replacement: At completion of building construction and prior to its acceptance, all broken, cracked, excessively scratched, or otherwise imperfect glazing materials included under this Section shall be replaced with new glazing materials of the type specified, as directed by the Architect, and at no additional cost to the Owner.

END OF SECTION

SECTION 08 88 13
FIRE RATED GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire rated glass and glazing for windows and doors.

1.2 RELATED SECTIONS

- A. Section 08 11 13 – Hollow Metal Doors and Frames.
- B. Section 08 81 00 – Glass Glazing.
- C. Section 08 88 53 – Security Glazing.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. American National Standards Institute (ANSI) – ANSI Z97.1: Standard for Safety Glazing Materials Used in Buildings.
 - 2. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 - 3. ASTM C1036 – Standard Specification for Flat Glass.
 - 4. ASTM C1048 – Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.
 - 5. ASTM E2010 – Standard Test Method for Positive Pressure Fire Tests of Window Assemblies.
 - 6. ASTM E2074 – Standard Test Method for Fire Tests of Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Door Assemblies.
 - 7. Consumer Product Safety Commission (CPSC) – CPSC 16 CFR 1201: Safety Standard for Architectural Glazing Materials.
 - 8. GANA Glazing Manual.
 - 9. GANA Sealant Manual.
 - 10. NFPA 80 – Fire Doors and Windows.
 - 11. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies.
 - 12. NFPA 257 – Fire Tests of Window Assemblies.
 - 13. SGCC – Safety Glazing Certification Council – Certified Products Directory.
 - 14. UL 9 – Fire Tests of Window Assemblies.

- 15. UL 10B – Fire Tests of Door Assemblies.
- 16. UL 10C – Positive Pressure Fire Tests of Door Assemblies.
- 17. UL 263 – Fire Tests of Building Construction and Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data on Glass Types Specified: Provide structural, physical and environmental characteristics, size limitations, and special handling or installation requirements.
- C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, and special handling or installation requirements. Identify available colors.
- D. Samples:
 - 1. Glass: Submit two samples, 12 inches x 12 inches in size, illustrating each type of glazing.
 - 2. Glazing Sealant: Submit 3 inch long bead of glazing sealant, color as selected.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with GANA Glazing Manual, FGMA Sealant Manual for glazing installation methods.
- B. Installer's Qualifications: The installation shall be performed only by an installation firm normally engaged in this business. All work shall be performed by qualified mechanics that specialize in glazing and glass installation.
- C. Safety glazing shall meet the requirements of 2013 CBC Section 2406 and shall be identified in accordance with 2013 CBC Sections 2403.1 and 2406.3, with identification etched in glass.
- D. Fire Protective Rated Glass:
 - 1. Fire rated glazing shall be under current follow-up service by a nationally recognized independent testing laboratory and maintain a current listing or certification. Assemblies shall be labeled in accordance with limits of listings.
 - a. Each lite shall bear permanent, non-removable label certifying it for use in tested and rated fire protective assemblies.
 - 2. Fire Protective Glazing Products for Door Assemblies: Products identical to those tested per ASTM E2074 and UL 10B, labeled and listed by UL.

1.6 DEFINITIONS

A. Fire-Rated Glazing Assembly Identification Markings per CBC Sections 703.6 and 716.3:

Fire Test Standard	Marking	Definition of Marking
ASTM E119 or UL 263	W	Meets wall assembly criteria.
NFPA 257 or UL 9	OH	Meets fire window assembly criteria including the hose stream test.
NFPA 252 or UL 10B or UL 10C	D	Meets fire door assembly criteria
	H	Meets fire door assembly hose stream test.
	T	Meets 450 degree F temperature rise criteria for 30 minutes.
	XXX	The time in minutes of the fire resistance or fire protection rating of the glazing assembly.

1.7 JOB AND ENVIRONMENTAL CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 48 hours after installation of glazing compounds.

1.8 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop Drawings.

1.9 COORDINATION

- A. Coordinate Work with glazing frames, wall openings, and adjacent Work.

PART 2 PRODUCTS

2.1 GENERAL

- A. All glass shall be graded and meet requirements of ASTM C1036 and ASTM C1048, Type I, quality q3. Each light of glass delivered and installed shall have affixed thereto the manufacturer's grade label.
- B. Glazing material installed in Hazardous Locations, subject to human impact, shall be certified and permanently labeled as meeting applicable requirements referenced in NFPA 80.
 - 1. CPSC 16 CFR 1201, Category I and II.
 - 2. Glazing in multipurpose gymnasiums, basketball courts and similar athletic facilities in areas subject to human impact load shall meet CPSC 16 CFR 1201, Category II.

- C. Each piece of fire-rated glazing material shall be labeled with a permanent logo including name of product, manufacturer, testing laboratory, fire rating period and safety glazing standards.

2.2 GLASS TYPES

- A. Type G-6: Fire Protective Rated Glass in 45 minute assemblies:

- 1. Acceptable Manufacturers:
 - a. Safli First. Product: SuperLite II-XL 45.
 - b. Technical Glass Products (TGP).
 - c. Pilkington.
 - d. Vetrotech Saint-Gobain.
 - e. Substitutions: Under provisions of Division 01.
- 2. Material: 3/4 inch thick, 45-minute rated assembly consisting of inboard and outboard sheets of clear tempered glass with a fire resistive interlayer marked in accordance with CBC Sections 703.6 and 716.3. Product shall meet the requirements of ANSI Z97.1, CPSC 16 CFR 1201 Category I and II, and UL 10C.

2.3 GLAZING SEALANT

- A. Fire-Rated Glazing Tape: UL 10B and UL 10C compliant, high performance fire-rated glazing tape; Pemko FG3000 or accepted equal. Glazing tape shall be installed on both sides of frame at all vision lites in fire-rated doors. Tape shall be compatible with and acceptable for use with the type of glazing and window frame to which they are applied.

2.4 GLAZING ACCESSORIES

- A. Setting Blocks: Fire-Rated: Calcium silicate blocks, chemically compatible with sealant used.
- B. Spacer Shims: Neoprene, 50-60 Shore A durometer hardness, minimum 3 inches long by one half the height of the glazing stop by thickness to suit application.
- C. Glazing Tape: Preformed butyl compound with integral resilient tube spacing device; 10-15 Shore A durometer hardness; coiled on release paper; black color; Tremco No. 440 tape or accepted equal.
- D. Glazing Splines: Resilient polyvinyl chloride extruded shape to suit glazing channel retaining slot; black color.
- E. Miscellaneous: Furnish all primers-sealers, setting blocks, shims, spacers, compression seals, etc., as required for a first class workmanlike job.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify prepared openings for adequacy to receive glass.
- B. Verify that openings for glazing are correctly sized and within tolerance.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

D. Report in writing any conditions that may be detrimental to the Work.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Check that glass is free of edge damage or face imperfections.

3.3 INSTALLATION

- A. General: Install glazing types at locations indicated on Drawings, according to glazing manufacturer's recommendations and as specified herein.
- B. Glass Glazing:
 - 1. Positioning Glass: Orient pattern and draw of glass pieces in same direction. Set all sheet glass so that any waves, etc. are horizontal.
 - 2. Do not cut, nip or abrade tempered glass.
 - 3. Watershed: Gunnable sealants, when applied as a cap head, shall form a bevel or watershed away from the glass. When tape is used to the sightline, it shall form a watershed when compressed. Do not undercut a sealant, compound, or tape below the sightline. Tool and finish sealant as required. Used tooling solution recommended by the sealant manufacturer.
 - 4. Positive Contact:
 - a. When applying a heel bead, lap onto the glass a minimum of 3/16 inch.
 - b. When applying a toe bead, whether continuous or a corner seal, make certain it is large enough to contact both the glass and sash. Install the sealant prior to glass placement.
 - 5. Setting blocks shall be 1/16 inch less than the full rabbet width, minimum length of 4 inches and high enough to provide the recommended minimum bite and edge clearance for the glass. Center blocks at 1/4 points unless otherwise recommended by the glass manufacturer.
 - 6. Provide spacer-shims at a maximum of 24 inches on center.
 - 7. Clearances: Observe minimum face clearances, edge clearance and glass bite as recommended by the glass and sealant manufacturers.
 - 8. Tape Installation: Do not install glazing tapes more than one day ahead of glass placement. Remove the paper backing from the tape only when the lite is ready to be installed. Do not stretch the tape to make it fit. Do not overlap the ends of the tape. Instead, butt ends together, and when corners are butted together, daub with sealant to assure a positive seal.
 - 9. Glazing tapes must be kept under proper compression.
 - 10. Glazing stops shall be installed so that stop or frame does not bear directly against glass.
 - 11. Install glazing in fire-rated assemblies to requirements of NFPA 80.
 - a. Install so that appropriate UL markings remain permanently visible.

3.4 CLEANING

- A. Clean work under provisions of Division 01.

- B. Remove glazing materials from finish surfaces.
- C. Remove temporary labels after work is complete.
- D. Clean glass.

3.5 PROTECTION OF FINISHED WORK

- A. Protect finished Work under provisions of Division 01.
- B. Replacement: At completion of building construction and prior to its acceptance, all broken, cracked, excessively scratched, or otherwise imperfect glazing materials included under this Section shall be replaced with new glazing materials of the type specified, as directed by the Architect, and at no additional cost to the Owner.

END OF SECTION

SECTION 08 88 53
SECURITY GLAZING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Security glazing for hollow metal frame security windows and doors.
- B. Glazing accessories.

1.2 RELATED SECTIONS

- A. Section 08 34 63 – Detention Doors and Frames.
- B. Section 08 81 00 – Glass Glazing.
- C. Section 08 56 19 – Pass Windows.
- D. Section 11 19 00 – Detention Equipment Contractor.
- E. Section 11 19 23 – Detention Fasteners.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AAMA 800 – Voluntary Specifications and Test Methods for Sealants.
 - 2. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
 - 3. ASTM C1036 – Standard Specification for Flat Glass.
 - 4. ASTM C1048 – Standard Specification for Heat-Treated Flat Glass – Kind HS, Kind FT Coated and Uncoated Glass.
 - 5. ASTM C1349 – Standard Specification for Architectural Flat Glass Clad Polycarbonate.
 - 6. ASTM D256 – Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - 7. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 8. ASTM D1003 – Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics.
 - 9. ASTM F1915 – Standard Test Methods for Glazing for Detention Facilities.
 - 10. GANA – Glazing Manual, latest edition.

11. H.P.White Laboratory, Inc – HPW-TP-0500.03 Test Procedure, Transparent Materials for Use in Forced Entry or Containment Barriers.

12. WMFL – Walker, McGough, Foltz, and Lyerla 8801 Attack Resistant Standard.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Submit data on glazing types specified: Provide structural, physical and environmental test characteristics, size limitations, special handling or installation requirements.
- C. Product data on glazing sealants, glazing tapes, and setting blocks: Provide functional and environmental characteristics, limitations, and special application requirements. Identify available colors.
- D. Samples: Submit two samples, 12 inches x 12 inches in size, illustrating each type of security glazing, clearly marked, in actual assembly for each type.

1.5 QUALITY ASSURANCE

- A. Perform work in accordance with GANA Glazing Manual and Installer's Qualifications: The installation shall be performed only by an installation firm with a minimum of five years experience in this business. All work shall be performed by qualified mechanics that specialize in security glazing installation.
- B. Manufacturer's experience; Manufacturer shall have a minimum of five years experience, with documented installation of identical product to that specified.

1.6 PERFORMANCE REQUIREMENTS

- A. Provide WMFL and ASTM F1915 Test Reports certified by independent testing laboratory for each type of security glazing products specified.

1.7 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.8 COORDINATION

- A. Coordinate the work with glazing frames, wall openings, and adjacent work.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver glazing with manufacturer's labels intact and store in protected areas. Keep glazing free from contamination by materials capable of staining glazing.
- B. Deliver glazing sealants, tapes, accessories, and specialty items in manufacturer's unopened, labeled packaging.
- C. Handling: Glazing shall be carefully handled and glazed to avoid damage.

1.10 EXTRA STOCK

- A. Extra Stock/Spare Parts: Furnish a stock equaling three percent of the quantity required on the project for each product, but not less than one unit of each product, of each size. Provide protection for transit and storage.

- B. Size of all attic stock panels shall be determined by Architect.
- C. Package, mark for identification, and deliver to Owner's designated storage space as directed.

1.11 WARRANTY

- A. Submit under provisions of Division 01.
- B. Provide ten year warranty against delamination of security glazing.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Global Security Glazing ("Secur-Tem+Poly" Glass Clad Polycarbonate), Selma, AL; 800-633-2513, www.security-glazing.com.
 - 2. Oldcastle Building Envelope ("ArmorProtect" Glass Clad Polycarbonate), Santa Monica, CA; 866-653-2278, www.oldcastlebe.com.
 - 3. Guardian Industries Corp. ("Safetee Clad" Glass Clad Polycarbonate), Carleton, MI; 866-482-7374, www.na.en.sunguardglass.com.
 - 4. The LTI Group ("Smartgard" Glass Clad Polycarbonate), Pittsfield, MA; 413-637-5001, www.ltisg.com.
- B. Substitutions: Under provisions of Division 01.

2.2 SECURITY GLAZING TYPES

- A. Type SG-1: Forced entry/bullet resistant security glass: Clear, heat or chemically strengthened glass on outboard faces laminated to multi-ply polycarbonate compositional sheet with clear urethane film. Nominal thickness: 1-1/4 inch.
 - 1. Product shall meet ASTM F1915 Grade 1-60 minute forced entry and one of the following:
 - a. WMFL Level II (60 minute forced entry).
 - b. HPW-TP-005.03 Level C Ballistics Modified (spall, no penetration).
 - 2. Basis of Design: Global Security Glazing 1 inch SecurTem+Poly SP-028 (modified with 1/4 inch heat or chemically strengthened glass outboard faces).
- B. Type SG-2: Forced entry/bullet resistant security glass: Clear, heat or chemically strengthened glass on outboard faces laminated to multi-ply polycarbonate compositional sheet with white urethane film. Nominal thickness: 1-5/16 inch.
 - 1. Product shall meet ASTM F1915 Grade 1-60 minute forced entry and one of the following:
 - a. WMFL Level II (60 minute forced entry).
 - b. HPW-TP-005.03 Level C Ballistics Modified (spall, no penetration).
 - 2. Basis of Design: Global Security Glazing 1 inch SecurTem+Poly SP-028 (modified with 1/4 inch heat or chemically strengthened glass outboard faces).

- C. Type SG-3: Forced entry security glass: Clear, heat or chemically strengthened glass on outboard faces laminated to multi-ply polycarbonate compositional sheet with clear urethane film. Nominal thickness: 1 inch.
 - 1. Product shall meet ASTM F1915 Grade 2 – 40 minute and one of the following:
 - a. WMFL Level III (30 minute forced entry).
 - b. HPW-TP-005.03 Level B Ballistics Modified (spall, no penetration).
 - 2. Basis of Design: Global Security Glazing 3/4 inch SecurTem+Poly SP-019 (modified with 1/4 inch heat or chemically strengthened glass outboard faces).
- D. Type SG-4: Forced entry 90-minute fire rated security glass: Clear glass with baroque wire on outboard faces laminated to multi-ply polycarbonate compositional sheet with urethane film. Nominal thickness: 1 inch.
 - 1. Product shall meet ASTM F1915 Grade 2 – 40 minute containment and one of the following:
 - a. WMFL Level III (30 minute physical attack).
 - b. HPW-TP-005.03 Level IV.
 - 2. Basis of Design: Global Security Glazing 1 inch Clear Inferno-Lite ICGC1216WW90.
- E. Type SG-5: Forced entry security glass: Clear, heat or chemically strengthened glass on outboard faces laminated to multi-ply polycarbonate compositional sheet with clear urethane film. Nominal thickness: 9/16 inch.
 - 1. Product shall meet ASTM F1915 Grade 4 – 10 minute and the following:
 - a. HPW-TP-005.03 Level A Ballistics Modified (spall, no penetration).
 - 2. Basis of Design: Global Security Glazing 9/16 inch SecurTem+Poly 2117.

2.3 GLAZING COMPONENTS

- A. Following materials are required as components for units except material requirements are general; provide specific materials as recommended by manufacturer (laminator) of units, to comply with ASTM C1349, specified minimum performance criteria, and additional requirements.
 - 1. Glass Sheets: Type I, quality Q3 glass in conformance with ASTM C1036 and ASTM C1048. Outer layer of all units shall be clear heat or chemically strengthened glass; thicknesses as indicated above.
 - 2. Polycarbonate Sheets: Clear, transparent, cast polycarbonate sheet with additional characteristics and performances as recommended by manufacturer (laminator) of units; with flexural strength of not less than 13,500 psi per ASTM D790; 240 degrees F allowable continuous service temperature; 95 percent light transmittance for 1/4 inch thick sheet per ASTM D1003; Izod strength of 16 foot-pounds per inch minimum per ASTM D256.
 - 3. Interlayer: Clear, transparent, high-impact-resistant permanent urethane film of a composition which has successfully withstood a minimum of twenty years of exposure to sunlight and severe weather/temperature changes as required for specified "arms" rating and overall thickness lamination.

2.4 GLAZING SEALANTS

- A. Material: Silicone sealants in conformance with ASTM C920.

B. Acceptable Manufacturers and Products:

1. Exterior Surfaces:

- a. Tremco, Product: Spectrem 2.
- b. GE, Product: 2200.
- c. Substitutions: Under provisions of Division 01.

2. Interior Surfaces – Glazing to Hollow Metal Frame:

- a. Pecora, Product: Dynaflex SC Security Sealant.
- b. Substitutions: Under provisions of Division 01.

2.5 GLAZING TAPE

A. Material: 100 percent solids butyl tapes in conformance with AAMA 800.

B. Acceptable Manufacturers and Products:

- 1. Tremco, Product: 440.
- 2. Parr Technologies, LLC, Product: PTI 303.
- 3. Substitutions: Under provisions of Division 01.

2.6 GLAZING ACCESSORIES

A. Setting Blocks: Provide type recommended, subject to compatibility testing and approval by security glazing manufacturer.

- 1. Neoprene or EPDM blocks with a Shore A Durometer hardness of 85, ± 5 percent, chemically compatible with sealant used.
- 2. Santoprene (silicone).
- 3. Thermoplastic rubber.

B. Miscellaneous: Furnish all primers, sealers, blocks, shims, spacers, seals etc. as required for a complete installation.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify prepared openings for adequacy to receive glazing.
- B. Verify openings for glazing are correctly sized and within tolerance.
- C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions, and ready to receive glazing.

3.2 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Apply primer or sealer to joint surfaces wherever recommended by sealant manufacturer.
- C. Check that glazing is free of edge damage and surface defects.

3.3 INSTALLATION

- A. Install security glazing and accessories in accordance with glazing manufacturer's recommendations.
- B. Protect glazing from edge damage at all times during handling, installation, and subsequent operation of the glazed components of the work.
- C. Glazing channel dimensions are intended to provide for necessary bite on the glazing, minimum edge clearance and adequate sealant thicknesses, with reasonable tolerances. The glazier is responsible for correct glazing size for each opening, within the tolerances and necessary dimensions established and for verifying the dimensions of the glazing stops.
- D. At all interior detention doors and frames scheduled to receive security glazing, apply pick-proof sealant and set flush with edge of stop. Protruding sealant not installed in a neat, flush, professional manner shall be completely removed and replaced at no cost to Owner.

3.4 CURE AND PROTECTION

- A. Cure glazing sealants, in compliance with manufacturer's instructions and recommendations, to obtain high early bond strength, internal cohesive strength and surface durability.
- B. Protect glazing sealants and compounds during the construction period, so that they will be without deterioration or damage (other than normal weathering) at the time of Project Completion.
- C. Remove and replace glazing that is broken, chipped, cracked, abraded or damaged during the construction period.
- D. Leave entire work in neat, orderly, clean condition at time of Project Completion.

3.5 CLEANING GLAZING

- A. Clean glazing under provisions of Division 01 and per glazing manufacturer's recommendations.
- B. Maintain glazing in a clean condition during construction so that it will not be damaged by corrosive action and will not contribute (by wash-off) to the deterioration of glazing materials and other work.

END OF SECTION

SECTION 08 90 50
FIELD TESTING OF GLAZED WALL SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Field testing of glazed aluminum curtain wall systems.
- B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections specified in this Section.

1.2 RELATED SECTIONS

- A. Section 08 44 13 – Glazed Aluminum Curtain Walls.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes in effect as of the date of issue of this Project Manual, unless indicated otherwise in CBC Chapter 35 and CFC Chapter 80.
- C. Referenced Standards:
 - 1. AAMA 501.2-09 – Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtain Walls, and Sloped Glazing Systems.
 - 2. AAMA 502-12 – Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
 - 3. ASTM E1105-08 – Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference.

1.4 SUBMITTALS

- A. General: Submit under provisions of Division 01.
- B. Submit narrative of test procedures to be used, including a step-by-step outline of the test procedure.
- C. Submit schematic diagrams of test apparatus, including description of all components.
- D. Submit test reports, photographs, and video as specified in this Section.
- E. Submit certification that all tests were performed in accordance with AAMA 501.2-09, AAMA 502-12, and ASTM E1105-08.
- F. Submit shop drawings showing modifications and corrective measures required to meet specified performance criteria.

1.5 TESTING AGENCY

- A. Contractor shall engage an independent testing agency, acceptable to the Architect, for field testing of fenestration systems listed in this Section.
 - 1. The Architect reserves the right to accept or reject the testing agency proposed by Contractor.
- B. Costs: All costs of field testing including chamber preparation, testing costs, test reports, certifications, shop drawings, and related services shall be the sole responsibility of Contractor.
- C. Contractor shall make building components available at the jobsite for testing and inspection, provide temporary work as needed, and coordinate work schedule with the testing agency.

1.6 GLAZED WALL SYSTEM FIELD TEST METHOD

- A. Conduct field testing of the following completed glazed systems in accordance with AAMA 501.2-09, AAMA 502-12, and ASTM E1105-08. Assemblies to be tested:
 - 1. Glazed aluminum curtain wall system.

PART 2 PRODUCTS

2.1 GENERAL

- A. Field testing apparatus shall consist of sealing a chamber to the interior face of specimen to be tested, exhausting air from the chamber at the rate required to maintain the pressure difference across the specimen while spraying water onto the outdoor face of the specimen at the required rate, and observing and documenting any water penetration.

2.2 FABRICATION

- A. Field Testing Apparatus Components:
 - 1. Test Chamber:
 - a. Provide a chamber or box made of plywood, plastic, or other suitable material and sealed against the interior face of the test specimen. Interior surfaces and joints of the specimen shall be easily observed for any water penetration during the test.
 - b. Provide observation ports of sufficient size and number to permit thorough examination of all interior surfaces and joints of the test assembly during the testing periods, in accordance with the safety requirements of the testing agency.
 - c. No part of the testing chamber shall come in contact with or restrict any point where water penetration may occur.
 - d. Provide at least one static air pressure tap to measure the chamber air pressure versus the ambient (interior-exterior) air pressure. Tap shall be located where the reading is unaffected by exterior impinging wind, or by the velocity of air supply to or from the chamber.
 - e. Provide access to the interior of the chamber to allow for close inspection of the test assembly during and following the water penetration performance tests.

2. Air System: Provide a controllable blower, compressed air supply exhaust system, or reversible blower designed to supply the required maximum air pressure difference across the specimen, at a constant airflow, and at a fixed pressure for the required test period.
3. Instruments and Gauges: Provide suitable instruments and gauges, calibrated and positioned to indicate face pressure on glass, water introduction rate, and other measurements as required by AAMA 501.2-09, AAMA 502-12, and ASTM E1105-08.
4. Water Spray System:
 - a. Provide a water-spray system capable of delivering water uniformly against the exterior surface of the test specimen at a rate of five gallons per square foot per hour.
 - b. Water-spray system water nozzles shall be spaced on a uniform grid, located at a uniform distance from the test specimen and shall be adjustable to provide the specified quantity of water in such a manner as to wet the entire test specimen uniformly, and to wet those areas vulnerable to water penetration. Provide additional nozzles as needed in accordance with ASTM E1105-08.
 - c. Provide pressure gauge and pressure adjusting valves.

PART 3 EXECUTION

3.1 TESTING

- A. Contractor shall notify the Architect in writing a minimum of two weeks prior to start of erection of the first typical glazed wall section. At that time, the Contractor shall provide notification to and description of the test agency and procedures to be used, including a step-by-step outline of the test procedure with schematic diagrams of test apparatus. No testing shall be performed on the specimen without Architect's acceptance of the testing materials and procedures to be employed.
- B. Number of Tests:
 1. One test shall be performed when approximately ten percent of each type of glazed wall system has been erected. A second test shall be performed when approximately fifty percent of the glazed wall system is in place. Depending on the results from the first two tests, a third test shall be performed at the discretion of the Architect.
 2. Depending upon the prevalence or absence of leakage in the initial water penetration test and upon measures taken by Contractor to eliminate sources of leakage from subsequently erected work, the Architect will determine the necessity for, and scope of additional tests. However, in no case will the total tested area be less than one percent of the glazed wall system area, except as subsequently directed by the Architect.
 3. At the Architect's discretion, specific non-typical areas or components of the exterior glazed wall system may be tested, in accordance with AAMA 501.2-09.

3.2 TEST OBSERVATIONS AND REPORTS

- A. Record photographs of all significant portions of testing procedure shall be taken including views of all instruments, devices, and the air chamber.

- B. Video recording of testing procedure shall be taken including ambient conditions such as temperature, wind speed, water flow rate, differential pressure, time and date, test duration, results, leakage magnitude and location, specimen description, and remedial work conducted.
- C. Furnish test diagrams for each test sequence on each specimen to illustrate the area of water spray and the location and magnitude of each type of leakage, if present.
- D. Furnish test reports including record photographs and video footage promptly to the Architect for review.
- E. Failed Tests:
 - 1. Failing results of any test shall not in any way negate the satisfactory completion of earlier tests.
 - 2. Provide all pertinent information on failing test results such as water flow rates. Test results shall describe all failures in detail.
 - 3. Tests revealing failure of an assembly to meet specified requirements shall immediately be brought to the attention of the Architect.
 - 4. In the event of failure of test specimen to initially meet specified performance requirements, Contractor shall redesign, rework, re-fabricate, reship, and re-erect as required until no failure occurs to the satisfaction of the Architect. All costs for retesting shall be borne by Contractor.
 - 5. Incorporate accepted and successfully tested corrective measures into the assembly. Modify installed or fabricated units to include these measures.
- F. Upon completion of testing, provide shop drawings showing modifications and corrective measures required to meet specified performance criteria.

END OF SECTION

SECTION 08 91 19

FIXED LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Continuous wall louvers.

1.2 RELATED WORK

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 07 25 00 – Weather Barriers.
- C. Section 07 62 00 – Sheet Metal Flashing and Trim.
- D. Section 07 92 00 – Joint Sealants.
- E. Section 08 11 13 – Hollow Metal Doors and Frames.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AMCA 500-L – Laboratory Methods of Testing Louvers for Rating.
 - 2. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process

1.4 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacture of AMCA certified louvers with sufficient documented experience.
- B. Louvers shall bear Air Movement and Control Association (AMCA) Certified Ratings Seals for air performance and water penetration ratings.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Indicate on shop drawings layout, elevations, dimensions and tolerances; head, jamb, and sill details, blade configuration, screening, and frames.
- C. Submit manufacturer's installation instructions under provisions of Division 01.
- D. Samples: Submit two 6 inch by 6 inch samples of selected finish color on specified metal substrate.

1.6 COORDINATION

- A. Coordinate work of this Section with installation of framing, flashings, interior and exterior wall finishes and mechanical systems.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS AND MANUFACTURERS – WALL LOUVERS

- A. Wonder Metals Corporation, Redding, CA; 800-366-5877, www.wondermetals.com. Product: Model SDL-4.
- B. C/S Group, Cranford, NJ; 800-526-6930, www.c-sgroup.com.
- C. The Airolite Company, LLC, Schofield, WI; 715-841-8757, www.airolite.com.
- D. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Steel Sheet: ASTM A653, G90 galvanized.

2.3 COMPONENTS

- A. Louver Blades:
 - 1. Slope: 45 degrees.
 - 2. Blade type: Fixed, drainable.
 - 3. Steel Thickness: 16 gauge.
- B. Frame:
 - 1. Shape: Channel.
 - 2. Head, jamb and sill material thickness: 16 gauge steel.
 - 3. Corners: Boxed.
- C. Intermediate concealed vertical mullions: Same material and gauge as louver.
- D. Fasteners and Anchors: Stainless steel or type as recommended by manufacturer.

2.4 ACCESSORIES

- A. Flashings: Of same material as louver frame.
- B. Insect Screen and Frame: Galvanized steel frame with 18 x 14 galvanized insect mesh, fabricated by louver manufacturer. Install on interior side of louver.
- C. Flexible Flashing Materials: As specified in Section 07 25 00.
- D. Sealants: As specified in Section 07 92 00.
- E. Neoprene isolation pads for installation between dissimilar metals.

2.5 FABRICATION

- A. Louver Size: 4 inches deep, face measurements as indicated, but not to exceed 40 square feet per panel. Nominal free area opening percentage of 48 percent, with storm-proof blades.
- B. Head and Sill Members: Roll formed to required shape, one piece per location.
- C. Vertical mullions: At louver panels greater than 48 inches wide, provide intermediate concealed vertical mullions for support of louver blades at interior side of panels.
 - 1. Spacing: Centered in width of frame.
- D. All welded construction.
- E. Screens: Screw to louver frame.

2.6 FINISHES

- A. Factory Finish: Prime paint finish.
- B. Provide factory finished louvers. Finish louvers after assembly.
 - 1. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions. Custom color as selected by Architect.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that prepared openings and flashings are ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install louver assembly in accordance with manufacturer's instructions.
- B. Install louvers level and plumb.
- C. Secure louvers in opening framing with concealed fasteners.
- D. Louver frame shall be anchored to structure with concealed fasteners appropriate for use with type of adjacent construction. Fasteners shall securely fasten louver frame to wall construction involved. Fasteners shall provide stiffness and rigidity to keep frames square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the louver manufacturer or as conditions warrant:
 - 1. Metal Framing: #14 stainless steel self-tapping sheet metal screws at 12 inches on center all around by length as required to penetrate framing member 1/4 inch minimum.
- E. Install perimeter flexible flashing membrane around all window openings in accordance with manufacturers' installation instructions and under provisions of Section 07 25 00.

- F. Install metal flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.
- G. Install insect screen on the interior face of the louver frame with mechanical fasteners.
- H. Install perimeter sealant to method required to achieve performance criteria and installation criteria described in Section 07 92 00.

3.3 CLEANING

- A. Clean surfaces and components per manufacturer's recommendations.

END OF SECTION

DIVISION 09
FINISHES

SECTION 09 21 16.23

GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Gypsum board shaft wall assemblies for the following:
 - 1. Shaft-wall enclosures.
 - 2. Chase enclosures.
 - 3. Horizontal enclosures.

1.2 RELATED SECTIONS

- A. Section 07 84 00 – Firestopping.
- B. Section 07 92 00 – Joint Sealants.
- C. Section 09 22 16 – Non-Structural Metal Framing.
- D. Section 09 29 00 – Gypsum Board.
- E. Section 09 81 00 – Acoustical Insulation.
- F. Section 09 91 00 – Painting.
- G. Divisions 21 - 23 – Mechanical Sections as applicable to the Project.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. American Iron and Steel Institute (AISI) Code of Standard Practice.
 - 2. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM C475 – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
 - 4. ASTM C954 – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
 - 5. ASTM C1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
 - 6. ASTM C1396/C1396M – Standard Specification for Gypsum Board.

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| 7. ASTM E72 | – Standard Test Methods of Conducting Strength Tests of Panels for Building Construction. |
| 8. ASTM E84 | – Standard Test Method for Surface Burning Characteristics of Building Materials. |
| 9. ASTM E119 | – Standard Test Methods for Fire Tests of Building Construction and Materials. |
| 10. GA 216 | – Gypsum Association Recommended Specifications for the Application and Finishing of Gypsum Board. |
| 11. GA 600 | – Gypsum Association Fire Resistance Design Manual. |
| 12. UL | – Underwriters Laboratories Inc.: Design Numbers for Fire-Resistance Rated Assemblies. |

1.4 SUBMITTALS

- A. Submit in accordance with Division 01.
- B. Product Data: Provide product data and material safety data sheets on gypsum board, joint tape, topping compound, texture and all accessories.
- C. Submit manufacturer's installation instructions.

1.5 QUALITY ASSURANCE

- A. Applicator: Firm specializing in work of this Section.
- B. Fire-Resistance Ratings: Provide fire-resistance ratings as indicated on Drawings. Materials and construction shall be identical to assemblies with fire-resistance ratings determined according to ASTM E119 by a testing and inspecting agency.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01. Review methods and procedures for installing gypsum board shaft-wall assemblies including, but not limited to, the following:
 - 1. Fasteners proposed for anchoring nonstructural steel framing to building structure.
 - 2. Sprayed fire-resistive materials applied to structural steel framing.
 - 3. Wiring devices in shaft-wall assemblies.
 - 4. Doors and other items penetrating shaft-wall assemblies.
 - 5. Items supported by shaft-wall-assembly framing.
 - 6. Mechanical work enclosed within shaft-wall assemblies.

1.6 REGULATORY REQUIREMENTS

- A. Install in strict accordance with all published applicable regulations by local, state or federal agencies that may have jurisdiction.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Steel framing and related accessories shall be stored and handled in accordance with the A.I.S.I. "Code of Standard Practice."

- B. All materials shall be stored in a safe, dry area in the original factory supplied packaging clearly marked with type of material and UL or other labels as required. It is the responsibility of Contractor to ensure that all materials are properly stored at the jobsite and remain free of damage and defects.

1.8 JOB AND ENVIRONMENTAL CONDITIONS

- A. Warm environment is ideal; avoid installation in subfreezing or wet conditions.
- B. Protect applicators and occupants from nuisance dust when saw-cutting.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. United States Gypsum Company, Chicago, IL; 800-874-4968, www.usg.com. Product: Cavity Shaft Wall.
 - 2. National Gypsum Company, Charlotte, NC 28211; phone: 704-365-7300, fax: 800-329-6421, www.nationalgypsum.com. Product: eXP Cavity Shaftwall System.
 - 3. Georgia-Pacific Corporation, Atlanta, GA 30303; toll free: 800-824-7503, phone: 404-652-4000, fax: 404-230-5624, www.gp.com. Product: DensGlass Shaftliner.
- B. Substitutions: Under provisions of Division 01.

2.2 PANEL PRODUCTS

- A. Gypsum Board: ASTM C1396/C1396M; 5/8-inch thick, Type X, maximum permissible length; ends square cut, tapered edges.
- B. Gypsum Shaftliner Board: ASTM C1396/C1396M; 1-inch thick, Type X, maximum permissible length, 24 inches wide, double beveled edges.
 - 1. Basis-of-Design Product: Sheetrock Brand Gypsum Liner Panels by United States Gypsum Company; or accepted equal.

2.3 METAL FRAMING

- A. Conform to the requirements of Section 09 22 16 for conditions indicated on Drawings.
- B. Metal Studs: Steel C-H Studs, J and E-Studs.
- C. Metal Runners: J-Runners.

2.4 ACCESSORIES

- A. Accessories: As recommended by the gypsum board manufacturer to meet required fire ratings.
- B. Corner Bead, U Bead (Edge Trim), Metal Trim and Control Joints: GA 216; ASTM C1047; sheet steel, zinc coated by hot-dipped process in accordance with ASTM A653/A653M, minimum G40 coating.
- C. Joint Materials: ASTM C475, GA 216; reinforcing tape, joint compound, adhesive, water and fasteners.

- D. Fasteners: Screws, Type S, conforming to ASTM C954, self-drilling and self-tapping steel screws with double-lead thread design as approved by system manufacturer for standard and heavier gauge load bearing steel framing.
- E. Acoustical Insulation: Refer to Section 09 81 00.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- F. Acoustical Sealant: Refer to Section 07 92 00.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that site conditions are ready to receive work and meet the design criteria for an approved installation.
- B. Ensure all materials are free of defects and are labeled by an approved listing and labeling service.
- C. Do not proceed with installation until deficiencies are corrected and surfaces are acceptable.
- D. Beginning of installation means acceptance of existing conditions.

3.2 SHAFT WALL INSTALLATION

- A. Comply with GA 600 and with shaft wall system manufacturer's installation instructions and details.
 - 1. Fire-Resistance Rating: As indicated on Drawings.
- B. Studs and Liner Panels:
 - 1. Position steel runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural support with power driven fasteners at both ends and maximum 24 inches on centers. With steel frame construction, install floor and ceiling runners and J or E-Studs before installing gypsum liner panels (Two-hour steel fireproofing). For other structural steel fireproofing requirements, use Z-shaped stand-off clips secured to structural steel before fireproofing application.
 - 2. Cut liner panels 1 inch less than floor-to-ceiling height and erect vertically between J-Runners. Where shaft walls exceed maximum available panel height, position liner panel end joints within upper and lower third points of wall. Stagger joints top and bottom in adjacent panels. Screw studs to runners on walls over 16 feet in height.
 - 3. Use steel C-H Studs 3/8 inch to not more than 1/2 inch less than floor-to-ceiling height, and install between liner panels with liner inserted in the groove. Install full-length steel J or E-studs vertically at T-intersections, corners, door jambs, and columns. Install full-length E-Studs over gypsum liner panels both sides of closure panels. For openings, frame with vertical J or E-Stud edges, horizontal J-Runner at head and sill, and reinforcing as shown on Drawings. Suitably frame all openings to maintain structural support for wall.
 - 4. Install floor-to-ceiling steel E-Studs each side of steel hinged door frames and jamb struts each side of elevator door frames to act as strut-studs. Attach strut-stud to floor and ceiling runners with two 3/8 inch Type S-12 pan head screws. Attach strut-studs to jamb anchors with 1/2 inch Type S-12 screws. Over steel doors, install a cut-to-length section of J-Runner and attach to strut-studs with 3/8 inch Type S-12 screws.

- C. Gypsum Panels (Single layer one side, one hour fire-rating): Apply 5/8 inch Type X gypsum board panels, on corridor side. Position gypsum panel vertically and fasten to studs and runners with 1 inch Type S Screws 12 inches on centers.
- D. Gypsum Panel Joints: Comply with applicable requirements of Section 09 29 00. Finish all face layer joints and internal angles with a Joint System installed according to manufacturer's recommendations. Spot exposed fasteners on face layers and finish corner bead, control joints and trim as required, with at least three coats of joint compound, feathered out onto panel faces and sanded smooth.
- E. Corner Bead: Reinforce all vertical and horizontal exterior corners with corner bead fastened with clinch-on tool or staples 9 inches on centers on both flanges along entire length of bead.
- F. Metal Trim: Where shaft wall terminates against masonry or other dissimilar material, apply metal trim over face layer edge and fasten with screws or staples spaced 9 inches on centers.
- G. Control Joints: Break panels behind joint. Apply acoustical sealant to fill gap and attach control joint to face layer with staples spaced 6 inches on centers on both flanges along entire length of joint.
- H. Screws: Power-drive at least 3/8 inch from edges or ends of gypsum panels to provide uniform dimple 1/32 inch deep. In gypsum base, set flush with surface without tearing face paper.
- I. Do not bridge architectural or building expansion joints with shaft-wall assemblies; frame both sides of expansion joints with furring and other support.
- J. At fire rated walls with more than a 16 foot vertical span, do not fasten shaft wall top track directly to support above. In these conditions, provide slip track or slip clips for attachment of shaft wall top track to supporting structure, with appropriate firestopping products.
- K. At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items. Refer to Section 07 84 00 for firestopping products and requirements.
- L. Acoustical Insulation: Install acoustical insulation per Section 09 81 00.
- M. Acoustical Sealant: Install acoustical sealant per Section 07 92 00.

3.3 TOLERANCES

- A. Maximum Variation from True Flatness: 1/4 inch in 10 feet in any direction.

3.4 CLEANING AND PROTECTION

- A. Cleaning and Repair: Clean surfaces that have been spotted or soiled during wallboard application.
- B. Defective Work: Remove and replace defective work that cannot be satisfactorily repaired, at the direction of Architect, at no cost to Owner.
 - 1. Remove and replace panels that are wet, moisture damaged, or mold damaged.
- C. Protection: Protect installed work against damage from other construction work.

- D. Upon completion of the work under this Section, remove all surplus material, rubbish and debris from the premises and leave floors "broom clean".

END OF SECTION

SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Section includes metal stud and joist framing and accessories at interior locations.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 05 50 00 – Metal Fabrications: Metal fabrications attached to stud framing.
- C. Section 07 84 00 – Firestopping.
- D. Section 07 92 00 – Joint Sealants.
- E. Section 09 29 00 – Gypsum Board.
- F. Section 09 81 00 – Acoustic Insulation.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A924/A924M – Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - 3. ASTM C645 – Standard Specification for Nonstructural Steel Framing Members.
 - 4. ASTM C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - 5. ASTM C1513 – Standard Specification for Steel Tapping Screws for Cold-Formed Steel Framing Connections.
 - 6. SSPC Paint 20 – Zinc Rich Primers.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.

B. Shop Drawings:

1. Indicate component details, stud layout, framed openings, anchorage to structure, type and location of fasteners and accessories or items required of other related work.
2. Describe method for securing studs to tracks, splicing and for blocking and reinforcement to framing connections.

C. Product Data: Submit data describing standard framing member materials and finish, product criteria, load charts and limitations.

D. Manufacturer's Installation Instructions: Submit special procedures, perimeter conditions requiring special attention.

E. Evaluation Reports: Submit evaluation reports certified under an independent third party inspection program administered by an agency accredited by IAS to ICC-ES AC98, IAS Accreditation Criteria for Inspection Agencies.

1.5 SYSTEM DESCRIPTION

A. Interior Walls: Metal stud framing system with batt type acoustic insulation specified in Section 09 81 00 and interior gypsum board specified in Section 09 29 00.

B. Maximum Allowable Deflection:

1. 1:120 span at gypsum board finish.
2. 1:240 span at ceramic tile finishes.

C. Wall and Ceiling Systems:

1. Design to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.

1.6 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C754.

B. Comply with 2013 CBC, Chapter 22, Sections 2210 and 2211.

C. Form, fabricate, install, and connect components in accordance with ML/SFA 540.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section.

B. Installer: Company specializing in performing Work of this Section.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Notify manufacturer of damaged materials received. Do not install damaged materials.

B. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Protect cold-formed metal framing products from corrosion, deformation, and other damage during delivery, storage, and handling as required by AISI's "Code of Standard Practice".

1.9 PRE-INSTALLATION MEETING

- A. Convene minimum one week prior to commencing Work of this Section under provisions of Division 01.

1.10 COORDINATION

- A. Coordinate placement of components within stud framing system.

PART 2 PRODUCTS

2.1 METAL FRAMING SYSTEM

- A. Acceptable Manufacturers:
 - 1. ClarkDietrich Building Systems, West Chester, OH; 513-870-1100, www.clarkdietrich.com.
 - 2. Marino/Ware, Griffin, GA; 678-688-1312, www.marinoware.com.
 - 3. CEMCO, Pittsburg, CA; 925-473-9340, www.cemcosteel.com.
- B. Substitutions: Under provisions of Division 01.

2.2 COMPONENTS

- A. Framing System Components: ASTM C645.
 - 1. 16 Gauge and heavier, $F_y = 50$ ksi
 - 2. 18 Gauge and lighter, $F_y = 33$ ksi minimum.
- B. Studs and Joists: ASTM A653/A653M non-load bearing rolled steel, channel shaped, punched for utility access, depths and gauges and spacing as indicated on the Drawings.
- C. Tracks and Headers: Same material and thickness as studs, bent leg retainer notched to receive studs. Ceiling runners shall have extended leg retainer.
- D. Slotted Track: Slotted track system for positive attachment of metal studs to track, for Head of Wall expansion joint movement (cyclic) and static Joint System in fire-rated construction, as detailed and required on Drawings, in compliance with UL 2079 cyclical movement $\pm 1/2$ inch overall 1 inch movement. Products: BlazeFrame DSL at rated assemblies and MaxTrak at non-rated assemblies as manufactured by ClarkDietrich Building Systems or accepted equal.
 - 1. Forming steel shall conform to ASTM A653, Grade 33 with a minimum yield point of 33,000 psi.
 - 2. Formed steel shall be galvanized in accordance with ASTM A924 for a Class G60 by the hot dip process.
 - 3. Slotted track shall be provided in standard widths and gauges, as required and indicated on Drawings. Down standing legs shall be nominally 2-1/2 inches and shall be provided with 1-1/2 inch slots at 1 inch on center.
 - 4. Fasteners:
 - a. For attachment of studs to slotted track, minimum No. 8 corrosion resistant by 1/2 inch waferhead screws.

- b. For attachment of Slotted Track to overhead structural element, as provided for the structural details affecting the work.
- E. Furring and Bracing Members: Of same material as studs; thickness to suit purpose.
- F. Sheet Metal Backing: 16 gauge, unless noted otherwise on Drawings.
- G. Hat-Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch deep.
- H. Headers and Jambs: Manufacturer's proprietary shape used to form header beams and jambs, columns, or posts of web depths indicated, unpunched, with stiffened flanges.
- I. Resilient Furring Channels: 1/2 inch deep, sheet steel members designed to reduce sound transmission.
- J. Fasteners: ASTM C1513, self-drilling, self-tapping corrosion resistant screws.
- K. Anchorage Devices: As indicated on Drawings.
- L. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type II organic zinc rich.

2.3 FINISHES

- A. Studs and Joists: Provide galvanized finish as follows:
 - 1. Coating Class: G-40 per ASTM A653. A40 galvanized products are not acceptable.
- B. Tracks and Headers: Provide galvanized finish as follows:
 - 1. Coating Class: G-40 per ASTM A653. A40 galvanized products are not acceptable.
- C. Bracing, Furring, Bridging: ASTM C645, hot dip galvanized to Coating Class G-40 per ASTM A653.
- D. Plates, Gussets, Clips: ASTM C645, hot dip galvanized to Coating Class G-40 per ASTM A653.
- E. No equivalent coatings allowed.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify rough-in utilities are in proper location.

3.2 INSTALLATION

- A. Install metal framing per ASTM C754 and as indicated on Drawings
- B. Align and secure top and bottom runners as indicated on Drawings.
- C. Place two beads of acoustic sealant between tracks and substrate, studs and adjacent construction, to achieve acoustic seal.
- D. Place two beads of acoustic sealant between studs and adjacent vertical surfaces to achieve acoustic seal.

- E. Framing at openings shall be as shown on Drawings. Install intermediate studs at same spacing as wall studs.
- F. Install studs vertically at 16 inches on center unless otherwise noted on Drawings.
- G. Install joists horizontally at 16 inches on center unless otherwise noted on Drawings.
- H. Align stud web openings horizontally.
- I. Secure studs to tracks as indicated on Drawings.
- J. Stud splicing not permissible.
- K. Fabricate corners using minimum of three studs.
- L. Double stud at wall openings and door and window jambs, not more than 2 inches from each side of openings.
- M. Brace stud framing system rigid.
- N. Coordinate erection of studs with requirements of door frames and window frames; install supports and attachments.
- O. Backing/Blocking: Shall be provided for all wall and ceiling finishes and for the supporting and anchorage of products, fixtures and equipment for all trades, including, but not limited to, toilet partitions, toilet room accessories, casework, mirrors, trim, applied wall finishes, artwork, wall bumpers, downspout straps, plumbing and electrical fixtures, etc. Coordinate size, type and location of backing and supports with manufacturer or supplier of items requiring backing/blocking.
- P. Refer to Drawings for indication of partitions extending stud framing through ceiling to structure above. Maintain clearance under structural building members to avoid deflection transfer to studs. Install extended leg ceiling runners for slip connection.
- Q. Refer to Drawings for indication of partitions through ceiling, but not to structure above. Install diagonal stud bracing staggered at 48 inches on center to structure above. Stud bracing width and gauge shall match that of the stud framing below.
- R. Coordinate placement of insulation in stud spaces after stud frame erection.

3.3 ERECTION TOLERANCES

- A. Maximum Variation From Indicated Position: 1/8 inch in 10 feet (non-cumulative).
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet (non-cumulative).

END OF SECTION

SECTION 09 22 26.23
METAL SUSPENSION SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Suspended gypsum board ceiling metal framing system.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-in-Place Concrete.
- B. Section 05 31 00 – Steel Decking.
- C. Section 09 29 00 – Gypsum Board.
- D. Divisions 21 - 23 – Mechanical.
- E. Divisions 25 - 28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A641/A641M – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 2. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM C645 – Standard Specification for Nonstructural Steel Framing Members.
 - 4. ASTM C754 – Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.
 - 5. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specification for each product.
- C. Shop Drawings:
 - 1. Indicate typical layout including dimensions.

2. Submit drawings showing field measured dimensions.
3. Submit detail drawings of special accessory components not included in manufacturer's product data.

1.5 SYSTEM DESCRIPTION

- A. Metal framing system for single layer suspended gypsum board ceiling.
- B. Alternative systems conforming to CBC Table 2508.1 may be proposed. Conform to substitution requirements per Division 01. Include in proposal specifications and shop drawings showing framing layout, member sizes, hanger locations, fastening, and attachment details.
- C. Alternative suspended gypsum board ceiling framing systems may be submitted with appropriate current ICC-ES Report. Install in accordance with manufacturer's instructions and ICC-ES Report. Conform to substitution requirements per Division 01.
- D. Substitutions are subject to agency approval.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum five years experience.
 2. Installer Qualifications: Firm specializing in installing work specified in this Section with experience on at least five projects of similar nature in past three years.
- B. Coordinate work in this Section with work in related Sections.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Storage and Protection:
 1. Store materials in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage.
 2. If materials are stored outdoors, stack materials off ground, supported on a level platform, and fully protected from the weather.
- D. Handling: Handle materials carefully to prevent damage. Remove damaged materials and provide new items.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Galvanized or galvanized steel conforming to ASTM A653/A653M, minimum G40 or Z120.

B. Grade:

1. 16 gauge and heavier, $F_y = 50$ ksi
2. 18 gauge and lighter, $F_y = 33$ ksi minimum.

2.2 COMPONENTS

A. Frame Members: ASTM C645.

1. Main Runners: Cold-rolled steel channels; 1-1/2 inch by 16 gauge; 0.475 pounds per foot, minimum.
2. Cross-Furring: Cold-rolled steel hat channels: 7/8 inch by 22 gauge.

B. Wire Hangers: ASTM A641/A641M, zinc-coated wire, Class 1, soft temper, pre-stretched.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions. Verify hangers will not interfere with other work.

3.2 INSTALLATION

- A. Install ceiling metal suspension system in accordance with CBC Section 2508.1, approved shop drawings, and as specified in this Section.
- B. Install ceiling metal suspension system after major above ceiling work is complete. Coordinate location of hangers with other work.
- C. Hang suspension system independent of walls, columns, ducts, pipes and conduits.
- D. Install cross furring as recommended by gypsum board manufacturer to prevent sagging at maximum 24 inches on center; 16 inches on center for 5/8 inch moisture resistant gypsum board per CBC Section 2509.3.3, saddle tied to main runners using one strand of No. 16 gauge or two strands of No. 18 gauge tie wire.
- E. Use No. 8 gauge hanger wires saddle tied to main runners as follows:
1. 3 feet-0 inches on center maximum, where main runners are spaced 4 feet-0 inches on center.
 2. 3 feet-6 inches on center maximum, where main runners are spaced 3 feet-6 inches on center.
 3. 4 feet-0 inches on center maximum, where main runners are spaced 3 feet-0 inches on center.
- F. Splice main runners by lapping and interlocking flanges 12 inches minimum and tying near each end double loops of No. 16 gauge tie wire.
- G. Splice cross-furring by lapping and interlocking pieces 8 inches minimum and tying near each ends with double loops of No. 16 gauge tie wire.

- H. Fasten hanger wires with not less than three tight turns. Fasten bracing wires with four tight turns. Make all tight turns with a distance of 1-1/2 inch. Hanger or bracing wire anchors to the structure should be installed in such a manner that the direction of the wire aligns as closely as possible with the direction of the forces acting on the wire. Wire turns made by machine where both strands have been deformed or bent in wrapping can waive the 1-1/2 inch requirement, but the number of turns should be maintained, and as tight as possible.
- I. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc. It is acceptable to attach lightweight items, such as single electrical conduit not exceeding 3/4 inch nominal diameter, to hanger wires using connectors acceptable to Architect.
- J. When drilled-in concrete anchors or shot-in anchors are used in reinforced concrete for hanger wires, one out of ten shall be tested for 200 pounds tension. When drilled-in concrete anchors are used for bracing wires, one out of two shall be field tested for 440 pounds tension. Shot-in anchors in concrete are not permitted for bracing wires. Refer to CBC Section 1913.2.11.1 if any shot-in or drilled-in anchor fails.
- K. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits, or discontinuous areas. Where hanger wires are more than one in six out of plumb, provide counter-sloping wires.

3.3 BRACING ASSEMBLIES

- A. Provide bracing assemblies consisting of a compression strut and four 12 gauge splayed bracing wires oriented 90 degrees from each other. Splayed bracing wires shall be taut and shall not exceed 45 degrees from the ceiling plane. Splices in bracing wires are not permitted. Space bracing assemblies as follows:
 - 1. Not more than 12 feet by 12 feet on center.
 - 2. Not more than 1/2 of the spacing given above from the perimeter wall and at the edge of vertical ceiling offsets.
- B. Ceiling grid members may be attached to no more than two adjacent walls, and at least 1/2 inch free of other walls. Where walls run diagonally to ceiling grid system runners, one end of main and cross runner should be free, and a minimum 1/2 inch clear of wall.
- C. Suspended ceiling systems with a ceiling area of 144 square feet or less, surrounded by walls which connect directly to the structure above, do not require bracing assemblies when attached to two adjacent walls.

3.4 SUPPORT AND ANCHORAGE OF LIGHT FIXTURES AND MECHANICAL SERVICES

- A. Support drop-in light fixtures and ceiling mounted mechanical air terminals and services directly by main runners or by supplemental framing which is supported by main runners and positively attached with screws or other approved connectors.
- B. Attach surface mounted fixtures to main runners with a positive clamping device made of minimum 14 gauge material. Rotational spring clamps do not comply.

3.5 TOLERANCES

- A. Maximum Variation from True Plane: 1/4 inch in 10 feet in any direction.

END OF SECTION

SECTION 09 24 00
PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal furring and lathing.
- B. Building wrap (weather-resistive barrier) under metal lath, and over gypsum sheathing.
 - 1. Provide a two-layer building wrap system as follows:
 - a. One layer of kraft building paper over one layer of HDPE product.
 - b. Flashing as recommended by building wrap manufacturer.
- C. Two-coat (brown and finish) Portland cement plaster system over CMU with integral color acrylic finish coat.
- D. Three-coat Portland cement plaster system with integral color acrylic finish coat.

1.2 RELATED SECTIONS

- A. Section 04 22 00 – Concrete Unit Masonry.
- B. Section 05 40 00 – Cold-Formed Metal Framing.
- C. Section 07 25 00 – Weather Barriers.
- D. Section 07 92 00 – Joint Sealants.
- E. Section 09 29 00 – Gypsum Board: Mat-Faced Gypsum Sheathing.
- F. Section 09 91 00 – Painting.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes in effect as of the date of issue of this Project Manual, unless indicated otherwise in CBC Chapter 35 and CFC Chapter 80.
- C. Referenced Standards:
 - 1. ASTM A641/A641M – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 2. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM A924/A924M – Standard Specification for General Requirements for Sheet Steel, Metallic Coated by the Hot-Dip Process.

4. ASTM A1011/A1011M – Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
5. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
6. ASTM C150 – Standard Specification for Portland Cement.
7. ASTM C206 – Standard Specification for Finishing Hydrated Lime.
8. ASTM C841 – Standard Specification for Installation of Interior Lathing and Furring.
9. ASTM C897 – Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters.
10. ASTM C926 – Standard Specification for Application of Portland Cement-Based Plaster.
11. ASTM C954 – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
12. ASTM C1002 – Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
13. ASTM C1063 – Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
14. ASTM D412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers – Tension.
15. ASTM D779 – Standard Test Method for Water Resistance of Paper, Paperboard, and Other Sheet Materials by the Dry Indicator Test Method.
16. ASTM D882 – Standard Test Method for Tensile Properties of Thin Plastic Sheeting.
17. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
18. ASTM D1653 – Standard Test Methods for Water Vapor Transmission of Organic Coating Films.
19. ASTM D4060 – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser.
20. ASTM D4541 – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
21. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
22. ASTM E96 – Water Vapor Transmission of Materials.
23. ASTM G155 – Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials.
24. FS TT-C-555 – Coating, Textured (for Interior and Exterior Masonry Surfaces).
25. PCA Portland Cement Plaster (Stucco) Manual.

1.4 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Provide product data on building wrap, furring and lathing components, plaster materials, characteristics and limitations of products specified, and plastering accessories.
- C. Submit manufacturer's installation instructions under provisions of Division 01.
- D. Provide two 12 inch x 12 inch samples of plaster system for each type of color and texture scheduled for installation.

1.5 QUALITY ASSURANCE

- A. Applicator: Company specializing in cement plaster work sufficient documented experience.
- B. Apply cement plaster system in accordance with ASTM C926.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Delivery, storage and handling in accordance with provisions of Division 01.
 - 1. Deliver manufactured products to job site in their original unopened containers with labels intact and legible at the time of use.
 - 2. Do not permit scattering of materials or equipment but use necessary means to ensure neatness of the site and structure at all times.
 - 3. Perform cleaning of tools and equipment only in the area designated for that purpose.
- B. Protection: Use means necessary to protect lath and plaster materials before, during and after installation and to protect the installed work and materials of other trades.
- C. Replacements: In the event of damage, immediately make repairs and replacements necessary to the approval of the Architect and at no additional cost to Owner.

1.7 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply plaster when substrate or ambient air temperature is less than 35 degrees F nor more than 90 degrees F. If freezing is expected within the next twelve hours, do not apply plaster.
- B. Maintain minimum ambient temperature of 35 degrees F during and after installation of plaster.
- C. Protect plaster from uneven and excessive evaporation during any weather conditions.

PART 2 PRODUCTS

2.1 PLASTER MATERIALS

- A. Cement: ASTM C150, Normal – Type I or Type II, low alkali; gray color; Portland Cement.
- B. Lime:
 - 1. ASTM C206, Type S.

2. Plasticity Agents to Replace Lime: Conform to CBC Section 2508 with Current ICC-ES Report. Acceptable Products: Gibco MRF and PRF Liquid and Dry Admixtures (ICC-ES ER-3213) by Gibco Industries, Pozalite (ICC-ES ER-6248) by Stockton products, or accepted equal.
- C. Aggregate: In accordance with ANSI/ASTM C897, except that gradation shall meet the following requirements:

<u>Sieve Size</u>	<u>Percent Retained on each sieve (by weight)</u>	
	<u>Maximum</u>	<u>Minimum</u>
No. 4	0	—
No. 8	10	0
No. 16	40	10
No. 30	65	30
No. 50	90	70
No. 100	100	90-95

The sand shall have more than 50 percent retained between any two consecutive sieves nor more than 25 percent between Nos. 50 and 100 sieves.

- D. Water: Clean, fresh, potable and free of mineral or organic matter that can affect plaster system components.
- E. Bonding Agent (used over CMU substrate): Polyvinyl Acetate, rewettable type (use only in areas not subject to moisture). Acceptable products:
1. "Weldcrete" – The Larsen Company.
 2. "Euco Weld" – The Euclid Chemical Company.
- F. Acrylic Finish Coat: Vapor permeable, 100 percent acrylic polymer finish coat with crushed mineral aggregates, meeting the following performance criteria:

<u>Property</u>	<u>Test Method</u>	<u>Results</u>
Adhesion to concrete	ASTM D4541	100 psi
Vapor permeability	ASTM D1653 Method A Method B	3.0 dry perms 9.7 wet perms
Abrasion resistant (1000 cy)	ASTM D4060	6.8 percent weight loss
Tensile strength Nontextured film Textured film	ASTM D412	200 psi 20 psi
Elongation Nontextured film	ASTM D412	30 percent
Wind driven rain	Federal Spec TT-C-555B	Pass
Accelerated weathering 2000 hours	ASTM G155	No cracking, blistering, checking or adhesion loss

Freeze-thaw resistance of dry film (25 cy)	Lab method	Pass
Dirt pickup	Lab method	None
Chemical resistance	ASTM D1308	Good resistance to mild acids, alkalis and salts
Flame Spread	ASTM E84	15 maximum
Smoke Developed	ASTM E84	10 maximum

1. Acceptable manufacturers:
 - a. Dryvit Weatherlastic.
 - b. Omega Akroflex.
 - c. ParexLaHabra DPR Finish.
 - d. Substitutions: Under provisions of Division 01.
2. Color and Texture: As selected by Architect.
3. Accessories:
 - a. Leveler and primer as manufactured by the finish coat manufacturer.

2.2 LATH AND LATH ACCESSORIES

- A. General: Conforming to ASTM C1063; fabricated from ASTM A924/A924M G60 galvanized steel, 26 gage minimum or ASTM A641/A641M Class 1 hot-dipped steel wire, unless noted otherwise.
- B. Metal Lath: Self furred, grooved, galvanized expanded metal flat diamond mesh; weighing 3.4 pounds per square yard; continuous horizontal grooves 1/4 inch deep at 6-3/16 inches on center as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.
 1. Acceptable Alternative Metal Lath: Structa Mega Lath as manufactured by Structa Wire Corporation with the following characteristics:
 - a. Weight: 1.95 pounds per square yard.
 - b. No. 17 gauge x No. 16 gauge galvanized cold-rolled steel wire welded to form 0.7 inch x 1.5 inch openings.
 - c. Six secondary cold-rolled flat longitudinal wires spaced nominally every 5-3/8 inches to form a twin track.
 - d. Furring:
 - 1) Width of Furring Leg: 1/4 inch.
 - 2) Furring Height: 1/4 inch to underside of cross wire.
 - 3) Furring Spacing: 2-1/8 inch on center.
 - 4) Every cross wire is furred.
- C. Metal Lath corner reinforcement at exterior corners: Self furring expanded metal flat diamond mesh; weighing 3.4 pounds per square yard; galvanized finish as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

- D. Expanded Corner Bead: Formed steel, minimum 26 gauge thick, shaped to permit complete embedding in plaster; galvanized finish; No. 1A as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.
- E. Casing Beads: Formed steel, minimum 26 gauge thick; of longest possible length; sized and profiled to suit application; galvanized finish; No. 66 casing bead (with expanded flange at CMU only) as manufactured by ClarkDietrich Building Systems, Cemco, Amico, Brand X Metals Inc., or accepted equal.
- F. Weep Screeds: Formed steel, minimum 26 gauge thick; square flange, 3-1/2 inch high leg, of longest possible length; sized and profiled to suit application; galvanized finish; No. 7 foundation sill screed as manufactured by ClarkDietrich Building Systems, Cemco, Amico, Brand X Metals Inc., or accepted equal.
- G. Control Joints: Formed steel; minimum 26 gauge accordion profile, expanded metal flanges each side; of longest possible length; sized and profiled to suit application; galvanized finish; No. XJ 15, as manufactured by ClarkDietrich Building Systems, Cemco, Amico, Brand X Metals Inc., or accepted equal.
- H. Strip Mesh at horizontal surfaces and corners of openings: Expanded metal flat diamond; weighing 3.4 pounds per square yard; galvanized finish; 4 inches wide as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.
- I. Substitutions: Under provisions of Division 01.

2.3 LATH ANCHORAGES

- A. Anchorages at metal framing: Install galvanized # 8 wafer head screws at 6 inches on center vertically at each stud x length as required for 3/8 inch penetration into framing members.
 - 1. ASTM C954, self-drilling and self tapping screws for heavy gauge steel framing (0.033 inch to 0.112 inch thick). Minimum 500 hour corrosion resistant finish per ASTM B117.
 - 2. ASTM C1002, self drilling and self tapping screws for light gauge steel framing (less than 0.033 inch thick). Minimum 500 hour corrosion resistant finish per ASTM B117.

2.4 BUILDING WRAP (WEATHER RESISTIVE BARRIER)

- A. Building wrap shall consist of two layers; one layer of kraft building paper installed over one layer of HDPE product.
- B. HDPE and Flexible Flashing Products: Refer to Section 07 25 00.
- C. Kraft Building Paper: Grade D water-vapor-permeable, asphalt-saturated kraft building paper.
 - 1. Manufacturer and Product: Jumbo Tex Classic as manufactured by Fortifiber Building Systems Group or accepted equal.
 - 2. Properties:
 - a. Water Holdout: 20 minutes per ASTM D779.
 - b. Vapor Permeability: 29 perms/200 grams per ASTM E96.
 - c. Tensile Strength: Tested in accordance with ASTM D882.
 - 1) Cross Machine Direction: 29 lbf per inch.
 - 2) Machine Direction: 70 lbf per inch.

- d. Surface Burning Characteristics: Class I (NFPA Class A) per ASTM E84.
 - 1) Flame Spread: 30 per ASTM E84.
 - 2) Smoke Developed: 60 per ASTM E84.

2.5 CEMENT PLASTER MIXES

- A. Mix and proportion cement plaster in accordance with ASTM C926 and PCA Portland Cement/Stucco Manual. Mix plasticity agents (lime replacement admixtures) in accordance with manufacturer's written instructions and ICC-ES Report.
- B. Mix and proportion cement plaster as follows:
 - 1. Scratch Coat Proportions: One part Portland cement, four parts aggregate and three ounces PRF admixture.
 - 2. Brown Coat Proportions: One part Portland cement, five parts aggregate and three ounces PRF admixture.
 - 3. Finish Coat Proportions: Per manufacturer's recommendations.
- C. Mix only as much plaster as can be used in one hour.
- D. Mix materials dry, to uniform color and consistency, before adding water.
- E. Protect mixtures from frost, contamination, and evaporation.
- F. Do not retemper mixes after initial set has occurred.

2.6 SEALANTS

- A. Sealants used in conjunction with the scratch, brown, and finish coats shall only be the type recommended by the product manufacturer(s).

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Inspect the installed work of other trades and verify that such work is complete to the point work of this Section may begin.
- C. Verify that substrate is plumb, level, square and aligned.
- D. Verify that the joints at concrete masonry walls scheduled to receive cement plaster finish are struck flush.
- E. Report in writing conditions which might adversely affect the performance of installed lath and plaster to the Architect.
- F. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Protect surfaces near the work of this Section from damage or disfiguration.

3.3 BUILDING WRAP (WEATHER RESISTIVE BARRIER) INSTALLATION

- A. At all areas of three-coat Portland cement plaster system, apply two-layers of building wrap (weather resistive barrier). Install one layer of kraft building paper over one layer of HDPE product.
- B. HDPE and Flexible Flashing Product Installation: Refer to Section 07 25 00.
- C. Kraft Building Paper Installation: Apply kraft building paper over HDPE product, horizontally with a 3-inch overlap and a 6-inch end lap and fasten in place. Joints shall be staggered over HDPE product joints.
 - 1. Extend into jambs of openings and seal corners with tape.
 - 2. Seal fasteners and penetrations with compatible sealing tape.

3.4 LATH AND LATH ACCESSORIES INSTALLATION

- A. Install metal plaster bases and accessories in conformance with ASTM C1063. All vertically placed accessories shall be installed continuously; breaks shall occur only at horizontally placed accessories where they intersect vertically placed accessories.
- B. Lath shall be installed as specified in CBC Sections 2507.3 and 2510 and CBC Table 2507.2 for wire fabric lath. The lath shall be installed with the cross wires parallel to the framing and shall be attached with fasteners at the furring crimps.
- C. Apply metal lath with the long dimension across the supports with true, even surfaces, and without sags or buckles in accordance with ASTM C841. Orient metal lath on vertical surfaces to provide maximum mechanical bond with plaster. Apply upper sheets to overlap lower sheets.
- D. Attach metal lath to framing members at maximum 6 inches on center.
- E. Lath shall stand off substrate immediately behind the lath a minimum of 1/4 inch.
- F. Continuously reinforce internal angles with additional layer of lath, 6 inches wide minimum, except where the metal lath returns 3 inches from corner to form the angle reinforcement. Fasten at perimeter edges only.
- G. Place corner bead with mesh at corners. Attach with fasteners as recommended by manufacturer, spaced not more than 18 inches on center. Fasten at outer edges only.
- H. Place minimum 4 inch wide strip mesh diagonally at corners of lathed openings. Secure rigidly in place. Extend minimum 8 inches diagonally each direction from point of corner.
- I. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- J. Install accessories to lines and levels.

3.5 MASONRY PREPARATION

- A. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- B. Apply bonding agent per manufacturer's recommendations prior to application of brown coat.

- C. Install accessories to lines and levels.

3.6 CONTROL JOINTS

- A. At stud framing, locate exterior control joints every twelve feet in each direction, or as indicated on the Drawings. Vertical control joints shall be continuous; terminate horizontal control joints at vertical control joints. Install on top of metal lath and attach by wiring to metal lath.
- B. At masonry walls, locate plaster control joints over masonry control joints.

3.7 PLASTERING

- A. Apply plaster in accordance with CBC Section 2512 and ASTM C926.
- B. Control plaster thickness and surface evenness using grounds or screeds. Use temporary screeds or plaster screeds within plastered areas to supplement fixed grounds and screeds.
- C. Apply scratch coat to a nominal thickness of 3/8 inch over metal reinforcement. Use sufficient material to form good keys, to completely embed the lath, and to allow for scoring of cement plaster surface.
 - 1. After application, lightly score scratch coat horizontally.
 - 2. If brown coat cannot be applied within four hours, keep scratch coat moist for a minimum of 48 hours before applying brown coat.
- D. At masonry walls: Apply brown coat to a nominal thickness of 3/8 inch directly over bonding agent. Rod brown coat straight and true in all directions.
- E. Apply brown coat to a nominal thickness of 3/8 inch over scratch coat. Use sufficient material and pressure to ensure a tight, uniform bond to scratch coat. Rod brown coat straight and true in all directions.
- F. Moist cure brown coat for a minimum of seven days before applying finish coat.

3.8 CURING OF BASE COAT (SCRATCH AND BROWN COATS)

- A. Moist cure base coat when ambient temperature is 77 degrees F or higher and/or when relative humidity is below 70 percent and conditions are windy.
- B. Moist cure base coat as follows:
 - 1. Only when base coat has set and is hard,
 - 2. In the morning and late afternoon for at least two days,
 - 3. With a fine mist of clean water; do not saturate,
 - 4. Cover with polyethylene sheets to retard evaporation during extreme weather conditions,
 - 5. Do not cure base coat that is subject to freezing.

3.9 ACRYLIC FINISH COAT

- A. Surface Preparation:
 - 1. Surfaces to receive acrylic finishes must be structurally sound, clean and dry. Cement plaster base coats must be properly cured and free of all grease, mildew, fungus, efflorescence, and any other contaminant.

2. Contaminants must be removed by wire brush, pressure washing or sandblasting. Efflorescence shall be removed by a diluted acid wash and rinse.
3. Loose deteriorated stucco and masonry must be removed and repaired. Soft, dry dusty surfaces must be properly treated to insure adhesion of acrylic finish.
4. Verify that basecoat pH level is below 10.
5. Verify that ambient temperature is at least 40 degrees F and rising during application and for at least 24 hours after application.
6. Apply sealant as recommended by finish coat manufacturer where appropriate at terminations and the junctions of dissimilar materials.
7. Apply a leveler as necessary to achieve a flat surface prior to the application of the finish coat. The leveler shall be manufactured by the same manufacturer as the finish coat and shall be compatible for use with the plaster brown coat, the primer and the acrylic finish coat.

B. Priming:

1. Apply primer to all repaired, patched or chalking surfaces. An existing coating totally free of chalking does not require priming.
2. For improved finish coverage and workability, apply primer over Portland cement base coats.
3. Allow 24 hours for primer to dry before application of acrylic finish coats.
4. Primer shall be from the same manufacturer as the finish coat manufacturer.

C. Application:

1. Refer to manufacturer's instructions for application of leveler, primer and acrylic finish.
2. The finish coat shall be applied and leveled to the minimum required thickness in the same application.
 - a. The finish coat shall be applied and textured continually over the wall surface in order to maintain a wet edge and provide a uniform appearance.
 - b. Work to corners or joints and do not allow the partially applied material to set up within a distinct wall area.
 - c. Achieve the final texture by using trowels or floats with a variety of motions to create the specified texture and to match approved samples.
 - d. At exterior corners, the finish coat shall be applied so that the nose wire is covered with a minimum of 1/8 inch of plaster.

3.10 PAINTING

- A. Paint over acrylic finish coat under provisions of Section 09 91 00.

3.11 TOLERANCES

- A. Maximum Variation from True Flatness: 1/8 inch in 8 feet, properly meeting adjacent surfaces and materials.

3.12 CLEAN UP

- A. Promptly remove and clean plaster from all surfaces not scheduled to receive this finish. Verify cleaning recommendations from each substrate manufacturer prior to proceeding with any cleaning operations.
- B. Clean up and remove from the site all excess and waste materials generated by the installation of the plaster system.

END OF SECTION

SECTION 09 29 00

GYPSUM BOARD

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Gypsum board:
 - 1. Type X gypsum board.
 - 2. Moisture resistant gypsum board.
 - 3. Hi-impact gypsum wall systems.
- B. Cementitious backer board.
- C. Accessories.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 07 21 00 – Thermal Insulation.
- C. Section 07 84 00 – Firestopping.
- D. Section 07 92 00 – Joint Sealants.
- E. Section 08 11 13 – Hollow Metal Doors and Frames.
- F. Section 09 21 16.23 – Gypsum Board Shaft Wall Assemblies.
- G. Section 09 22 16 – Non-Structural Metal Framing.
- H. Section 09 22 26.23 – Metal Suspension Systems.
- I. Section 09 30 00 – Tiling.
- J. Section 09 65 00 – Resilient Flooring.
- K. Section 09 68 13 – Tile Carpeting.
- L. Section 09 77 10 – Sanitary Wall and Ceiling Finishes.
- M. Section 09 81 00 – Acoustic Insulation.
- N. Section 09 91 00 – Painting.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.

C. Referenced Standards:

1. ANSI A108.11 – Interior Installation of Cementitious Backer Units.
2. ANSI A118.1 – Dry-Set Portland Cement Mortar.
3. ANSI A118.4 – Latex-Portland Cement Mortar.
4. ANSI A118.9 – Test Methods and Specifications for Cementitious Backer Units.
5. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
6. ASTM C473 – Standard Test Method for Physical Testing of Gypsum Panel Products.
7. ASTM C475/C475M – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
8. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.
9. ASTM C954 – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
10. ASTM C1002 – Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.
11. ASTM C1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
12. ASTM C1325 – Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Interior Substrate Sheets.
13. ASTM C1396/C1396M – Standard Specification for Gypsum Board.
14. ASTM C1629 – Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel products and Fiber-Reinforced Cement Panels.
15. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
16. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
17. ASTM F1267 – Standard Specification for Metal, Expanded, Steel.
18. GA-214 – Recommended Levels of Gypsum Board Finish.
19. GA-216 – Application and Finishing of Gypsum Board.
20. GA-253 – Application of Gypsum Sheathing.
21. GA-600 – Fire Resistance Design Manual.
22. UL Fire Resistance Directory.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specification for each product.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum five years experience.
2. Installer Qualifications: Firm specializing in installing work specified in this Section acceptable to manufacturer with experience on at least five projects of similar nature in past three years.

B. Regulatory Requirements: Comply with requirements of CBC Chapter 25.

C. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Division 01.

B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.

C. Storage and Protection: Store materials in a dry secure place; neatly stacked to prevent sagging or damage to edges, ends, and surfaces. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Interior Environmental Requirements:

1. Maintain room temperature at not less than 40 degrees F during application of gypsum board. Maintain room temperature at not less than 50 degrees F for joint treatment, texturing, and decoration for 48 hours prior to and continuously thereafter until completely dry.
2. Provide adequate ventilation during installation and curing period.
3. Prevent exposure to excessive or continuous moisture before, during, and continuously after installation. Eliminate sources of moisture immediately.
4. Protect gypsum board from direct exposure to rain, snow, sunlight, or excessive weather conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. USG – United States Gypsum Company, Chicago, IL 60606; toll free: 800-874-4968, phone: 312-606-4000, fax: 312-606-5566, www.usg.com.
2. National Gypsum Co., Charlotte, NC 28211; phone: 704-365-7300, fax: 800-329-6421, www.nationalgypsum.com.
3. GP-Gypsum – Georgia-Pacific Corp., Atlanta, GA 30303; toll free: 800-824-7503, phone: 404-652-4000, fax: 404-230-5624, www.gp.com.
4. Pabco Gypsum, Newark, CA 94560; phone: 510-792-9555, fax: 510-794-8725, www.pabco gypsum.paccoast.com.

5. CertainTeed Corporation, Valley Forge, PA; toll free: 800-233-8990,
www.certainteed.com.

B. Substitutions: Under provisions of Division 01.

2.2 GYPSUM BOARD

- A. Type X: ASTM C1396/1396M; 5/8-inch thick; fire resistant core; maximum permissible length; ends square cut, tapered edges.
 1. Acceptable Products:
 - a. Sheetrock Brand Firecode Core manufactured by USG,
 - b. Gold Bond Brand XP Fire-Shield Gypsum Board manufactured by National Gypsum,
 - c. ToughRock Fireguard manufactured by G-P Gypsum,
 - d. or accepted equal.
- B. Moisture Resistant Gypsum Board: ASTM C1396/C1396M; 5/8 inch thick Type X, moisture and mold resistant core, encased in moisture resistant paper facers; maximum permissible length; ends square cut, tapered edges.
 1. Average water absorption after two-hour immersion per ASTM C473: 5 percent or less.
 2. Mold and mildew resistance per ASTM D3273: Minimum average score 8.
 3. Acceptable Products:
 - a. Sheetrock Brand Mold Tough Gypsum Panels manufactured by USG,
 - b. Gold Bond Brand XP Gypsum Board manufactured by National Gypsum,
 - c. ToughRock Mold Guard manufactured by G-P Gypsum,
 - d. or accepted equal.
- C. Hi-Impact Gypsum Wall System: 5/8 inch Type X, Level 3 surface abrasion resistance, Level 1 indentation resistance, Level 3 hard-body impact resistance, and Level 3 soft-body impact resistance per ASTM C1629.
 1. Acceptable Systems:
 - a. US Gypsum Co.: Mold Tough VHI fire rated gypsum board panel with two coats Imperial Veneer,
 - b. National Gypsum Co.: Gold Bond Brand Hi-Impact XP Gypsum Board with two coats Kal-Kote veneer plaster,
 - c. or accepted equal.

2.3 ACCESSORIES

- A. Corner Bead, Edge Trim, and Decorative Dividers: ASTM C1047; zinc-coated sheet steel.
- B. Control Joints: ASTM C1047; roll-formed zinc joint with removable protected opening; provided in accordance with UL fire rated assemblies. Acceptable product: Zinc Control Joint No. 093 manufactured by USG, or accepted equal.
- C. Screws:
 1. ASTM C1002, Type S or Type A; bugle head; self drilling and self tapping screws for light gauge steel framing (less than 0.033 inch thick).

2. ASTM C954; bugle head; self-drilling and self tapping screws for heavy gauge steel framing (0.033 inch to 0.112 inch thick).
- D. Jointing Tape: ASTM C475/C475M; 2 inch wide heavy duty paper joint tape.
- E. Joint Compound: ASTM C475/C475M.
- F. Primer-Surfacer (used in lieu of skim coat in a Level 5 finish): High-build interior coating finish applied with an airless sprayer. Products: Sheetrock Brand Primer-Surfacer Tuff-Hide manufactured by USG, ProForm Brand Surfacer/Primer manufactured by National Gypsum, or accepted equal. Note: walls applied with primer-surfacer do not require drywall paint primer prior to application of finish coats.
- G. Acoustical Sealant: Refer to Section 07 92 00.
- H. Firestop Putty Pads for Electrical Boxes: Intumescent moldable firestop putty pad. Acceptable products: SSP4S 7.25 inches by 7.25 inches or SSP9S 9 inches by 9 inches manufactured by Specified Technologies Inc. (STI), Somerville, NJ; 800-992-1180, www.stifirestop.com, or accepted equal.
- I. Security Lath (Metal Mesh): 0.070 inch thick flattened expanded carbon steel mesh with 57 percent open area; pre-galvanized high strength low alloy (HSLA) meets or exceeds ASTM F1267 Type II, Class 1; 0.500 inch by 1.260 inch diamond openings; 1.40 pounds per square foot. Acceptable product: No. ASM .50-13F manufactured by Amico – Alabama Metal Industries Corporation (toll free: 800.366.2642; phone: 205.787.2611; URL: <http://www.amico-securityproducts.com>), or accepted equal.
 1. Construction: Made from sheet steel that is simultaneously slit and stretched into a rigid open diamond mesh making one continuous sheet that cannot unravel.
 2. Fastening system - Secura Clips as manufactured by Amico attached with a flat head bugle type self-tapping screw long enough to penetrate the steel stud at least 3/8 inch.
 3. Closure strip – Amico two-piece Secura Lath Closure Strip.

2.4 CEMENTITIOUS BACKER BOARD

- A. Cement Board: ANSI A118.9 and ASTM C1325; polymer-modified cementitious board, with alkali-resistant fiberglass mesh reinforcing facers (front and back); long edges wrapped.
 1. Thickness: 5/8 inch.
 2. Acceptable Products:
 - a. Durock Brand Cement Board by United States Gypsum Co.,
 - b. PermaBase Brand Cement Board by National Gypsum Co.,
 - c. or accepted equal.
- B. Accessories:
 1. Screws: No. 6 gauge by sufficient length to penetrate 3/8 inch into steel framing, self-drilling, ribbed wafer head screws or ribbed bugle head screws; minimum 500 hour corrosion resistant finish per ASTM B117.
 2. Jointing Tape: Alkali-resistant fiberglass mesh tape; 2 inches wide.
 3. Bonding and Jointing Materials: ANSI A118.1, dry-set Portland cement mortar; or ANSI A118.4, latex Portland cement mortar.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions.
- B. Verify framing for acceptable placement, spacing, and tolerance (alignment and plumb).
- C. Verify that framing and furring are securely attached.
- D. Verify that all blocking, headers, and supports are in place to support plumbing fixtures, grab bars, towel racks, shelves, and similar items.
- E. Verify that insulation is secured.
- F. Verify firestopping work, refer to Section 07 84 00.
- G. Report unacceptable conditions to the Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 FIRESTOPPING AND SEALANTS

- A. Install intumescent moldable pads over backs and sides of all electrical junction and utility boxes at fire rated walls.
- B. Apply acoustical sealant at partitions per sealant manufacturer's instructions. Refer to Section 07 92 00.

3.3 GYPSUM BOARD INSTALLATION

- A. Install gypsum board to framing and furring members in accordance with manufacturer's recommendations, GA-216 or ASTM C840, and as specified in this Section.
- B. Install gypsum board with separate panels in moderate contact, do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints.
- C. Install gypsum board in most economical direction, using maximum practical lengths, with edges occurring over firm bearing. Install 1/4 inch (nominal) above rough floor or curb. Cut out gypsum board as required to make neat close joints around openings.
- D. In vertical applications, provide lengths required to reach full height of vertical surfaces in one continuous piece.
- E. Where gypsum board is carried full height to structure above, provide for deflection of structure by undercutting board 3/8 inch (nominal) and sealing top edge of board to substrate with a continuous bead of sealant to form an elastic closure.
- F. Use screws to fasten gypsum board to framing.
- G. Treat cut edges and holes in moisture resistant gypsum board per manufacturer's recommendations.
- H. Place corner beads at all exterior corners. Use longest practical length. Place edge trims where gypsum board abuts dissimilar materials.

- I. Control Joints: Install control joints where indicated on the Drawings. Where not specifically indicated, install consistent with lines of building spaces as directed by Architect; and as a minimum, install as follows:
 - 1. Where a partition, wall, or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
 - 2. Where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet.
 - 3. In interior ceilings without perimeter relief so that linear dimensions between control joints do not exceed 30 feet and total area between control joints does not exceed 900 square feet.
 - 4. Where ceiling framing members change direction.
 - 5. Where a partition transitions from floor-supported framing to overhead hung framing.
- J. Attach metal corner beads, edge trim, decorative dividers, and control joints to the supporting construction at 9 inches on center maximum spacing using same fasteners used to attach gypsum board panels.

3.4 FIRE-RESISTANT ASSEMBLIES

- A. Install fire rated assemblies using materials, application methods including types and spacing of fasteners, and framing in accordance with the specified UL Fire Resistive Design Number, GA-600 File Number, or CBC Table 721.1.
- B. Completely seal joints of fire-rated gypsum board enclosures in accordance with UL or GA listed assembly requirements. Seal penetrations through rated partitions and ceilings in accordance with tested systems. Refer to Section 07 84 00.

3.5 CEMENTITIOUS BACKER BOARD INSTALLATION

- A. Install cementitious backer boards in accordance with ANSI A108.11 and manufacturer's instructions.
- B. [Install moisture retarding membrane.] Place and fasten boards per manufacturer's instructions.
- C. Apply boards with ends and edges closely butted but not forced together. Center end or edge joints on framing and stagger joints in adjacent rows.
- D. Fasten boards to framing using specified fasteners. Drive fasteners into field of board first, working toward ends and edges. Hold boards in firm contact with framing while driving fasteners. Space fasteners maximum 8 inches on center with perimeter fasteners at least 3/8 inch from ends and 5/8 inch from edges.
- E. Drive screws so bottoms of heads are flush with surface of boards to provide firm panel contact with framing. Do not overdrive screws and replace any screws that are stripped.
- F. Provide additional blocking where required to permit proper attachment. Edges or ends of unit parallel to framing shall be continuously supported.

3.6 JOINT TREATMENT AND FINISH TEXTURE

- A. Finish gypsum board surfaces in accordance with ASTM C840, GA-214 and GA-216.

- B. Remove dirt, oil, and other materials that may cause lack of bond from all surfaces to receive joint compound.
- C. Set mechanical fasteners below the plane of the board.
- D. Tape, fill, and sand all joints, edges and corners to produce smooth surface ready to receive finishes. Fill all dents, gouges, recesses, or other depressions with joint compound to produce a monolithic surface.
- E. Feather coats onto adjoining surfaces so that camber is maximum 1/32-inch.
- F. Levels of Finish: Finish gypsum board surfaces in accordance with GA-214 as follows:

Area	Finish
Plenum areas above ceilings.	Level 1 finish.
Standard and moisture resistant gypsum backing board (substrate for adhesive applied finish material).	Level 2 finish.
Smooth finish; satin/eggshell paint finish.	Level 4 finish. Level 5 finish where critical (severe) lighting condition occurs (refer to GA-214 for description of critical lighting).
Smooth finish; semi-gloss paint finish.	Level 5 finish.

3.7 TOLERANCES

- A. Maximum variation from true flatness: 1/4 inch in 10 feet in any direction.
- B. Maximum surface variation of substrate for walls to receive ceramic tile: Refer to Section 09 30 00.

3.8 CLEANING AND PROTECTION

- A. Cleaning and Repair: Clean surfaces that have been spotted or soiled during wallboard application.
- B. Defective Work: Remove and replace defective work that cannot be satisfactorily repaired, at the direction of the Architect, with no additional cost to the Owner.
- C. Protection: Protect installed work against damage from other construction work.
- D. Upon completion of the work under this Section, remove all surplus material, rubbish and debris from the premises and leave floors broom clean.

END OF SECTION

SECTION 09 30 00

TILING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Ceramic tile.
- B. Setting materials including adhesives and mortar.
- C. Tile grout.
- D. Sealants.
- E. Membranes:
 - 1. Crack isolation.
 - 2. Waterproofing.
- F. Accessories.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 07 92 00 – Joint Sealants.
- C. Section 09 29 00 – Gypsum Board.
- D. Section 10 21 13.36 – Composite Toilet Compartments.
- E. Section 10 28 13 – Toilet Accessories.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards and Manuals:
 - 1. ANSI A108.1B – Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar.
 - 2. ANSI A108.5 – Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
 - 3. ANSI A108.6 – Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy.
 - 4. ANSI A108.10 – Installation of Grout in Tilework.
 - 5. ANSI A108.11 – Interior Installation of Cementitious Backer Units.

- 6. ANSI A108.13 – Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone.
- 7. ANSI A108.17 – Installation of Crack Isolation Membranes.
- 8. ANSI A118.3 – Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive.
- 9. ANSI A118.4 – Latex-Portland Cement Mortar.
- 10. ANSI A118.9 – Cementitious Backer Units.
- 11. ANSI A118.10 – Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone Installations.
- 12. ANSI A118.12 – American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation.
- 13. ANSI A137.1 – Ceramic Tile.
- 14. ASTM A82 – Standard Specifications for Steel Wire, Plain, for Concrete Reinforcement.
- 15. ASTM A185 – Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete.
- 16. ASTM C144 – Standard Specification for Aggregate for Masonry Mortar.
- 17. ASTM C150 – Standard Specification for Portland Cement.
- 18. ASTM C206 – Standard Specification for Finishing Hydrated Lime.
- 19. ASTM C207 – Standard Specification for Hydrated Lime for Masonry Purposes.
- 20. ASTM C373 – Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products.
- 21. ASTM C648 – Standard Test Method for Breaking Strength of Ceramic Tile.
- 22. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.
- 23. ASTM C1027 – Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile.
- 24. ASTM C1028 – Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
- 25. MIA Design Manual.
- 26. TCNA Handbook for Ceramic, Glass, and Stone Tile Installation by Tile Council of North America, Inc.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Submit product data indicating material specifications, characteristics and instructions for using adhesives and grouts.
- C. Samples: Submit two samples of each type and color of ceramic tile and trim.
- D. Closeout Submittals: Cleaning and maintenance data.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum ten years experience.
2. Installer Qualifications: Firm specializing in installing work specified in this Section acceptable to manufacturer with experience on at least five projects of similar nature in past three years.

B. Perform work in accordance with TCNA Handbook for Ceramic Tile Installation and ANSI A108 Series. Provide a copy of TCNA Handbook for Ceramic Tile Installation and ANSI A108 Series at the job site.

C. Pre-Installation Meetings:

1. Conduct pre-installation meeting in accordance with Division 01.
2. Convene pre-installation meeting prior to commencing work of this Section.
3. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Division 01.

B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.

C. Storage and Protection: Store materials in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Perform ceramic tile work when the ambient temperature is at least 50 degrees F and rising. Maintain temperature above 50 degrees F while the work is being performed for at least seven days after completion of the work.

B. Do not install adhesives in a closed, unventilated environment.

1.8 WARRANTY

A. Comply with provisions of Division 01.

B. Provide manufacturer's standard performance warranties that extend beyond a one-year period.

1.9 MAINTENANCE

A. Extra Materials: Provide five percent extra of the total square footage of each type and color of tile installed. Comply with provisions of Division 01.

B. Operation and Maintenance Data: Submit cleaning and maintenance data in accordance with Division 01.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers - Tile:

1. Daltile Corp., Dallas, TX; (800) 933-8453, www.daltile.com.
2. Crossville Inc., Crossville, TN; (931) 484-2110, www.crossvilleinc.com.
3. United States Ceramic Tile Co., East Sparta, OH; (330) 866-5531, www.usctco.com.
4. American Olean Tile Co., Dallas, TX; (888) 268-8453, www.aotile.com.
5. Interceramic, Garland, TX; (800) 688-5671, www.interceramic.com.
6. Emser Tile, Los Angeles, CA; (323) 650-2000, www.emser.com.

B. Acceptable Manufacturers - Setting Materials:

1. Custom Building Products, Seal Beach, CA; (209) 518-1153, www.custombuildingproducts.com.
2. Laticrete International, Inc., Bethany, CT; (800) 243-4788, www.laticrete.com.
3. Mapei Corp., Deerfield Beach, FL; (800) 426-2734, www.mapei.com.

C. Acceptable Manufacturers - Grout:

1. Custom Building Products.
2. Laticrete International, Inc.
3. Mapei Corp.

D. Acceptable Manufacturers - Sealants:

1. Custom Building Products.
2. Laticrete International, Inc.
3. Mapei Corp.
4. Color Caulk, Inc.

E. Acceptable Manufacturers - Crack Isolation and Waterproofing Membranes:

1. Custom Building Products.
2. Laticrete International, Inc.
3. Mapei Corp.

F. Acceptable Manufacturers - Accessories:

1. Schlüter-Systems L.P., Plattsburgh, NY; (800) 472-4588, www.schluter.com.
2. Custom Building Products, Seal Beach, CA; (209) 518-1153, www.custombuildingproducts.com.

G. Single Source Responsibility: Provide setting, grouting, and membrane materials from a single manufacturer to ensure system compatibility and quality, and to comply with manufacturer's warranty requirements.

H. Substitutions: Under provisions of Division 01.

2.2 CERAMIC TILE

- A. General: ANSI A137.1, Standard Grade. Packaging shall be grade sealed. Seals shall be marked to correspond with the marks on the signed master grade certificate.
- B. Properties:
1. Impact resistant with a minimum breaking strength of 90 pounds for wall tiles and 250 pounds for floor tiles in accordance with ASTM C648.
 2. Water absorption shall be 0.50 percent maximum in accordance with ASTM C373.
 3. Floor tiles shall have a minimum static coefficient of friction of 0.6 for walking surfaces and 0.8 for ramps in accordance with ASTM C1028.
 4. Floor tiles shall be minimum Class IV – Heavy Traffic durability when tested in accordance with ASTM C1027 for abrasion resistance as related to foot traffic.
- C. Products:
1. Floor Tiles: Daltile Corp., Industrial Park Series (CT1).
 - a. Nominal Size: 12 inches by 24 inches.
 - b. Thickness: 3/8 inch.
 - c. Color: As indicated on Drawings.
 2. Floor Tiles: Daltile Corp., Industrial Park Series (CT2).
 - a. Nominal Size: 12 inches by 12 inches.
 - b. Thickness: 3/8 inch.
 - c. Color: As indicated on Drawings.
 3. Wall Tiles: Crossville Inc., Shades Series (CT3 and CT6).
 - a. Nominal Size: 6 inches by 24 inches.
 - b. Thickness: 10.5 mm.
 - c. Surface Finish: Unpolished.
 - d. Color: As indicated on Drawings.
 4. Floor Tiles: Daltile Corp., Continental Slate Series (CT4).
 - a. Nominal Size: 6 inches by 6 inches.
 - b. Thickness: 5/16 inch.
 - c. Color: As indicated on Drawings.
 5. Wall Tiles: Daltile Corp., Continental Slate Series (CT5).
 - a. Nominal Size: 12 inches by 12 inches.
 - b. Thickness: 5/16 inch.
 - c. Color: As indicated on Drawings.
 6. Wall Tiles: Crossville Inc., Shades Series Mosaic (CT7).
 - a. Nominal Size: 2 inches by 13 inches.
 - b. Thickness: 10.5 mm.
 - c. Surface Finish: Metallic.
 - d. Color: As indicated on Drawings.

- D. Special Shapes (trimmers, angles, bases, caps, stops, and returns): Same nominal size as field tile; rounded concave and convex surfaces; same properties as field tile (moisture absorption, surface finish, and color). Provide radius at all outside vertical and horizontal corner tile. Provide base at wall tile.
- E. Wall Base: Unless otherwise indicated, wall base shall be 6 inches high with 3/8 inch minimum cove radius.

2.3 SETTING MATERIALS

- A. Latex Portland Cement Mortar: Prepackaged, one-part, high performance, latex polymer modified dry-set, thin-set mortar. Meets or exceeds ANSI A118.4.
 - 1. Products:
 - a. Custom Building Products MegaLite Crack Prevention Mortar.
 - b. Laticrete 254 Platinum Multipurpose Thin-Set Mortar.
 - c. Mapei Ultraflex 3.
 - d. Or accepted equal.
- B. Latex Portland Cement Mortar for Large Format Tile: Prepackaged, one-part, high performance, latex polymer modified dry-set, thin-set mortar. Meets or exceeds ANSI A118.4.
 - 1. Products:
 - a. Custom Building Products ProLite Tile & Stone Mortar.
 - b. Laticrete 4-XLT.
 - c. Mapei Ultraflex LFT.
 - d. Or accepted equal.
- C. Mortar Bed:
 - 1. Materials:
 - a. Cement: Portland cement, ASTM C150 Type I.
 - b. Aggregate: ASTM C144, clean, graded, and passes a 16-mesh screen.
 - c. Hydrated Lime: ASTM C206, Type S or ASTM C207, Type S.
 - d. Water: Clean and potable.
 - 2. Mortar Mix: Comply with ANSI A108.1A Section A-4.1a.2.

2.4 GROUTING MATERIALS

- A. Epoxy Grout: 100 percent solids epoxy grout; stainless, non-sagging, water cleanable; conforming to ANSI A118.3.
 - 1. Products:
 - a. Custom Building Products CEGLite Commercial Epoxy Grout.
 - b. Laticrete Spectralock.
 - c. Mapei Kerapoxy IEG.
 - d. Or accepted equal.
 - 2. Colors as selected by Architect.

2.5 SEALANTS

- A. Latex siliconized sealant, non-sanded, in conformance with ASTM C920, Type S, Grade NS, Class 25, Uses NT, M and G. Color to match grout color.

1. Products:

- a. Custom Building Products 100% Silicone Commercial Caulk.
- b. Laticrete Premium Tub and Tile Caulk.
- c. Mapei Keracaulk.
- d. Color Caulk, Inc. Latex Siliconized Sealant.
- e. Or accepted equal.

2.6 MEMBRANES

- A. Crack Isolation Membrane: Trowel applied or self-adhering sheet membrane; load bearing; bonded; conforming to ANSI A118.12.

1. Products:

- a. Custom Building Products Fracture Free.
- b. Laticrete Blue 92.
- c. Mapei Mapelastic 2, Crack Isolation Membrane, flexible thin, 40-mil lightweight, load-bearing, fabric-reinforced "peel-and-stick" crack-isolation membrane.
- d. Or accepted equal.

- B. Interior Waterproofing Membrane: Trowel applied, liquid, load bearing; bonded; conforming to ANSI A118.10.

1. Products:

- a. Custom Building Products Custom 9240 Waterproofing and Crack Prevention Membrane. Self-curing liquid elastomeric membrane with reinforcing fabric.
- b. Laticrete 9235 Waterproofing Membrane with Microban. Self-curing liquid elastomeric membrane with reinforcing fabric forming a flexible, seamless waterproof membrane bonded to the substrate. Contains an antimicrobial protection to inhibit growth of mold and mildew.
- c. Mapei Mapelastic 400, premixed, flexible, thin, ultra fast-drying waterproofing membrane.
- d. Or accepted equal.

2.7 ACCESSORIES

- A. Mortar Bed Reinforcing Mesh: ASTM A82 and ASTM A185; galvanized welded wire fabric; 16 gauge wire; 2 inch by 2 inch mesh.
- B. Expansion Joints: Dilex-EZ 6+9 manufactured by Schlüter-Systems L.P., Custom Building Products, or accepted equal.
- C. Trim: Rondec in stainless steel manufactured by Schlüter-Systems L.P., Custom Building Products, or accepted equal.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions. Verify substrate is plumb, level, true to line and square.
- B. Substrate surface conditions shall conform to the requirements of ANSI A108 for the type of substrate specified and for workmanship.
- C. Maximum surface variation of substrate shall not exceed maximum limits as specified in specific TCNA Methods or as follows, whichever is more stringent.

Type	Walls	Floors
Latex Portland Cement Mortar	1/8 inch in 8 feet	1/8 inch in 10 feet
Mortar Bed	Not Applicable	1/4 inch in 10 feet

- D. Tile work shall not be started until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring waterproofing membrane have been installed and tested.
- E. Verify that the joints at concrete masonry walls scheduled to receive tile finish are struck flush.
- F. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 PREPARATION

- A. Roughen the surface of concrete walls scheduled to receive tile finish to facilitate bonding.

3.3 INSTALLATION

A. General:

1. Install in accordance with TCNA Handbook for Ceramic Tile Installation and ANSI A108.
2. Do not interrupt tile pattern through openings.
3. In areas requiring floor and wall tiles, floor tile installation shall not begin until after wall tiles have been installed.
4. Allow waterproofing membrane to cure before flood testing.
5. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base and wall joints.
6. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar or excess grout.
7. Provide grout joint spacing in accordance with tile manufacturer's recommendations.
8. Install movement joints where indicated on Drawings and as specified in this Section.
9. Sound tile after setting. Replace hollow sounding units.
10. Allow tile to set prior to grouting: Minimum of 48 hours for thin-set methods and 78 hours for mortar bed methods.

B. Installation Methods – Interior Walls:

Method	Substrate/Application	Setting Material
TCNA Method W202I, ANSI A108.5, and A108.6.	Masonry or concrete; thin set application; epoxy grout.	Latex Portland cement mortar.
TCNA Method W243, ANSI A108.5, and A108.6.	Moisture resistant gypsum board; thin set application; epoxy grout.	Latex Portland cement mortar.

C. Installation Methods – Interior Floors:

Method	Substrate/Application	Setting Material
TCNA Method F114, ANSI A108.1B, A108.6, and A108.17.	Concrete slab-on-grade; crack isolation membrane; mortar bed application; epoxy grout.	Latex Portland cement mortar.
TCNA Method F122A; ANSI A108.5, A108.6, and A108.13.	Raised concrete slab; waterproof membrane; thin set application; epoxy grout.	Latex Portland cement mortar.

D. Installation Methods – Shower Receptors:

Method	Substrate/Application	Setting Material
TCNA Method B415 with W244C, ANSI A108.5, A108.6, A108.11, and A108.13.	Wall – Cementitious backer board; bonded waterproofing membrane; thinset application; epoxy grout. Floor – Concrete slab-on-grade with mortar bed or raised slab, bonded waterproofing membrane; thinset application; epoxy grout.	Wall and Floor: Latex Portland cement mortar.

3.4 JOINTS

A. Joint Widths at Walls and Floors: Install tile on walls and floors in the joint widths recommended by the tile manufacturer.

B. Expansion Joints:

1. Provide expansion joints at locations shown on the Drawings or where Drawings do not indicate location, provide in the following locations as a minimum requirement:
 - a. Provide and install expansion joints per TCNA EJ171.
 - b. At control joints and expansion joints in substrate material,
 - c. Where substrate material changes to separate different materials,
 - d. Over construction joints,
 - e. Where tile abuts restraining surfaces, such as perimeter walls, curbs, and columns and at intervals of 24 to 36 feet each way in interior floor areas.
2. Expansion joints shall extend through setting-beds and fill.

3.5 INSTALLATION - GROUT

- A. Epoxy Grout: Install in accordance with manufacturer's printed instructions and ANSI A108.6.
 - 1. Before grouting, ensure all tiles are firmly in place. Clean tile surfaces; remove paper and glue from face of mounted tiles. Remove spacers, strings, ropes, and pegs.
 - 2. Clean open tile joints. Remove excess setting materials present in the open grout joints.
 - 3. Mix grout in accordance with manufacturer's instructions.
 - 4. Apply grout firmly into open joints using a hard rubber float.
 - 5. Remove all excess epoxy grout from the tile surface with a rubber squeegee or rubber trowel before it loses plasticity and begins to set.
 - 6. Immediately perform final clean up in accordance with manufacturer's instructions.

3.6 CLEANING AND PROTECTING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction.
- B. Protect installed tile finish surfaces from damage during construction. Provide protective covering as required to ensure installed tile finish will not be damaged by work of other trades.

END OF SECTION

SECTION 09 51 13
ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Lay-in acoustical panels.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 05 12 00 – Structural Steel Framing.
- C. Section 05 31 00 – Steel Decking.
- D. Section 09 29 00 – Gypsum Board.
- E. Divisions 21 – 23 – Mechanical.
- F. Divisions 25 – 28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASCE 7-10 – Minimum Design Loads for Buildings and Other Structures.
 - 2. ASTM A641/A641M – Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
 - 3. ASTM C635 – Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
 - 4. ASTM C636 – Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
 - 5. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 6. ASTM E580 – Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels in Areas Subject to Earthquake Ground Motions.
 - 7. ASTM E1264 – Standard Classification for Acoustical Ceiling Products.
 - 8. UL Fire Resistance Directory and Building Material Directory.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Provide data on metal grid system components, compression struts, and acoustical units.
- C. Samples:
 - 1. Submit two samples, 6 inch by 12 inch in size, illustrating material and finish of each type of acoustical panel specified.
 - 2. Submit two samples each, 12 inch long, of suspension system main runner, cross runner and edge trim in specified color.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

1.5 SYSTEM DESCRIPTION

- A. Performance Requirements: Rigidly secure suspended acoustical ceiling system, including integral mechanical and electrical components with maximum deflection of 1/360.

1.6 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Metal Suspension Grid Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum ten years experience.
 - 2. Lay-in Acoustical Tile Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum ten years experience.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Storage and Protection: Store materials in a dry secure place. Protect from weather, surface contaminants, construction traffic, and other potential damage.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Maintain 60 degrees F minimum uniform temperature and 20 percent to 40 percent relative humidity prior to, during, and after installation of acoustical lay-in tiles.

1.9 SEQUENCING

- A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust-generating activities have terminated and overhead work is completed, tested and approved.
- B. Install acoustical units after interior wet work is dry.

1.10 MAINTENANCE

A. Extra Materials:

1. Furnish in accordance with Division 01.
2. Provide ten percent extra of each type of panel.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers – Metal Suspension Systems:

1. USG Interiors, Inc., Chicago, IL 60606-4678; phone: 800.950.3839; fax: 312.606.4093; URL: <http://www.usg.com>. Refer to ICC ESR-1222.
2. Armstrong World Industries, Inc., Lancaster, PA 17603-3550; phone: 888.234.5464; fax: 800.572.8324; URL: <http://www.armstrong.com>. Refer to ICC ESR-1308.
3. Chicago Metallic, Chicago, IL 60638; phone: 800.323.7164; fax: 800.222.3744; URL: <http://www.chicago-metallic.com>. Refer to ICC ESR-2631.

B. Acceptable Manufacturers – Lay-in Acoustical Panels:

1. USG Interiors, Inc.
2. Armstrong World Industries, Inc.

C. Substitutions: Under provisions of Division 01.

2.2 METAL SUSPENSION SYSTEM

A. Metal Suspension Grid: ASTM C635, heavy duty classification in compliance with ASCE 7-10 13.5.6.2.2 (a); hot-dipped galvanized steel (minimum G40); 15/16 inch face; structural tee main and cross members; capped with steel , coated with factory applied baked-on white enamel paint.

1. Main runners, cross runners, splices, expansion devices, and intersection connectors shall be designed to carry a mean ultimate test load of not less than 180 pounds in compression and tension per ASTM E580.

B. Products, Suspension System:

	Main Runner	Cross Tees
1. USG Donn DX	DX26	DX424 and DX216
2. Armstrong Prelude XL	7301	XL7342 and XL7328
3. Chicago Metallic 1200 Seismic	200.01Z	1210.01Z and 1202.01Z

C. Products, Suspension System Accessories:

	Wall Angle	Seismic Clip at Wall Angle
1. USG Donn	M7	ACM7
2. Armstrong	7800	BERC2
3. Chicago Metallic	1420.01	1496

2.3 ACCESSORIES – METAL SUSPENSION SYSTEM

- A. Metal suspension system accessories as required for a complete system including but not limited to moldings, stabilizer bars, splices, hold down clips, and light fixture clips.
- B. Wire Hangers: ASTM A641/A641M, zinc-coated wire, Class 1, soft temper, pre-stretched, with a yield stress of at least three times the design load; sizes and gauges as shown on the Drawings and as specified in this Section.
- C. Support channels and hangers: Galvanized primed steel (minimum G30); size and type to suit application and to meet seismic requirements and as specified in this Section.

2.4 ACOUSTICAL LAY-IN PANELS

A. Panel Type 1:

- 1. ASTM E1264, Type IV, Form 2; Pattern E.
- 2. Material: Wet-formed mineral fiber with acoustically transparent membrane and factory-applied latex paint finish.
- 3. Properties:
 - a. Color: White.
 - b. Light Reflectance: Minimum 0.87.
 - c. NRC: Minimum 0.80.
 - d. Fire Resistance: CBC Class A (NFPA Class A); Flame Spread: 25 or under; Smoke Developed: 50 or under per ASTM E84.
- 4. Product:

	Size (ft x ft x in thick)	Edge
Armstrong Ultima High NRC, No. 1943	2 x 4 x 1	Square

B. Panel Type 2:

- 1. ASTM E1264, Type III, Form 2; Pattern C E.
- 2. Material: Wet-formed mineral fiber with factory-applied latex paint finish.
- 3. Properties:
 - a. Color: White.
 - b. Light Reflectance: Minimum 0.86.
 - c. NRC: Minimum 0.50.
 - d. Fire Resistance: CBC Class A (NFPA Class A); Flame Spread: 25 or under; Smoke Developed: 50 or under per ASTM E84.

4. Product:

	Size (ft x ft x in thick)	Edge
Armstrong Armatuff No. 860	2 x 4 x 3/4	Square

C. Accessories – Acoustical Lay-in Panels:

1. Touch-up Paint: Type and color to match acoustical and grid units.
2. Hold Down Clips: Provide manufacturer's universal hold down clips at all Type 2 acoustical panels.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions. Verify hangers will not interfere with other work.

3.2 INSTALLATION – SUSPENDED CEILING METAL GRID

- A. Install in accordance with manufacturer's instructions, CBC Sections 808 and 1616.10.16, ASTM C635, ASTM C636, ASTM E580, approved shop drawings, and as specified in this Section.
- B. Install ceiling metal suspension system after major above ceiling work is complete. Coordinate location of hangers with other work.
- C. Hang suspension system independent of walls, columns, ducts, cable trays, pipes, and conduits.
- D. Use minimum 12 gauge hanger wires for up to and including four foot by four foot grid spacing attached to main runners.
- E. Provide 12 gauge hanger wires at the perimeter ends of all main and cross runners within 8 inches of the support or within 1/4 of the length of the end tee, whichever is least. End connections for runners which are designed and detailed to resist the applied vertical and horizontal forces may be used in lieu of the 12 gauge hanger wires.
- F. Provide trapeze or other supplementary support members at obstructions to typical hanger spacing. Provide additional hangers, struts or braces as required at all ceiling breaks, soffits, or discontinuous areas. Where hanger wires are more than one in six out of plumb, provide counter-sloping wires.
- G. Ceiling grid members shall be attached to two adjacent walls, and at least 3/4 inch free of other walls. Where walls run diagonally to ceiling grid system runners, one end of main and cross runner should be free, and a minimum 3/4 inch clear of wall.
- H. At ceiling perimeter area, where main or cross runners are not connected to adjacent walls, provide interconnection between runners at the free end to prevent lateral spreading. A metal strut or a 16 gauge wire with positive mechanical connection to the runner may be used. Interlock is not required where perpendicular distance from the wall to the first parallel runner is 8 inches or less.
- I. Expansion joints shall be provided in the ceiling at the intersections of corridors and at junctions of corridors and lobbies or other similar areas.

- J. Where ceiling areas exceed 2500 square feet, a seismic separation joint shall be provided to divide the ceiling into areas not exceeding 2500 square feet. Alternatively, comply with ASTM E580.
- K. Penetrations through the ceiling for fire sprinkler heads and other similar devices that are not integrally tied to the ceiling system in the lateral direction shall have a 2 inch oversized ring, sleeve, or adapter through the ceiling panel to allow free movement of 1 inch in all directions. Alternatively, a flexible fire sprinkler hose fitting that can accommodate 1 inch of ceiling movement per ASTM E580 may be used.
- L. Provide bracing assemblies consisting of a compression strut and four 12 gauge splayed bracing wires oriented 90 degrees from each other. Splayed bracing wires shall be taut and shall not exceed 45 degrees from the ceiling plane. Splices in bracing wires are not permitted. Space bracing assemblies as follows:
 - 1. Not more than 12 feet by 12 feet on center.
 - 2. Not more than 1/2 of the spacing given above from the perimeter wall and at the edge of vertical ceiling offsets.
 - 3. Suspended acoustical ceiling systems with a ceiling area of 144 square feet or less surrounded by walls which connect directly to the structure above, do not require bracing assemblies when attached to two adjacent walls.
- M. Compression struts shall be adequate to resist the vertical component induced by the bracing wires, and shall not be more than one horizontal in six vertical out of plumb.
- N. Fasten hanger wires with not less than three tight turns in 3 inches. Fasten bracing wires with four tight turns in 1-1/2 inches. Install hanger or bracing wire anchors to the structure in a manner that the direction of the wire aligns as closely as possible to the direction of the forces acting on the wire.
- O. Separate all ceiling hanging and bracing wires at least 6 inches from all unbraced ducts, pipes, conduit, etc.
- P. When drilled-in concrete anchors or shot-in anchors are used in reinforced concrete for hanger wires or when drilled-in concrete anchors are used in reinforced concrete for bracing wires, refer to Drawings for testing frequency and tension test load values. Shot-in anchors in concrete are not permitted for bracing wires. Refer to CBC Section 1913.2.11.1 if any shot-in or drilled-in anchor fails.
 - 1. Concrete Anchorage Requirements:
 - a. Anchorage to Concrete: Conform to requirements of CBC Chapter 19, Section 1909 "Anchorage to Concrete-Strength Design".
 - b. Tests for Post-Installed Anchors in Concrete: Conform to CBC Chapter 19, Section 1913 "Additional Requirements", Section 1913.2.11 "Tests for Post-Installed Anchors in Concrete".
- Q. Attach all light fixtures, ceiling mounted air terminals or services, light-weight miscellaneous devices, such as strobe lights, speakers, etc., and all other devices to the ceiling grid runners to resist a horizontal force equal to the weight of the fixtures. Screw or approved fasteners are required. A minimum of two attachments are required per ASTM E580.
 - 1. Devices weighing more than ten pounds and twenty pounds or less shall have a 12 gauge slack safety wire anchored to the structure above.

- R. Flush or recessed light fixtures, air terminals or services, and flexible fire sprinkler hose fittings weighing more than 20 pounds and less than 56 pounds, shall be supported directly on the runners of a heavy duty grid system. In addition, provide two 12 gauge slack safety wires attached to the fixture at diagonal corners and anchored to the structure above. Four foot by four foot light fixtures shall have slack safety wires at each corner.
- S. Flush or recessed light fixtures, air terminals or services, and flexible fire sprinkler hose fittings weighing 56 pounds or more shall be independently supported by not less than four taut 12 gauge wires attached to the fixture and to the structure above. The four taut 12 gauge wires, including their attachment to the structure above must be capable of supporting four times the weight of the unit.
- T. Surface-mounted fixtures shall be attached to the main runner with at least two positive clamping devices made of minimum 14 gauge material. Rotational spring catches are not allowed. A 12 gauge suspension wire shall be attached to each clamping device and be attached to the structure above. Provide additional supports when light fixtures are eight feet or longer. Maximum spacing between supports shall not exceed eight feet.
- U. Support pendant mounted light fixtures directly from structure above with hanger wires or cables passing through each pendant hanger and capable of supporting two times the weight of the fixture. A bracing assembly is required where the pendant hanger penetrates the ceiling. Attach pendant hanger to bracing assembly in a manner to transmit horizontal force. Where the pendant mounted light fixture is directly and independently braced below the ceiling, such as with aircraft cables to walls, the brace assembly is not required above the ceiling.
- V. Do not eccentrically load suspended ceiling grid system or produce rotation of runners.
- W. Install edge molding at intersection of ceiling and vertical surfaces, using longest practical lengths. Miter corners; provide edge moldings at junctions with other interruptions.

3.3 INSTALLATION – LAY-IN CEILING PANELS

- A. Install units in accordance with manufacturer's instructions.
- B. Fit units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Cut units to fit irregular grid and perimeter edge trim.
- D. Lay directional patterned units one way with pattern parallel to longest room axis. Fit border trim neatly against abutting surfaces.
- E. Install units after above ceiling work is complete.
- F. Install units level, in uniform plane, and free from twist, warp and dents.
- G. Panels weighing more than 1/2 pound per square foot, other than mineral fiber acoustical panels, shall be positively attached to the ceiling suspension runners.
- H. Install hold-down clips to retain units tight to grid system within ten feet of all exterior doors.

3.4 ERECTION TOLERANCES

- A. Maximum variation from flat and level surface: 1/8 inch in 10 feet.

B. Variation from plumb of grid members caused by eccentric loads: Two degrees maximum.

3.5 CLEANING

A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction.

END OF SECTION

SECTION 09 54 26
LINEAR WOOD CEILINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Linear, wood ceiling panels.
- B. Suspended metal grid ceiling system and perimeter trim.
- C. Acoustical insulation over system units.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 09 22 16 – Non-Structural Metal Framing.
- D. Section 09 29 00 – Gypsum Board.
- E. Division 21 – Sprinkler Systems: Sprinkler heads in ceiling system.
- F. Division 23 – Air Outlets and Inlets: Air diffusers in ceiling system.
- G. Division 26 – Interior Luminaries: Light fixtures in ceiling system.
- H. Division 26 – Fire Alarm and Smoke Detection Systems: Smoke detectors in ceiling system.
- I. Division 28 – Security Electronics.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A446 – Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, Structural (Physical Quality).
 - 2. ASTM B209/B209M – Aluminum and Aluminum-Alloy Sheet and Plate.
 - 3. ASTM B221/B221M – Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 - 4. ASTM A 653/A653M – Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
 - 5. ASTM A666 – Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.

- 6. ASTM C423 – Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberant Room Method.
- 7. ASTM C636 – Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels.
- 8. ASTM C665 – Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
- 9. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
- 10. ASTM E90 – Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions.
- 11. ASTM E580 – Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate ceiling system reflected plan, location of mechanical and electrical components, details of junction with dissimilar materials, and points of suspension.
- C. Product Data: Provide component profiles, materials, perimeter and integral trim, and space closures.
- D. Submit two samples 6 inches long, full width in size illustrating color and finish of exposed to view components.

1.5 DESIGN REQUIREMENTS

- A. Design components to ensure light fixtures, and installed accessories, will not induce eccentric loads. Where components may induce rotation of ceiling system components, provide stabilizing reinforcement.

1.6 PERFORMANCE REQUIREMENTS

- A. Installed Ceiling System: Exhibit maximum deflection of 1/360 of span.
- B. Acoustic Attenuation: 0.70 NRC.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this Section.
- B. Installer: Company specializing in performing the work of this section with sufficient documented experience approved by manufacturer.
- C. Design suspension system for seismic considerations under direct supervision of a Professional Structural Engineer experienced in design of this Work and licensed in the State of California.

1.8 REGULATORY REQUIREMENTS

- A. Conform to 2013 California Building Code for seismic requirements.

1.9 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.10 COORDINATION

- A. Coordinate work under appropriate provisions of Division 01.
- B. Coordinate the work with installation of mechanical and electrical components.

1.11 MAINTENANCE MATERIALS

- A. Provide maintenance materials under Division 01.
- B. Provide ten percent of total standard lengths linear ceiling panels.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Rulon Company.
- B. Architectural Surfaces, Inc.
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Linear wood strips made from prime grade, all natural solid stock maple with satin finish. Stain color as indicated on Drawings.
- B. Fire Rating: UL Class A when tested according to ASTM E84.

2.3 COMPONENTS AND ACCESSORIES

- A. Suspension Members: Formed steel sections, with integral attachment points; primed finish; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.
- B. Subgirt Members: ASTM A446 Grade A, galvanized to 1.25 ounce per square foot zinc coating, formed structurally rigid to resist imposed loads, shaped to provide attachment for the finish panels and other accessories.
- C. Leveling Splines: As supplied by linear wood ceiling manufacturer.
- D. Attachment Clip: As supplied by linear wood ceiling manufacturer.
- E. Acoustic Insulation: ASTM C665, preformed glass fiber roll; conforming to the following:
 - 1. Black, Class A, no surface priming, 1 inch thick, 2 pounds per cubic foot density.

2.4 FINISHES

- A. Factory Finish: Stained with lacquer topcoat in satin finish. Stain color and finish as selected by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job site conditions and verify field dimensions. Verify hangers will not interfere with other work.
- B. Verify that required utilities are available, in proper location, and ready for use.

3.2 INSTALLATION

- A. Install suspension systems in accordance with manufacturer's instruction, ASTM C635, ASTM C636, ASTM E580, CBC Section 803.9, and as supplemented in this Section.
- B. Install work after above ceiling work is complete. Coordinate location of hangers with other work.
- C. Provide hanger clips during steel deck erection. Provide additional hangers and inserts as required.
- D. Where ducts or other equipment prevent regular spacing of hangers, reinforce nearest adjacent hangers to span the required distance.
- E. Hang suspension system independent of walls, columns, ducts, light fixtures, pipe and conduit. Where carrying members are spliced, avoid visible displacement of face panels with adjacent panels.
- F. Install panel members. Align end joints.
- G. Locate system according to reflected ceiling plan.
- H. Butt interior end joints tight.
- I. Exercise care when site cutting exposed finished components to ensure surface finish is not defaced.
- J. Install edge moldings at intersection of ceiling and vertical surfaces using maximum lengths.
- K. Field miter corners.
- L. Provide edge moldings at junction with other finishes.
- M. Provide end caps for linear panels exposed-to-view.
- N. Install insulation above panel members; fit tight between grids members.
- O. Provide expansion joints to accommodate ± 1 inch movement and maintain visual closure.

3.3 ERECTION TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.
- C. Maximum Variation from Dimensioned Position: 1/4 inch.

3.4 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction.
- B. Replace damaged or abraded components.

END OF SECTION

SECTION 09 65 00
RESILIENT FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Vinyl sheet flooring with integral cove base.
- B. Resilient wall base, rubber.
- C. Resilient molding accessories.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete; for concrete substrate.
- B. Section 07 26 50 – Vapor Emission Control System.
- C. Section 09 29 00 – Gypsum Board; for wall materials to receive resilient base.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM D1308 – Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - 2. ASTM D2047 – Standard Test Method for Static Coefficient of Friction of Polish-Coated Floor Surfaces as Measured by the James Machine.
 - 3. ASTM D2240 – Standard Test Method for Rubber Property - Durometer Hardness.
 - 4. ASTM D3389 – Standard Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader).
 - 5. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 6. ASTM E662 – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 7. ASTM F137 – Standard Test Method for Flexibility of Resilient Flooring Materials with Cylindrical Mandrel Apparatus.
 - 8. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 9. ASTM F970 – Standard Test Method for Static Load Limit.
 - 10. ASTM F1516 – Standard Practice for Sealing Seams of Resilient Flooring Products by the Heat Weld Method (when Recommended).

- 11. ASTM F1861 – Standard Specification for Resilient Wall Base.
- 12. ASTM F1913 – Standard Specification for Vinyl Sheet Floor Covering Without Backing.
- 13. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
- 14. NFPA 253 – Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Provide product data on specified products, describing physical and performance characteristics, sizes, patterns and colors.
- C. Submit samples under provisions of Division 01.
- D. Submit two samples, 6 inches by 12 inches in size, illustrating color and pattern for each flooring material specified.
- E. Submit heat-welded seam samples for each sheet or material type, 6 inches by 12 inches, with seam running lengthwise in the center.
- F. Submit two 4-inch long samples of wall base material of each color specified; include preformed or job-formed corners, as applicable.
- G. Submit manufacturer's installation instructions under provisions of Division 01.

1.5 OPERATION AND MAINTENANCE DATA

- A. Submit cleaning and maintenance data under provisions of Division 01.
- B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, sealing and re-finishing.

1.6 JOB AND ENVIRONMENTAL CONDITIONS

- A. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- B. Maintain ambient temperature required by adhesive manufacturer three days prior to, during and 24 hours after installation of materials.

1.7 EXTRA MATERIALS

- A. Provide 40 square feet of flooring and 20 lineal feet of non-integral wall base of each material and color specified, under provisions of Division 01.

1.8 QUALITY ASSURANCE

- A. Resilient flooring shall comply with the requirements of CBC Section 804.
- B. Concrete slabs to receive resilient flooring shall conform to applicable requirements of ASTM F710.

- C. Installer Qualifications: Installer to have at least three years experience of installing flooring products in similar facilities.

1.9 REGULATORY REQUIREMENTS

- A. Resilient flooring shall comply with the requirements of 2013 California Green Building Standards Code, Section 5.504.4.6.
 - 1. Provide verification of compliance with this requirement per 2013 California Green Building Standards Code, Section 5.504.4.6.1.

1.10 SLIP RESISTANCE

- A. Flooring shall be slip resistant. The static coefficient of friction (COF) shall not be less than 0.5 for level surfaces and 0.8 for ramps, per ASTM D2047.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS, VINYL SHEET FLOORING

- A. Acceptable Manufacturers:
 - 1. Mannington Commercial. Product: Biospec MD.
 - 2. Armstrong World Industries, Inc.
 - 3. Forbo Industries, Inc.
 - 4. Tarkett, Inc.
 - 5. Substitutions: Under provisions of Division 01.
- B. Vinyl Sheet Materials:
 - 1. Homogeneous sheet floor covering without backing, conforming to ASTM F1913.
 - 2. Sheet Width: 72 inches.
 - 3. Overall Thickness: 0.080 inch (2.0 mm).
 - 4. Wear Layer: Urethane aluminum oxide topcoat cured by UV process.
 - 5. Static Load Limit: 750 psi minimum, per ASTM F970.
 - 6. Fire-Test-Response Characteristics:
 - a. Smoke Developed: 450 or less, ASTM E662.
 - b. Critical Radiant Flux Classification: Class 1, 0.45 watts per square centimeter or greater, ASTM E648.
 - 7. Colors and Patterns: As indicated on Drawings.
 - 8. Seaming Method: Heat welded.
 - 9. Heat-Welding Bead: Solid-strand product as standard with flooring manufacturer. Color of heat-welding beads shall match flooring color.
 - 10. Adhesive: Water-resistant type, as recommended by flooring manufacturer for substrates indicated.

2.2 MANUFACTURERS AND PRODUCTS, RESILIENT WALL BASE

A. Acceptable Manufacturers:

1. Johnsonite.
2. Roppe Corporation.
3. Burke Flooring.
4. Substitutions: Under provisions of Division 01.

B. Wall Base Materials:

1. Wall Base: ASTM F1861, Type TS, (rubber, vulcanized, thermoset).
2. Style: Cove (base with toe), top set; or straight (flat or toeless), as indicated on Drawings.
3. Height: 4 inches, unless otherwise indicated.
4. Thickness: 1/8 inch, minimum.
5. Lengths: Coils in manufacturer's standard length.
6. Color: As indicated on Drawings.

C. Wall Base Accessories:

1. Preformed end stops, and outside corners, of the same material, manufacturer, size, and color as wall base.
2. Adhesive: Water-based type, as recommended by base manufacturer for substrates indicated.

2.3 MANUFACTURERS AND PRODUCTS, ACCESSORIES

A. Subfloor Filler: Portland cement type at concrete substrate as recommended by flooring material manufacturer.

B. Primers and Adhesives: Water-resistant type, as recommended by flooring and wall base manufacturers. Flooring adhesives shall be compatible for use over the vapor emission control system installed under Section 07 26 50.

C. Resilient Molding Accessories:

1. Molding Accessories: Rubber, unless otherwise indicated on Drawings. Provide where required or indicated.
 - a. Carpet edge or nosing.
 - b. Nosing for resilient flooring.
 - c. Joiner for tile and carpet.
 - d. Transition strips.
 - e. Reducer strip for resilient flooring.
2. Acceptable Manufacturers:
 - a. Johnsonite.
 - b. Roppe Corporation.
 - c. Burke Flooring.
 - d. Substitutions: Under provisions of Division 01.

2. Colors: As selected by Architect.
- B. Integral Cove Base Accessories:
 1. Cove Strip (Support Strip): 1-inch radius, as recommended by flooring manufacturer.
 2. Cap Strip: Metal.
 - a. Shape and Color: Square; color as selected by Architect.
- C. Seamless-Installation Accessories:
 1. Heat-Welding: Solid-strand product for heat welding seams; color to match floor covering.
- D. Cleaners, Sealers and Finishes: All cleaners, sealers and finishes to be products of one manufacturer. Use products approved by flooring manufacturers in writing.
 1. Products for Vinyl Sheet Flooring:
 - a. Cleaner: Neutral detergent, Armstrong S-485 or accepted equal.
 - b. Floor Polish: Commercial floor polish, Armstrong S-480 or accepted equal.
 2. Substitutions: Under provisions of Division 01.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 3/16 inch in 10 feet, and are ready to receive Work.
- B. Contractor shall verify that concrete floors are dry and exhibit negative alkalinity, carbonization or dusting. The concrete relative humidity and alkalinity tests required in Section 07 26 50 shall be performed and documented prior to installation of resilient flooring.
- C. Install vapor emission control system per Section 07 26 50, when concrete relative humidity and alkalinity test results exceed the values specified in Section 07 26 50.
- D. Resilient flooring shall not be installed when the atmospheric relative humidity exceeds 60 percent. Contractor shall provide dehumidifiers as required to maintain 60 percent maximum relative humidity for the duration of the resilient flooring installation.
- E. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. Prepare substrate in accordance with ASTM F710 and flooring manufacturer's recommendations.
- B. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to leave a smooth, flat, hard surface.
- D. Prohibit traffic from area until filler is cured.
- E. Vacuum clean substrate.

F. Apply primer to concrete surfaces.

3.3 INSTALLATION

A. General:

1. Install all resilient flooring products and accessories under this Section in accordance with manufacturers' printed instructions.
2. Terminate flooring at centerline of door openings where adjacent floor finish is dissimilar.
3. Install edge strips at unprotected or exposed edges of flooring including terminations at thresholds and where flooring abuts a dissimilar finished floor material.
4. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

B. Vinyl Sheet Flooring:

1. Provide heat welded seams as recommended by manufacturer.
 - a. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and use welding bead to permanently fuse sections into a seamless floor covering.
2. Integral Cove Base: Provide where indicated. Cove flooring 6 inches up vertical surfaces, unless otherwise indicated on Drawings, and support at horizontal and vertical junction with cove strip. Butt at top against cap strip.

C. Resilient Wall Base:

1. Install resilient wall base on entire wall perimeter including toe spaces and open ends of cabinets. Set all bases in adhesive as recommended by the manufacturer. All joints in bases, including those at any preformed corners, shall be plumb, flush, tight and inconspicuous. Seat top edge and back of base firmly against the wall.
2. Fit joints tight and vertical. Maintain minimum measurement of 18 inches between joints.
3. Corners and Ends:
 - a. At external corners, use preformed units. Install preformed corners before installing straight pieces.
 - b. Interior corners shall be mitered and tightly fitted. Use straight pieces of maximum lengths possible.
4. At exposed ends use preformed units.
5. Install base on solid backing. Bond tight to wall and floor surfaces.
6. Scribe and fit to door frames and other interruptions.
7. Do not stretch resilient base during installation.

D. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.4 CLEANING, SEALING, AND POLISHING

A. Remove excess adhesive from floor, base, and wall surfaces without damage. Sweep and vacuum surfaces thoroughly.

B. Clean, seal, and finish floor and wall base surfaces in accordance with manufacturer's written instructions.

1. Vinyl Sheet Flooring:

a. Cleaning: Damp mop with dilute detergent solution, as recommended by flooring manufacturer.

b. Finish: Three coats of commercial polish, as recommended by flooring manufacturer.

2. Wall Base, Rubber: Clean by wiping with soft cloth dampened with warm water.

3.5 PROTECTION

A. Comply with manufacturer's written instructions for protection of resilient flooring.

B. Protect flooring from damage during construction operations for the remainder construction period. After allowing drying film to disappear, cover flooring until Project Completion.

END OF SECTION

SECTION 09 68 13

TILE CARPETING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Modular carpet tile.
- B. Accessories.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete: Concrete floor slab.
- B. Section 07 26 50 – Vapor Emission Control System.
- C. Section 09 29 00 – Gypsum Board: Walls to receive resilient carpet base.
- D. Section 09 65 00 – Resilient Flooring: Resilient wall base and transition strips.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AATCC 134 – Electrostatic Propensity of Carpets.
 - 2. ASTM D1667 – Standard Specification for Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam).
 - 3. ASTM E648 – Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.
 - 4. ASTM E662 – Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials.
 - 5. ASTM F710 – Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring.
 - 6. ASTM F2170 – Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
 - 7. CRI 104 – Standard for Installation of Commercial Carpet.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Provide product data on specified products, describing physical and performance characteristics; sizes, patterns, colors available and method of installation.

- C. Submit samples for review prior to beginning installation.
- D. Submit three full size samples illustrating color and pattern for each carpet material specified. Samples shall be labeled to indicate product name, weight, thickness, weave, and manufacturer's name.
- E. Submit manufacturer's installation instructions for review.
- F. Submit manufacturer's written Warranty, as described in Article 1.10 of this Section, under provisions of Division 01.

1.5 MAINTENANCE DATA

- A. Submit three copies of manufacturer's maintenance data for commercial installation to Owner in an 8-1/2 by 11 inch hard cover binder.
- B. Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, vacuum cleaning, shampooing and recommended type of furniture casters and glides for use with specified carpet tile products.

1.6 QUALITY ASSURANCE

- A. Concrete slabs to receive tile carpeting shall conform to applicable requirements of ASTM F710.
- B. Manufacturer: Company specializing in commercial carpet tile with sufficient documented experience.
- C. Installer: Company with sufficient documented experience, approved by manufacturer. All work shall be performed by qualified and experienced mechanics working under the supervision of an experienced supervisor.
- D. A certification provided by carpet tile manufacturer shall be furnished to Owner stating that register numbers on carpet tile furnished was manufactured in accordance with these specifications.

1.7 REGULATORY REQUIREMENTS

- A. Carpet tile work shall conform to applicable requirements of Americans with Disabilities Act (ADA), Article 4.5.
- B. Carpet work shall comply with 2013 California Building Code, Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing, Section 11B-302 "Floor or Ground Surfaces", Section 11B-303, "Changes in Level", and Section 11B-302.2, "Carpet" requirements.
 - 1. Carpet tile edges and trim shall conform to CBC Sections 11B-303 and 11B-302.2 requirements.
 - 2. Fasten exposed edges to floor surfaces with trim along that edge.
 - 3. Carpet tile shall have a level loop, textured loop, level cut pile, or level cut/uncut pile; height (measured from bottom of tuft) not to exceed 1/2 inch.
 - 4. Carpet tile with a pile height exceeding 1/2 inch above adjoining floor surface, shall have a transition ramp between the surfaces.

- C. Carpet shall meet testing requirements of ASTM E648 and ASTM E662.
 - 1. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E648 and ASTM E662 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
- D. Carpet shall comply with the requirements of 2013 California Green Building Standards Code, Section 5.504.4.4.

1.8 JOB AND ENVIRONMENTAL CONDITIONS

- A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.
- C. Environmental Limitations: Do not install carpet until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Maintain minimum 70 degree F ambient temperature at floor level three days prior to, during, and 24 hours after installation of materials.
- D. Carpet tiles shall be delivered to job site in original mill wrappings, with each box having register number and tags attached, or register number intact.

1.9 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- B. Provide full size units equal to five percent of the total area of carpeting, but not less than ten square yards, of each type and color specified. Extra materials shall be packaged, identified, and delivered to Owner under provisions of Division 01.

1.10 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than ten percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excess static discharge, and delamination.
 - 3. Warranty Period:
 - a. Tandus Products: Manufacturer's lifetime limited warranty.
 - b. Forbo Products: Manufacturer's ten year limited warranty.
- B. Provide installer's two year warranty commencing from the date of Project Completion.

C. Submit warranty to Architect, under provisions of Division 01.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Acceptable Manufacturers:

1. Tandus, Dalton, GA; 800-248-2878, www.tandus.com. Product: Gravity Series, Elevate #04705 (C1).
2. Forbo, Hazelton, PA; 800-842-7839, www.forboflooringna.com. Product: Flotex Linear (C2 – C4).
3. Shaw Contract Group, Calhoun, GA; 800-257-7429, www.shawcontractgroup.com.
4. Lees Carpets, a division of Mohawk Industries, Kennesaw, GA; 800-523-5647, www.leescarpets.com.

B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Carpet Tile (C1): Conforming to the following criteria:

1. Size: 24 inches by 24 inches.
2. Construction: Stratatec patterned loop.
3. Gauge: 5/64 inch.
4. Stitches per Inch: 10.0.
5. Pile Height Average: 0.187 inch.
6. Fiber System: Antron Lumena nylon.
7. Dye Method: Solution dyed.
8. Soil/Stain Protection: Ensure.
9. Primary Backing: Synthetic, Non-Woven.
10. Flammability: Class 1 (CRF: 0.45 watts per square centimeter or higher), per ASTM E648.
11. Smoke Density: NBS Smoke Density (ASTM E662), less than 450.
12. Static Propensity: AATCC-134, 1.0 KV or lower; permanent conductive fiber.
13. Color: As indicated on Drawings.

B. Carpet Tile (C2 – C4): Conforming to the following criteria:

1. Size: 20 inches by 20 inches.
2. Construction: 100 percent 6,6 nylon type wear layer with an intermediate fiberglass layer and a recycled vinyl cushioned backing.
3. Gauge: 0.21 inch.
4. Wear Layer Density: 80,000,000 fibers per square yard.
5. Antimicrobial: Sanitized Treatment.
6. Flammability: Class 1 (CRF: 0.45 watts per square centimeter or higher), per ASTM E648.

- 7. Smoke Density: NBS Smoke Density (ASTM E662), less than 450.
- 8. Static Propensity: ISO 6356, 0.1 KV.
- 9. Colors: As indicated on Drawings.

2.3 ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Primers and Adhesives:
 - 1. Primers: As recommended by carpet tile and adhesive manufacturer.
 - 2. Adhesives: Water-resistant, mildew-resistant, non-staining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - a. Adhesives shall be compatible for use over the vapor emission control system installed under Section 07 26 50.
- C. Resilient Wall Base and Transition Strips: Refer to Section 09 65 00 for resilient wall base and transition strips.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that substrate surfaces are smooth and flat with maximum variation of 3/16 inch in 10 feet and are ready to receive work.
- B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for concrete relative humidity and alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- C. Contractor shall verify that concrete floors are dry and exhibit negative alkalinity, carbonization or dusting. The relative humidity and alkalinity tests required in Section 07 26 50 shall be performed and documented prior to installation of carpet.
- D. Install vapor emission control system per Section 07 26 50, when relative humidity and alkalinity test results exceed the values specified in Section 07 26 50.
- E. Carpet tile shall not be installed when the atmospheric relative humidity exceeds sixty percent. Contractor shall provide dehumidifiers as required to maintain sixty percent maximum relative humidity for the duration of the carpet tile installation.
- F. Beginning of installation means acceptance of existing substrate and site conditions.

3.2 PREPARATION

- A. General: Comply with ASTM F710, CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer's written installation instructions for preparing substrates.

- B. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes and other defects with sub-floor filler.
- C. Apply, trowel and float filler to leave smooth, flat, hard surface. Repair all floor irregularities.
- D. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch, unless more stringent requirements are required by manufacturer's written instructions.
- E. Prohibit traffic until filler is cured.
- F. Broom and vacuum clean substrates to be covered immediately before installing carpet.
- G. Allow carpet to acclimate at installation location for at least 72 hours prior to beginning installation.

3.3 INSTALLATION

- A. Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Pattern: Install modular tile using quarter-turn technique; unless otherwise indicated on Drawings or recommended by tile manufacturer.
- C. Installation Method: As recommended in writing by carpet tile manufacturer.
- D. Maintain dye lot integrity. Do not mix dye lots in the same area.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, non-staining marking device.
- H. Install pattern parallel to walls and borders, unless otherwise indicated on Drawings.
- I. Install edge strips at unprotected or exposed edges of carpet tile including terminations at thresholds and where carpet tile abuts a dissimilar finished floor material. Carpet tile edges and trim shall comply with CBC Section 11B-303 and Section 11B-302.2 requirements.

3.4 CLEANING

- A. Remove excess adhesive from floor, base and wall surfaces without damage. Remove and dispose of all scraps, cartons and rubbish upon completion of the work. Remove all loose yarn with sharp scissors.
- B. Clean carpet tiles of all spots with proper spot remover and vacuum clean carpet tile surfaces.

3.5 PROTECTION

- A. Protect installed carpet tile to comply with CRI 104, Section 16, "Protection of Indoor Installations".
- B. Prohibit traffic from carpet tile areas for 24 hours after installation. Installer shall take necessary steps to protect carpet tile work and the work of other trades during carpet tile installation, and shall be responsible for restoration of work or property damaged by carpet tile Installer.

END OF SECTION

SECTION 09 77 10
SANITARY WALL AND CEILING FINISHES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fiberglass Reinforced Plastic Panels.
- B. Accessories.

1.2 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants.
- B. Section 09 29 00 – Gypsum Board.
- C. Section 09 65 00 – Resilient Flooring.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM D256– Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - 2. ASTM D570 – Standard Test Method for Water Absorption of Plastics.
 - 3. ASTM D638 – Standard Test Method for Tensile Properties of Plastics.
 - 4. ASTM D790 – Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
 - 5. ASTM D2583 – Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor.
 - 6. ASTM D5319 – Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels.
 - 7. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Indicate on shop drawings, detail dimensions and trim and panel attachment details.
- C. Provide product data on panels, trim and adhesive.
- D. Submit samples under provisions of Division 01.

- E. Submit two samples, 6 inches x 6 inches in size, illustrating panel material, color, and finish.
- F. Submit two samples, 6 inches long in size, illustrating trim material, color and finish.
- G. Submit manufacturer's installation instructions under provisions of Division 01.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Marlite. Product: Standard FRP.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Fiberglass Reinforced Plastic Panels (FRP): Smooth Surface, color as indicated on Drawings, four feet x eight feet x 3/32 inch. Class A Fire Rated; Flame Spread less than 25; Smoke Developed less than 450.
 - 1. Sheet size shall be one piece full vertical height from floor to ceiling. "Piecing" of sheets to achieve full height finish will not be allowed.
- B. Accessories and Adhesives: Manufacturer's standard adhesive and aluminum joinery trim system that conceals each vertical joint and exposed edges.

PART 3 EXECUTION

3.1 PREPARATION

- A. All surfaces to receive FRP shall be properly prepared in strict accordance with manufacturer's specifications and as specified herein. Fill all pinholes, cracks and other surface imperfections with spackle and scrape off surface splatters and imperfections to leave substrate surfaces smooth and free of damage.
- B. All other trade work that penetrates substrate shall be completed before beginning FRP application.

3.2 APPLICATION

- A. Install FRP panels according to manufacturer's instructions. No horizontal seams will be permitted.
- B. FRP shall be installed with adhesive supplied by or recommended by the FRP manufacturer.
- C. Install trim in longest practicable lengths. "Piecing" of trim will not be allowed.
- D. Remove excessive adhesive from surfaces immediately.
- E. Ensure positive contact of FRP to adhesive material with all wall surfaces. Remove or replace damaged or improperly applied FRP.

3.3 CLEAN-UP

- A. Upon completion of the work of this Section, remove all surplus material, and debris from the premises.

END OF SECTION

SECTION 09 81 00
ACOUSTIC INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Acoustic insulation in interior wall construction.

1.2 RELATED SECTIONS

- A. Section 07 21 00 – Thermal Insulation.
- B. Section 09 22 16 – Non-Structural Metal Framing.
- C. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM C665 – Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 2. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 3. UL 723 – Test for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Provide data on product characteristics, performance criteria and limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed California Quality Standards.

1.5 SYSTEM DESCRIPTION

- A. Materials of this Section: Provide continuity of acoustic barriers and separations at building interior elements.

1.6 COORDINATION

- A. Coordinate work with other trades under provisions of Division 01.

PART 2 PRODUCTS

2.1 GLASS FIBER INSULATION

A. Acceptable Manufacturers:

1. EcoBatt by Knauf Insulation, Shelbyville, IN; 317-398-4434, www.knaufusa.com.
2. Owens-Corning, Toledo, OH; 800-438-7465, www.owenscorning.com.
3. Certaineed Corp., Insulation Group, Valley Forge, PA; 800-233-8990, www.certaineed.com.
4. Johns Manville, Denver, CO; 800-654-3103, www.specJM.com.
5. Thermafiber, Inc., Wabash, IN; 888-834-2371, www.thermafiber.com.
6. Substitutions: Under provisions of Division 01.

B. Batt Insulation: ASTM C665 Type I; preformed glass fiber batt; conforming to the following:

1. Facing: Acoustic insulation shall be unfaced.
2. Flame Spread and Smoke Density Properties: 25/450 maximum in accordance with 2013 CBC Section 720, California Referenced Standard Code Chapter 12-13, ASTM E84, and UL 723.
3. Provide formaldehyde-free thermal insulation products.
4. Recycled Content: Minimum thirty percent post-consumer.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify existing site conditions.
- B. Verify that substrate, adjacent materials, and insulation are dry and ready to receive insulation.

3.2 INSTALLATION – BATT INSULATION.

- A. Install insulation in accordance with insulation manufacturer's instructions and with the flame spread rating and smoke density requirements of CBC Section 720, ASTM E84, and UL 723.
- B. Install in interior walls full width, depth, and height of cavity, without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
- E. Securely fasten and anchor insulation in place to prevent displacement or sagging of material in all areas.
 1. At metal stud walls, the insulation shall be wired in place with two #14 spring steel wires, one within 12 inches of the top and one at the mid-point of each stud bay.

END OF SECTION

SECTION 09 84 13
FIXED SOUND - ABSORPTIVE PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fabric faced acoustical wall panels.
- B. Installation accessories.

1.2 RELATED SECTIONS

- A. Section 04 22 00 – Concrete Unit Masonry.
- B. Section 09 84 19 – Acoustical Metal Wall Panels.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM C423 – Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 2. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit shop drawings, product data, samples, and installation instructions under provisions of Division 01.
- B. Shop Drawings: Indicate wall elevations, dimensions, joint locations, penetrations, and anchorage details.
- C. Product Data: Indicate specific products and related accessories to be provided for this Project.
- D. Submit test data to show compliance with requirements for acoustical and flammability ratings.
- E. Submit two samples, 12 inches x 12 inches in size, illustrating materials and finish, color, and texture of surface, core material, edge, corner details, and wall mounting hardware.
- F. Submit manufacturer's installation instructions specific to mounting conditions on this project.
- G. Maintenance Data: Provide recommended procedures for cleaning and removal of stains. Include precautions in use of cleaning materials that may be detrimental to surfaces.

1.5 REGULATORY REQUIREMENTS

- A. Conform to California Building Code for Class "A" rating for fabric covered acoustic panels in accordance with ASTM E84.

1.6 QUALITY ASSURANCE

A. Single Source Responsibility:

- 1. Obtain acoustical panel materials from a single manufacturer. Provide acoustical panels and fabrics of each type required from one manufacturer, of uniform texture and color.

B. Experience:

- 1. Provide products for this Section that are designed and furnished by one manufacturer, factory-assembled and shipped as a unit. Manufacturer shall have been engaged in the manufacture of sound absorbing panels for at least five years immediately prior to the start of this work.
- 2. Contractor shall have sufficient documented experience in the purchase and installation of acoustical wall panels and baffles. Contractor shall submit proof of previous experience and list a minimum three previous jobs of similar or larger size.

C. Materials:

- 1. The fabric used for the fabric faced acoustical wall panels shall all be from the same batch of material with sufficient extra material available for patching. Submit manufacturer's certificate of compliance.
- 2. Comply with referenced American Society for Testing and Materials (ASTM).
- 3. Comply with Underwriter's Laboratories, Inc. (UL) requirements for fire rated systems. Furnish listed and labeled products.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and protect products under provisions of Division 01.
- B. Deliver materials to the job site in manufacturer's original, unopened containers and packaging, with labels clearly indicating manufacturer and material.
 - 1. Do not deliver materials to the building until the completion of wet work, such as concrete, plastering, and painting has been completed and the building is completely enclosed.
- C. Protect products against damage during delivery and handling.
- D. Store all items in a clean, dry indoor storage area, protected from damage, and in accordance with manufacturer's instructions.
- E. Maintain temperature in storage area above 40 degrees F, without excessive humidity.
- F. Do not install damaged material.

1.8 ENVIRONMENTAL CONDITIONS

- A. Do not install acoustical panels until the building space is enclosed and weather-tight, work above ceilings completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near final occupancy.

- B. Remove material from packaging and allow to acclimatize in area of installation 24 hours before application.
- C. Install under same temperature, humidity conditions that will normally exist when building is occupied.
- D. Maintain temperature of all areas to receive acoustical wall panels at 60 degrees F to 85 degrees F and relative humidity not greater than seventy percent for 72 hours before, during, and 48 hours minimum after application.

1.9 EXTRA MATERIALS

- A. Deliver extra materials equal to five percent of each type of acoustical panel provided under provisions of Division 01.
- B. All cartons shall be new, unopened, packaged with protective covering for storage, and identified with appropriate labels.

1.10 WARRANTY

- A. Submit under provisions of Division 01.
- B. Materials shall be warranted against defects and workmanship for a period of five years from the date of Project Completion.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS AND PRODUCTS

- A. Lamvin Inc., Oceanside, CA; 800-446-6329, www.lamvin.com. Product: Sonic Series, Ultra High-Impact Acoustical Panels.
- B. Tectum, Inc., Newark, OH; 888-977-9691, www.tectum.com. Product: Fabri-Tough.
- C. Wall Technology, Inc., Ladysmith, WI; 800-359-3312, www.walltechnology.com. Product: IR 108.
- D. Kinetics Noise Control, Inc., Dublin, OH; 877-457-2695, www.kineticsnoise.com. Product: High Impact Hardside.
- E. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Fabricate panels to sizes and configurations indicated on Drawings; attach facing materials to cores to produce installed panels with visible surfaces fully covered and free of wrinkles, sags, blisters, seams, adhesive or other foreign matter and wrapped 2 inches to the back.
 - 1. Fabricate panels in factory to exact sizes required to fit wall surfaces based on field measurements of completed substrates indicated to receive wall panels.
 - 2. Where square corners are indicated, tailor corners.
 - 3. Dimensional tolerances of finished units: $\pm 1/16$ inch.

- B. Acoustical wall panels: Facing material laminated to front face, edges and back border of dimensionally stable, rigid glass fiber board core; with edges chemically hardened to reinforce panel perimeter against warpage and damage.
- C. Panel Characteristics:
 - 1. Thicknesses: 2 inches.
 - 2. Acoustical Core: 6 pound to 7 pound density, rigid fiberglass.
 - 3. Core Facing: Perforated co-polymer plastic, 1/16-inch thick, 3/32-inch diameter holes on 5/32 inch staggered centers with 33 percent open area.
 - 4. Edge Detail: Beveled, chemically hardened edges to reinforce panel perimeter against warping and damage.
 - 5. Panel Width and Height: As indicated on Drawings.
 - 6. Finish: Polyester fabric shall be bonded directly to panel face with all edges wrapped a minimum of 1-1/2 inch to the back of the panel to ensure a flat, wrinkle-free surface with tailored corners.
 - a. Manufacturer and Product: Carnegie Fabrics, Twilight 5274, or accepted equal.
 - b. Content: 70 percent post industrial recycled polyester and 30 percent post consumer recycled polyester.
 - c. Flammability: Class A per ASTM E84:
 - 1) Flame Spread: Less than 25.
 - 2) Smoke Developed: Less than 450.
 - d. Color: As indicated on Drawings.
 - 7. Panels: Class A flame spread rating (ASTM E84 Tunnel Test).
 - a. Flame Spread: 25 or less
 - b. Smoke Developed: 450 or less.
 - 8. Mounting: Mechanical Z-Clip/Rail.
 - 9. NRC: 0.85 to 0.95 for 1 inch acoustical core thickness per ASTM C423.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces and internal wall blocking are ready to receive work, and dimensions are as indicated on shop drawings.
- B. Examine surfaces scheduled to receive acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of work. Do not proceed with work until unsatisfactory conditions have been corrected.
- C. Beginning of installation means acceptance of substrate construction.

3.2 INSTALLATION

- A. Install acoustical wall panels in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other panels, and scribed to fit adjoining work accurately at borders and penetrations.

- B. Comply with panel manufacturer's written instructions for installation of panels using type of mounting accessories indicated or, if not indicated, as recommended by manufacturer.
- C. All fastening devices shall be concealed in completed installation.
- D. Wall panels shall be securely affixed by Mechanical Z-Clip/Rail method of attachment.
- E. Clips shall engage vertical kerfs on the edges of the wall panels. Apply adhesive where necessary.
- F. Field cut edges shall be covered by means of on-site fabric wrapping.
- G. Cut and fit around equipment on walls such as electrical switches, receptacles, fire alarm components, grilles, etc. Where field cutting occurs, make cuts true and plumb and wrap cut edges to match factory wrapped edges.
- H. Prior to final inspection and/or occupancy of the building by the Owner, review installation and replace all damaged panels, leaving installation complete and ready for occupancy by the Owner without further work.

3.3 CLEANING

- A. Clip any loose threads; remove pulls and extraneous materials.
- B. Clean exposed surfaces of acoustical wall panels to remove dust and any other foreign materials and trim edge moldings to comply with manufacturer's instruction for cleaning and touch-up of minor finish damage.
- C. Remove surplus materials, rubbish and debris resulting from installation on completion of work, and leave the area of installation in a neat clean condition.
- D. Replace work which cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, as directed by Architect.

3.4 PROTECTION

- A. Provide required protection for the acoustical wall panels, including temperature, humidity limitations and dust control so that the work will be without damage and deterioration at the time of Project Completion.

END OF SECTION

SECTION 09 84 19
ACOUSTICAL METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Architectural metal panel systems including trims, terminations, miscellaneous steel and sub frames, clips, fasteners and other devices for secure anchorage of panels to steel framing members.

1.2 RELATED SECTIONS

- A. Section 09 22-16 – Non-Structural Metal Framing.
- B. Section 09 29 00 – Gypsum Board.
- C. Section 09 84 13 – Fixed Sound-Absorptive Panels.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A653 – Standard Specification for Sheet Steel, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM C423 – Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
 - 3. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. ASTM D4214 – Standard Test Methods for Evaluating the Degree of Chalking of Exterior Paint Films.
 - 5. ASTM D6386 –Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.

1.4 SUBMITTALS

- A. Submittal Drawings: Submit complete shop drawings indicating quantities, finishes, dimensions, and attachment relationships.
- B. Product Data: Submit manufacturer's product data, specifications, and installation instructions.
- C. Samples: Submit four color and finish samples to determine range of texture and consistency of color and finish expected in the finished work. Sample size shall be 6 inches x 6 inches minimum.

1.5 QUALITY ASSURANCE

- A. Manufacturer shall have a minimum of five years experience in manufacturing and shall have successfully completed at least twenty projects within the past five years in architectural metals.
- B. Fabricator must own and operate its own manufacturing facilities for all metal components.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver components in clearly marked containers and packages suitable for shipment of specified products so as to prevent finish damage in transit. Provide protective wrapping for protection.
- B. Store components in locations that will avoid damage from job-site traffic, moisture, stacking, or other job-site contamination.
- C. Handle components to avoid racking, twisting, denting, or scratching of finished surfaces.

1.7 WARRANTY

- A. Provide manufacturers' warranty against defects in material and workmanship for a period of one year beginning on the date of project completion.
- B. Fluoropolymer Finish Warranty: Warrant fluoropolymer coating to remain free, under normal atmospheric conditions, from peeling, checking, cracking, chalking in excess of numerical rating of 8 when measured in accord with ASTM D4214, of fading in excess of 5 N.B.S. Units during warranty period. Warranty period shall be ten years, beginning at date of project completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Fry Reglet Corporation, Alpharetta, GA; 800-955-2343, www.fryreglet.com. Product:
 - 1. Fry Reglet Profile "C" with 1/8 inch diameter perforations and smooth finish.
 - 2. Include all secondary framing, anchors, clips and other fasteners to provide a complete and finished wall panel system.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Metal Panels:
 - 1. Galvannealed Steel: Hot-dipped galvanized sheet of an iron-zinc alloy coating complying with ASTM A653, Coating Designation A-40 or A-60 with surfaces chemically treated for paint adhesion in accord with ASTM D6386.
 - a. Thickness: 22 gauge.
- B. Mounting Devices:
 - 1. Extruded aluminum. Accessories shall include J-trim, Z-furring and self-tapping fasteners which shall be finished to match wall panels.

2. All framing components shall be fabricated from extruded 6063 T5 aluminum.

C. Sound Absorption Material:

1. Provide 2 inch thickness x 1.5# or other density fiberglass. The fiberglass shall be wrapped in Class A. Black Polyethylene. Acoustic performance shall have a noise reduction coefficient (NRC) of 0.90 when tested in accordance with ASTM C423.

2.3 PERFORATIONS

A. R125: 1/8 inch diameter holes x 21/64 inch staggered centers.

2.4 FABRICATION

A. Standard height of wall panels shall be up to 10 feet without horizontal joints.

2.5 FINISHES

- A. General: Comply with NAAMM's "Metal Finished Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes. Metal finish shall have a Class "A" rating per ASTM E84.
- B. Fluoropolymer coating finish: Two-coat, factory applied, baked-on fluoropolymer coating based on Valspar Corporation or PPG Industries resin (polyvinylidene fluoride, PVDF), formulated by a licensed manufacturer and applied by manufacturer's approved applicator.
 1. Coating system shall provide minimum 1.0 mil dry film thickness consisting of minimum 0.20 mil primer and minimum 0.80 mil color coat. Color as indicated on Drawings.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine job-site conditions for conditions that may adversely affect installation of wall panels.
- B. Verify dimensions of wall panels prior to installation to ensure compatibility with job-site conditions.
- C. Visually examine finished surfaces to ensure that blemished or dented surfaces are not present prior to installation.

3.2 INSTALLATION

- A. Install components in accord with manufacturer's installation instructions and accepted submittal drawings.
- B. Wall panels shall be erected plumb, level, square, true to line, securely anchored and in proper alignment and relationship to work of other trades.
- C. Wall panels, insulation and trim package to be shipped loose for on-site assembly.
- D. Wall panels to be installed ensuring one cell overlap from side to side.

3.3 CLEANING AND PROTECTION

- A. Visually inspect all exposed surfaces for scratches or blemishes. Protect wall panels from damage by other trades after installation.

END OF SECTION

SECTION 09 91 00

PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Surface preparation.
- B. Painting schedules, including painting of exposed surfaces, interior and exterior, except as otherwise specified or indicated.

1.2 RELATED SECTIONS

- A. Section 03 45 00 – Precast Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 05 12 00 – Structural Steel Framing.
- D. Section 05 31 00 – Steel Decking.
- E. Section 05 50 00 – Metal Fabrications: Shop Primed Surfaces.
- F. Section 07 62 00 – Sheet Metal Flashing and Trim.
- G. Section 08 11 13 – Hollow Metal Doors and Frames.
- H. Section 08 31 00 – Access Doors and Panels.
- I. Section 08 34 63 – Detention Doors and Frames.
- J. Section 09 21 16.23 – Gypsum Board Shaft Wall Assemblies.
- K. Section 09 24 00 – Portland Cement Plastering.
- L. Section 09 29 00 – Gypsum Board.
- M. Section 13 34 23 – Modular Precast Cells.
- N. Divisions 21 – 23 – Mechanical.
- O. Divisions 25 – 28 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards, Manuals and Codes:
 - 1. ASTM D523 – Standard Test Method for Specular Gloss.

2. The Master Painters Institute, MPI Gloss and Sheen Levels.

1.4 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Provide product data on all finishing products.
- C. Submit four brush-out samples 8 inches by 10 inches in size illustrating color selected for each surface finishing product scheduled.
- D. Field Sample: Furnish sample of actual paint colors selected on portion of building item to receive paint as directed by Architect, prior to beginning interior and exterior painting.
- E. During the Contract Closeout period, provide two copies of coating maintenance manual including, but not limited to, location of manufacturer's paint store closest to the project site, area summary with finish schedule, area detail designating where each product, color, and finish was used, product data sheets and material safety data sheets for each product used, color formulations for each color used, cleaning instructions, touch-up procedures, and color samples of each color and finish used.

1.5 QUALITY ASSURANCE

- A. Product Manufacturer: Company specializing in manufacturing quality paint and finish products with sufficient documented experience.
- B. Applicator: Company specializing in commercial painting and finishing with sufficient documented experience.
- C. Gloss Levels: Per Master Painters Institute (MPI) gloss standards "MPI Gloss and Sheen Levels," measured in accordance with ASTM D523.

GLOSS LEVEL	DESCRIPTION	GLOSS AT 60 DEGREES ASTM D523	SHEEN AT 85 DEGREES ASTM D523
G1	A traditional matte finish – flat.	5 units, maximum	and 10 units, maximum
G2	A high side sheen flat - "a velvet-like" finish.	10 units, maximum	and 10 - 35 units
G3	A traditional "eggshell-like" finish.	10 - 25 units	and 10 - 35 units
G4	A "satin-like" finish.	20 - 35 units	and 35 units, minimum
G5	A traditional semi-gloss.	35 - 70 units	-
G6	A traditional gloss.	70 - 85 units	-
G7	A high gloss.	More than 85 units	-

1.6 REGULATORY REQUIREMENTS

- A. Conform to California Building Code for flame spread and smoke density requirements for finishes.
- B. Furnish certification that all paint coatings furnished for the location of the project comply with the EPA clean air act for permissible levels of volatile organic content for architectural coatings applied in California as designated by California Air Resources Board (CARB).

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site in manufacturer's original unopened, labeled containers; inspect to verify acceptance.
- B. Store and protect products from abuse and contamination.
- C. Container labeling is to include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation and instructions for mixing and reducing.
- D. Store paint materials at minimum ambient temperature of 50 degrees F and a maximum of 90 degrees F, in well-ventilated area, unless required otherwise by manufacturer's instructions.
- E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Provide continuous ventilation and heating facilities to maintain surface and ambient temperatures above 50 degrees F for 24 hours before, during and 48 hours after application of finishes, unless required otherwise by manufacturer's instructions.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is above fifty percent, unless required otherwise by manufacturer's instructions.
- C. Minimum Application Temperatures for Latex Paints: 50 degrees F for interior work and exterior work, unless required otherwise by manufacturer's instructions.
- D. Provide lighting level of 80 foot candles measured mid-height at substrate surface.

1.9 EXTRA STOCK

- A. Provide a new and unopened one-gallon container of each type, color and sheen to Owner.
- B. Label each container with color, in addition to the manufacturer's label.

PART 2 PRODUCTS

2.1 PAINT SYSTEMS, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

2.2 ACCEPTABLE MANUFACTURERS – PAINT

- A. Refer to Table at the end of this Section.
- B. Substitutions: Under provisions of Division 01.

2.3 ACCEPTABLE MANUFACTURERS – PRIMER SEALERS

- A. Refer to Table at the end of this Section.
- B. Substitutions: Under provisions of Division 01.

2.4 MATERIALS

- A. All paint materials shall be provided from a single manufacturer unless noted otherwise in this Section.
- B. Coatings: Ready mixed. Process pigments to a soft paste consistency capable of being readily and uniformly dispersed to a homogeneous coating.
- C. Coatings: Good flow and brushing properties; capable of drying or curing free of streaks or sags.
- D. Accessory Materials: All other materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

2.5 FINISHES

- A. Refer to schedule at end of Section for surface finish schedule. Refer to Drawings for color schedule.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Plaster and Gypsum Wallboard: 18 percent.
 - 2. Concrete and Concrete Masonry Units: 10 percent.
- D. Beginning of application constitutes acceptance of existing surfaces.

3.2 PREPARATION

- A. Remove electrical plates, hardware, light fixture trim, and fittings prior to preparing surfaces for painting.
- B. Correct minor defects and clean surfaces that affect work of this Section.
- C. Seal marks that may bleed through surface finishes.
- D. Impervious Surfaces: Remove mildew by scrubbing with solution of tri-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- E. Gypsum Board Surfaces: Latex fill minor defects. Spot-prime defects after repair.

- F. Galvanized Surfaces: Remove passivators, oil, grease, acid residue, and surface contamination; wash with solvent. Apply coat of etching primer, unless otherwise recommended by finish coating system manufacturer.
- G. Shop-Primed Steel Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces as recommended by primer manufacturer. Prime shop-primed steel items with steel primers specified in this Section.

3.3 PROTECTION

- A. Protect elements surrounding the work of this Section from damage or disfiguration.
- B. Repair damage to other surfaces caused by work of this Section.
- C. Furnish drop cloths, shields and protective methods to prevent spray or droppings from disfiguring other surfaces.
- D. Remove empty paint containers from site.

3.4 APPLICATION

- A. Apply products in accordance with manufacturer's instructions.
 - 1. Paint mil thicknesses shall not be less than the minimums recommended by the paint manufacturers.
- B. Do not apply finishes to surfaces that are not dry.
- C. Apply each coat to uniform finish.
- D. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.
- E. Sand lightly between coats to achieve required finish.
- F. Allow applied coat to dry before next coat is applied.
- G. Where concrete block filler is required, apply to a Level 3 Premium Fill per Painting and Decorating Contractors of America (PDCA) Standard P12.

3.5 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT

- A. See Divisions 21 – 23 and 25 – 28 for other items requiring painting.
- B. Paint interior surfaces of air ducts and convector heating cabinets that are visible through grilles and louvers with one) coat of flat black paint, to limit of sight line. Paint dampers exposed behind grilles to match face panels. Paint all new interior and exterior exposed ductwork and ductwork supports. Paint all new conduit, pipes and conduit/pipe supports in exposed interior and exterior locations.
- C. Reinstall electrical plates, hardware, light fixture trim, and fittings removed for surface preparation or painting.
- D. Do not paint factory-finished mechanical and electrical equipment.

3.6 CLEANING

- A. As Work proceeds, promptly remove paint where spilled, splashed or spattered.

- B. During progress of Work, maintain premises free of unnecessary accumulation of tools, equipment, surplus materials and debris.
- C. Collect cotton waste, cloths, and material which may constitute a fire hazard, place in closed metal containers and remove from site daily.

3.7 PAINTING SCHEDULE – EXTERIOR SURFACES

- A. Ferrous Metal:
 - 1. 1st coat – Acrylic Flat Primer
 - 2. 2nd and 3rd coats – 100 percent Acrylic Semi-Gloss
- B. Ferrous Metal (Industrial) – For use at exterior metal architectural features/exposed structure:
 - 1. 1st coat – Epoxy Flat Primer
 - 2. 2nd and 3rd coats – Aliphatic Urethane Gloss Enamel
- C. Galvanized Metal and Aluminum:
 - 1. 1st coat – Etch Prep
 - 2. 2nd coat – Acrylic Flat Primer
 - 3. 3rd and 4th coats – 100 percent Acrylic Semi-Gloss
- D. Exposed Concrete:
 - 1. 1st coat – Polyamine Epoxy Primer
 - 2. 2nd coat – Polyamine Epoxy Intermediate
 - 3. 3rd coat – Aliphatic Polyurethane Topcoat
- E. Cement Plaster with Acrylic Finish Coat:
 - 1. 1st coat – Acrylic Flat Primer
 - 2. 2nd and 3rd coats – 100 percent Acrylic Flat

3.8 PAINTING SCHEDULE – INTERIOR SURFACES.

- A. Gypsum Board:
 - 1. 1st coat – PVA Primer Sealer
 - 2. 2nd and 3rd coats – Latex Semi-Gloss Enamel
- B. Gypsum Board:
 - 1. 1st coat – PVA Primer Sealer
 - 2. 2nd and 3rd coats – Latex Eggshell Enamel
- C. Gypsum Board:
 - 1. 1st coat – PVA Primer Sealer
 - 2. 2nd and 3rd coats – Waterborne Semi-Gloss Epoxy
- D. Ferrous Metal:
 - 1. 1st coat – Acrylic Flat Primer

2. 2nd and 3rd coats – Latex Semi-Gloss Enamel

E. Railing Assemblies:

1. 1st coat – Epoxy Satin Primer
2. 2nd and 3rd coats – High Dispersion Pure Acrylic Polymer

F. Galvanized Metal, Zinc Alloy Metal and Aluminum:

1. 1st coat – Etch Prep
2. 2nd coat – Acrylic Flat Primer
3. 3rd and 4th coats – Latex Semi-Gloss Enamel

G. Concrete:

1. 1st coat – Acrylic Flat Primer
2. 2nd and 3rd coats – Latex Semi-Gloss Enamel

H. Concrete:

1. 1st coat – Acrylic Flat Primer
2. 2nd and 3rd coats – Waterborne Semi-Gloss Epoxy

I. Masonry (CMU):

1. 1st coat – Acrylic Block Filler Primer
2. 2nd and 3rd coats – Latex Semi-Gloss Enamel

J. Masonry (CMU):

1. 1st coat – Acrylic Block Filler Primer
2. 2nd and 3rd coats – Waterborne Semi-Gloss Epoxy

APPLICATION	TYPE	MPI Gloss Level	MANUFACTURERS				
			Dunn Edwards	PPG Paints	Sherwin Williams	Kelly Moore/Devoe	Tnemec
PRIMERS							
Exterior Ferrous Metal	Acrylic	G1	BRPR00-1	4020	B66W00310	5725	
Exterior Ferrous Metal (Industrial)	Epoxy	G1	Carboline Rustbond	Amerlock2VOC	B58W00620	Bar-Rust 235V	
Exterior Cement Plaster System with Acrylic Finish Coat	Acrylic	G1	ESPR00	6001	A24W351	250	
Exterior Galvanized Metal and Aluminum	Acrylic	G1	ULGM00	4020	B66W00310	5725	
Exterior Concrete	Polyamine Epoxy						201 Epoxoprime
Interior Concrete	Acrylic	G1	ESPR00	6001	A24W08300	247	
Interior Railing Assemblies	Epoxy	G1	ULGM00	98-46	B58W00620	Tru-Glaze 4030	
Interior Masonry (Block Filler)	Acrylic	G1	SBPR00	3010	B25W25	521	
Interior Gypsum Board with Epoxy Paint Finish	Acrylic	G1	Carboline Sanitile 120	1000	B28 2600 ProMar 200 Zero	971	
Zero VOC Interior Gypsum Board	Acrylic	G1	VNSL00	9-900	B28 2600	971	

Interior Gypsum Board	PVA	G1	VNSL00	1030	B28 2600	971	
Interior Ferrous Metal	Acrylic	G1	BRPR00	4020	B66W00310	5725	
Interior Galvanized Metal	Acrylic	G1	UGPR00 or GAPR00	4020	B66W00310	5725	
FINISHES							
Exterior Ferrous and Galvanized Metal, and Aluminum	100 percent Acrylic	G5	SSHL50	2406V	A77 Solo	1250	
Exterior Ferrous Metal (Industrial)	Aliphatic Urethane Enamel	G6	Carbothane 134MC	Amershield	B66W300	Devthane 379H	
Exterior Cement Plaster with Acrylic Finish Coat	Elastomeric	G1	EDLX10	2260	A5W451	1128	
Exterior Concrete	Polyamine Epoxy and Aliphatic Polyurethane	G6					280 Tneme-Glaze and 297 Enviro-Glaze
Interior Railing Assemblies	High Dispersion Pure Acrylic	G5	ASHL50	4216	B66W0600	Devcryl 1448	
Interior Masonry, Concrete, and Gypsum Board	Waterborne Epoxy	G5	Carboline Sanitile 255	WB4406	B70W211 and B60V25	Tru-Glaze 4030	
Zero VOC Interior Gypsum Board	100 percent Acrylic	G3	SZRO30	9-300	B09-1000	1010	
Zero VOC Interior Gypsum Board	100 percent Acrylic	G5	SZRO50	9-500	B10-1051	1050	
Interior Gypsum Board, Ferrous Metal, Concrete, Masonry, and Galvanized Metal	100 percent Acrylic	G5	SZRO50	6-8510	A76W53 Solo	1650	
Interior Gypsum Board	100 percent Acrylic	G3	SZRO30	1402N	A75W51 Solo	1610	
MISCELLANEOUS							
Exterior Heavy Duty Cleaner	Water-Based	N/A	Krud Kutter Gloss-Off	88		Devprep 88	
Exterior and Interior Galvanized Metal Etch Prep.	N/A	N/A	Krud Kutter Metal Clean and Etch, Dissco Eco-Prime 100, or Jasco Prep & Prime				

END OF SECTION

DIVISION 10
SPECIALTIES

SECTION 10 11 00
VISUAL DISPLAY SURFACES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Liquid chalk writing surfaces.
- B. Tackboards.
- C. Trim, marker tray and accessories.

1.2 RELATED SECTIONS

- A. Section 09 22 16 – Non-Structural Metal Framing: Substrate construction behind markerboards and tackboards.
- B. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AA (Aluminum Association) – Designation System for Aluminum Finishes.
 - 2. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. ASTM C1396/C1396M – Standard Specification for Gypsum Wallboard.
 - 4. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 5. Porcelain Enamel Institute – Performance Specifications for Porcelain Enamel Chalkboards.

1.4 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchorage details. Method of attachment to structure shall be acceptable to Architect.
- C. Provide product data on markerboards, tackboards, trim, and accessories.
- D. Submit samples under provisions of Division 01.
- E. Submit two samples, 4 inches x 4 inches in size, illustrating markerboard and tackboard materials finish, color, and texture.

F. Submit manufacturer's installation instructions under provisions of Division 01.

1.5 REGULATORY REQUIREMENTS

A. Conform to flame and smoke rating for markerboards and vinyl fabric covered tackboards in accordance with ASTM E84.

1.6 MAINTENANCE DATA

A. Submit maintenance data under provisions of Division 01.

B. Include maintenance information on regular cleaning and stain removal.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Claridge Products and Equipment, Products:

1. Markerboards: Series 5, Type A, sizes as indicated on Drawings.
2. Tackboards: Series 800, Type CO, sizes as indicated on Drawings.

B. Aarco Products Inc.

C. Platinum Visual Systems.

D. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. Markerboards:

1. Outer Face Sheet Steel: 24 gauge steel with LCS (porcelain enamel) face.
2. Aluminum Extrusions: ASTM B221, 6063 alloy, T-5 temper.
 - a. Frame: Manufacturer's standard profile; concealed fasteners.
 - b. Chalk Tray: Manufacturer's standard profile; one piece, full length of markerboard with end closures; concealed fasteners.
 - c. Map Rail: Continuous 1 inch map rail with cork insert and end stops at each end of markerboard.
3. Core: 7/16 inch Duracore, composed of 100 percent recycled wood fiber.
 - a. Binder shall not contain added urea-formaldehyde resins.]
4. Foil Backing: Aluminum foil sheet, 0.005 inch thick.
5. Adhesives: Type recommended by manufacturer.
6. Splice Joint: Extruded aluminum exposed "H" type, with chalk surfacing applied.

B. Tackboards:

1. Tackboard Covering: Vinyl coated fabric wallcovering.
2. Aluminum Extrusions: ASTM B221, 6063 alloy, T-5 temper.
 - a. Frame: 5/8 inch face width; concealed fasteners.
3. Core: 7/32 inch cork over 1/4 inch Duracore.

4. Adhesives: Type recommended by manufacturer.

2.3 FINISHES

- A. Porcelain Enamel: Glass-fibered enamel, baked to vitreous surfaces; Porcelain Enamel Institute Type A; color: Claridge No. 100 White.
- B. Aluminum Frames and Accessories: Anodized to clear finish.
- C. Tackboard Surface: Vinyl wallcovering, color as selected by Architect.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that surfaces and internal wall blocking are ready to receive work, and opening dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of substrate construction.

3.2 INSTALLATION

- A. Install markerboards and tackboards where located on the Drawings in accordance with manufacturer's instructions.
- B. Secure units level and plumb.

3.3 CLEANING

- A. Clean markerboard and tackboard surfaces in accordance with manufacturer's instructions.

END OF SECTION

SECTION 10 14 00

SIGNAGE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Exterior Signages:
 - 1. Accessibility Signage.
 - 2. Monument sign.
- B. Interior Signages:
 - 1. Accessibility Signage.
 - 2. Room Capacity Signage.
 - 3. Vinyl Applied Door Graphics.
- C. Life Safety Signages.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 08 11 13 – Hollow Metal Doors and Frames.
- D. Section 08 14 00 – Wood Doors.
- E. Section 09 29 00 – Gypsum Board.
- F. Division 26 – Electrical

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ADA – Americans with Disabilities Act - 2010 Standards for Accessible Design.
 - 2. ASTM A53/A53M – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.
 - 3. ASTM A123/A123M – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
 - 4. ASTM A283/A283M – Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

5. ASTM A500/A500M – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
6. ASTM B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
7. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
8. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.
9. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
10. AWS D1.1 – Structural Welding Code – Steel.
11. AWS D1.2 – Structural Welding Code – Aluminum.
12. 2013 California Building Code (CBC).
13. 2013 California Electrical Code.
14. NFPA 80, 4.1.4 – Signage on Fire Doors.
15. NFPA 101 – Life Safety Code.
16. UL 924 – Emergency Lighting and Power Equipment.
17. UL Building Materials Directory.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specification for each product.
- C. Shop Drawings: Submit shop drawing for each sign and plaque to show construction, sections, dimensions, text, character spacing, and anchorage and mounting details.
- D. Samples: Submit sign and plaque colors, designs and sizes as specified in this Section and as shown on the Drawings for review.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum five years' experience.
- B. Regulatory Requirements:
 1. Accessibility Signage, General: Provide signage in accordance with California Code of Regulations, Title 24, Part 2, Chapter 11B, Sections 11B-216 and 11B-703, 2013 California Building Code.
 - a. Finish, Color, and Contrast: Characters, pictograms, symbols and their backgrounds shall have a non-glare finish. Characters shall contrast with their background with either light characters on a dark background or dark characters on a light background.
 - b. Depth: Raised characters shall be 1/32 inch minimum above their background.

- c. Case:
 - 1) Raised Characters: Characters shall be uppercase.
 - 2) Visual Characters: Characters shall be uppercase or lowercase or a combination of both.
- d. Style: Characters shall be conventional in form. Characters shall not be italic, oblique, script, highly decorative, or of other unusual forms. Raised characters shall be sans serif.
- e. Proportions: Visual characters on signs shall be selected from fonts where the width of the uppercase letter "O" is 60 percent minimum and 110 percent maximum of the height of the uppercase letter "I". Stroke thickness of the uppercase letter "I" shall be 15 percent maximum of the height of the character.
- f. Character Height:
 - 1) Raised Characters: Character height measured vertically from the baseline of the character shall be 5/8 inch minimum and 2 inches maximum based on the height of the uppercase letter "I".
 - 2) Visual Characters: Minimum character height shall comply with CBC Table 11B-703.5.5. Viewing distance shall be measured as the horizontal distance between the character and an obstruction preventing further approach towards the sign. Character height shall be based on the uppercase letter "I".
- g. Character Spacing:
 - 1) Raised Characters: Character spacing shall be measured between the two closest points of adjacent raised characters within a message, excluding word spaces. Where characters have rectangular cross sections, spacing between individual raised characters shall be 1/8 inch minimum and four times the raised character stroke width maximum, Where characters have other cross sections, spacing between individual raised characters shall be 1/16 inch minimum and four times the raised character stroke width maximum at the base of the cross sections, and 1/8 inch minimum and four times the raised character stroke width maximum at the top of the cross sections. Characters shall be separated from raised borders and decorative elements 3/8 inch minimum.
 - 2) Visual Characters: Character spacing shall be measured between the two closest points of adjacent characters, excluding word spaces. Spacing between individual characters shall be 10 percent minimum and 35 percent maximum of character height.
- h. Line Spacing: Spacing between the baselines of separate lines of characters within a message shall be 135 percent minimum and 170 percent maximum of the character height.
- i. Format: Text shall be in horizontal format.
- j. Braille: Comply with CBC Section 11B-703.3, contracted Grade 2 Braille.
 - 1) Dimensions and Capitalization: Braille dots shall have a domed or rounded shape and shall comply with CBC Table 11B-703.3.1. The indication of an uppercase letter or letters shall only be used before the first word of sentences, proper nouns and names, individual letters of the alphabet, initials, and acronyms.

- 2) Position: Braille shall be positioned below the corresponding text in a horizontal format, flush left or centered. If text is multi-lined, Braille shall be placed below the entire text. Braille shall be separated 3/8 inch minimum and 1/2 inch maximum from any other tactile characters and 3/8 inch minimum from raised borders and decorative elements.
 - k. Pictograms: Comply with CBC Section 11B-703.6.
 - 1) Pictogram Field: Pictograms shall have a field height of six inches minimum. Characters and Braille shall not be located in the pictogram field.
 - 2) Text Descriptors; Pictograms shall have text descriptors located directly below the pictogram field. Text descriptors shall comply with CBC Sections 11B-703.2, 11B-703.3, and 11B-703.4.
 - l. Symbols of Accessibility: Symbols of accessibility shall comply with CBC Section 11B-703.7.
2. Accessibility Signage:
- a. Delayed Egress Door Signage: CBC Section 1008.1.9.7 "Delayed Egress Locks".
 - 1) Sign Text and Type: CBC Section 1008.1.9.7.5 for sign text and size, and Section 1008.1.9.7.5.1 for tactile sign.
 - b. Tactile Exit Signage: CBC Chapter 10 "Means of Egress," Section 1011 "Exit Signs," Section 1011.1 "Where Required," and Section 1011.4 "Raised Character and Braille Exit Signs".
 - 1) Tactile signs required by CBC Section 1011.4 need not be provided with illumination per Section 1011.3.
 - 2) Tactile Stairway Signs (SFM Requirements): CBC Section 1022.9 "Stairway Identification Signs".
 - c. Other Accessible Signage: CBC Chapter 11B, "Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing."
 - 1) Toilet Room and Bathing Room Signage: CBC Section 11B-216.8, "Toilet Rooms and Bathing Rooms" and CBC Section 11B-703.7.2.6, "Toilet and Bathing Facilities Geometric Symbols".
 - 2) Elevator Signage: CBC Section 11B-407, "Elevators" and CBC Section 11B-407.2.3, "Hoistway Signs".
 - 3) Detailed Requirements for Accessible Signage: CBC Chapter 11B, Division 7, Section 11B-703, "Signs".
 - a) Sign Mounting Heights and Locations: CBC Sections 11B-703.4, 11B-703.5.6, and 11B-703.7.2.6.
 - b) Symbols of Accessibility: CBC Section 11B-703.7, "Symbols of Accessibility".
 - c) International Symbol of Accessibility: CBC Section 11B-703.7.2.1, "International Symbol of Accessibility".
 - d) Entrance Signs: CBC Section 11B-216.6, "Entrances".
 - 4) Stairway Accessibility Signage:
 - a) Tactile Floor Signage: CBC Section 11B-504.8 "Floor Identification".
 - 5) Site Accessibility Signage: CBC Sections 11B-216, "Signs", 11B-502.6, "Identification", 11B-502.8, "Additional Signage", and 11B-703, "Signs".

- 6) Accessible Parking Signage: CBC Section 11B-502.6 "Identification".
- 7) Post or Pylon Mounted Signs: CBC Section 11B-307.3 "Post-Mounted Objects".
- d. Field Inspection: Signs and identification shall be field inspected after installation and approved by the enforcing agency, in accordance with CBC Section 11B-703.1.1, "Plan Review and Inspection".
3. Exit Signage: Provide signage in accordance with California Code of Regulations, Title 24, Part 2, 2013 California Building Code, Chapter 10 "Means of Egress", Section 1011 "Exit Signs", as applicable to Occupancy Group.
 - a. Illuminated Exit Signs: CBC Section 1011.1 "Where Required", Section 1011.3 "Illumination", Section 1011.5 "Internally Illuminated Exit Signs", and Section 1011.6 "Externally Illuminated Exit Signs".
 - b. Floor Exit Signs (SFM Requirement): CBC Section 1011.7 "Floor-Level Exit Signs".
 - c. Stairway Signs: CBC Section 1022.9 "Stairway Identification Signs".
4. Wind Load Requirements: Exterior signages shall be designed to resist wind loads in accordance with CBC.
5. Electrical Materials and Components: Provide in accordance with California Electrical Code and NFPA 70.
- C. Pre-Installation Meetings:
 1. Conduct pre-installation meeting in accordance with provisions of Division 01.
 2. Convene pre-installation meeting one week prior to commencing work of this Section.
 3. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Storage and Protection: Store materials in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. WeidnerCA, Sacramento, CA; phone: 916-452-8000, URL: www.weidnerca.com.
 2. ASI-Modulex, Dallas, TX; phone: 800-274-7732, URL: www.asisign.com.
 3. In Pro Corporation, Muskego, WI; phone: 800-222-5556, URL: www.inprocorp.com.
 4. Mohawk Sign Systems, Inc., Schenectady, NY; phone: 518-842-5303, URL: www.mohawksign.com.
 5. APCO, Atlanta, GA; phone: 404-688-9000, URL: www.apcosigns.com.
 6. Diverse ID, Tampa, FL; phone: 877-446-2374, URL: www.diverseid.com.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Acrylic Plastic: Non-glare finish acrylic with integral color as manufactured by Romark or accepted equal. Thickness shall be 1/4 inch at door mounted restroom signs and 1/8 inch minimum at all other locations, unless noted otherwise. Colors as selected by Architect from manufacturer's full range of colors.
- B. Aluminum: ASTM B209 for sheet or plate; ASTM B221 for extrusions, and ASTM B26/B26M for castings. Aluminum extrusions shall be 1/8 inch thick minimum. Wall and post mounted panels shall be 0.080 inch thick minimum. Aluminum panels shall have an acrylic polyurethane paint finish.
- C. Steel Posts: ASTM A53/A53M, Type E or S, Grade B; galvanized 1-1/2 inch nominal pipe size (NPS), Schedule 40. Provide 1/8 inch thick steel cap (ASTM A283/A283M) welded to top of post. Galvanize post and cap to minimum G50 in accordance with ASTM A123/A123M.
- D. Vinyl Sheet for Graphics: Precision cut with reflective surface; five to seven year premium type; shall be in accordance with flammability requirements of ASTM E84; minimum 0.003 inch film thickness. Film shall include a precoated pressure sensitive adhesive backing or positionable pressure sensitive backing. Film shall be as manufactured 3M or accepted equal. Color as selected by Architect.
- E. Anchors and Fasteners: Stainless steel conforming to ASTM F593.

2.3 EXTERIOR SIGNAGE

- A. Accessible Signage: Provide the following signages in accordance with 2010 ADA Standards for Accessible Design and 2013 CBC where indicated on the Drawings.
 - 1. Entrance to Parking Lot Sign: 17 inches wide by 22 inches high (minimum) metal panel, reflectorized sign mounted on a single post with text "UNAUTHORIZED VEHICLES PARKED IN DESIGNATED ACCESSIBLE SPACES NOT DISPLAYING DISTINGUISHING PLACARDS OR SPECIAL LICENSE PLATES ISSUED FOR PERSONS WITH DISABILITIES WILL BE TOWED AWAY AT OWNERS EXPENSE. TOWED VEHICLES MAY BE RECLAIMED AT _____ OR BY TELEPHONING _____."
 - a. Blank Space Text: Coordinate text requirement for blank spaces with Owner.
 - 2. Accessible Parking Stall Sign: Provide a 12 inch wide by 18 inch high metal panel, reflectorized International Symbol of Accessibility sign, mounted on a single post, at every accessible parking stall indicated on the Drawings.
 - 3. Van Accessible Parking Stall Sign: Provide a 12 inches wide by 18 inches high metal panel, reflectorized International Symbol of Accessibility sign, mounted on a single post for each van accessible parking stall as indicated on the drawings. Text shall occur below the symbol and read "RESERVED PARKING". Mounted on the same post, below this sign, a sign of the same width and required height shall display the text "VAN ACCESSIBLE". Refer to Drawings for additional sign information.
 - 4. Sign for Parking Violation Fine: An additional sign or additional language below the symbol of accessibility shall state "Minimum Fine \$250".

5. Accessible Route Signage: Provide where accessible route of travel diverges from the regular circulation path along or leading to an accessible route of travel, entrance or facility. Sign shall display the International Symbol of Accessibility, shall indicate the direction to accessible entrances and facilities, and shall comply with the requirements of CBC Sections 11B-216 and 11B-703.
 6. Building Entrance: Provide a 6-inch square International Symbol of Accessibility plaque for public entrances where indicated on the Drawings.
 - a. At Solid Wall Surfaces: Minimum 1/8 inch thick, non-glare finish acrylic with integral color and inlaid copy.
 - b. At Glass Surfaces: Vinyl decal applied to exterior surface of glass.
 7. Functional Room Signage: Provide acrylic plastic room signage with inlaid characters raised 1/32-inch, upper case, sans serif type with corresponding contracted Grade 2 Braille. Raised characters shall be at least 5/8 inch high, but no higher than 2 inches. Color selections from manufacturer's full range of colors. Characters and symbols shall contrast with their background per CBC Section 11B-703.
- B. No Smoking Signage: Provide no smoking signage. Text for signs:
1. "NO SMOKING WITHIN 25 FEET OF BUILDING".
 2. "DESIGNATED SMOKING AREA".
- C. Monument Sign:
1. Components:
 - a. Concrete Foundation: Refer to Section 03 30 00 for Cast-In-Place Concrete and Section 03 20 00 for concrete steel reinforcing.
 - b. Concrete Unit Masonry: Split face units in size and configuration indicated on Drawings. Refer to Section 04 22 00 for additional information. Provide precast concrete caps in size and configuration indicated on Drawings. Fabricate precast units with sharp arrises and accurately reproduced details, with smooth texture on all exposed surfaces.
 - c. Structural Steel: ASTM A500, Grade B galvanized steel tubing and ASTM A36 galvanized steel plate. Galvanizing shall be in accordance with ASTM A123/A123M. Provide minimum 1.25 ounces per square foot galvanized coating. Steel welding per AWS D1.1. Sizes and configuration as indicated on Drawings.
 - d. Housings: ASTM A666, 16 gauge Type 316 stainless steel with No. 4 finish. Stainless steel welding per AWS D1.6. Size and configuration as indicated on Drawings.
 - e. Acrylic Panel: 1/4 inch thick clear Lexan polycarbonate sheet. Panel shall be one piece without seams.
 - f. Aluminum Plate: ASTM B209 3/8 inch thick aluminum plate, alloy 6061-T6. Create graphic lettering and logo motif by laser-cutting, water jet-cutting, or other accepted method from digital CAD files provided by Architect. Aluminum plates shall have Architectural Class I finish per Aluminum Association Standard AA-M12 C22 A41, clear anodized complying with AAMA 611, 0.7 mil minimum thickness.

- g. Internal Light Fixture: Surface-mounted linear LED fixture, suitable for exterior use, with dimensions indicated on Drawings for fixture and associated power supply. Fixture shall be available in 8 feet maximum sections. LED fixture shall use 6 watts per foot, and emit pure white light. Power supply shall be capable of operating 96 watts at 120 VAC and shall be UL listed for wet locations.

2.4 INTERIOR SIGNAGE

- A. Accessible Signage: Provide the following signages in accordance with 2010 ADA Standards for Accessible Design and 2013 CBC where indicated on Drawings:
 - 1. Material: 1/4-inch thick acrylic plastic, edges rounded, chamfered, or eased. Corners shall have minimum radius of 1/8 inch.
 - 2. Color: Characters, symbols, and pictograms on contrasting background per CBC Section 11B-703. Colors as selected by Architect from manufacturer's full range of colors.
 - 3. Restroom Signage:
 - a. Men's Restroom Symbol (door mounted): Provide for each men's restroom door an equilateral triangle, 1/4 inch thick with 12 inch long sides, vertex pointing upward. Provide an international symbol of accessibility and male pictogram, centered on the triangle at accessible restrooms. The color of the triangle symbol shall contrast with the door color, either light on a dark background or dark on a light background.
 - b. Men's Restroom Sign (wall mounted): Provide for each men's restroom a 6 inch wide by 10 inch high acrylic plaque with an international symbol of accessibility and male pictogram (minimum 6 inches high) centered at the top of the sign; 5/8 inch high by 1/32 inch raised, inlaid characters below the pictogram to read "MEN"; corresponding contracted Grade 2 Braille 3/8 inch minimum to 1/2 inch maximum below text.
 - c. Women's Restroom Symbol (door mounted): Provide for each women's restroom door a circle, 1/4 inch thick and 12 inches in diameter. Provide an international symbol of accessibility and female pictogram, centered on the circle at accessible restrooms. The color of the circle symbol shall contrast with the door color, either light on a dark background or dark on a light background.
 - d. Women's Restroom Sign (wall mounted): Provide for each women's restroom a 6 inch wide by 10 inch high acrylic plaque with an international symbol of accessibility and female pictogram (minimum 6 inches high) centered at the top of the sign; 5/8 inch high by 1/32 inch raised, inlaid characters below the pictogram to read "WOMEN"; corresponding contracted Grade 2 Braille 3/8 inch minimum to 1/2 inch maximum below text.
 - e. Unisex Restroom Symbol (door mounted): Provide for each unisex restroom door a circle, 1/4 inch thick and 12 inches in diameter with a 1/4 inch thick equilateral triangle with a vertex pointing upward superimposed on the circle and within the 12 inch diameter. Provide an international symbol of accessibility, centered on the triangle at restrooms equipped for the disabled. The triangle symbol shall contrast with the circle, either light on a dark background or dark on a light background. The circle symbol shall contrast with the door color, either light on a dark background or dark on a light background.

- f. Unisex Restroom Sign (wall mounted): Provide for each unisex restroom a 6 inch wide by 10 inch high acrylic plaque, with an international symbol of accessibility and a paired male and female pictogram (minimum 6 inches high) centered at the top of the sign; 1 inch high by 1/32 inch raised text below the pictogram shall read "RESTROOM"; with corresponding contracted Grade 2 Braille 3/8 inch minimum to 1/2 inch maximum below text.
4. Functional Room Signage: Provide room signage with inlaid characters raised 1/32-inch, upper case, sans serif type with corresponding contracted Grade 2 Braille. Raised characters shall be at least 5/8 inch high, but no higher than 2 inches. Characters and symbols shall contrast with their background per CBC Section 11B-703.
5. Tactile Exit Signage:
 - a. Provide tactile exit signs at doors in rooms or areas that require more than one exit or exit access per CBC Sections 1011.1 and 1011.4.
 - b. Acrylic plaque tactile exit signs shall have text at least 5/8 inch high, but no higher than 2 inch high, and corresponding contracted Grade 2 Braille shall be placed a minimum of 3/8 inch and a maximum of 1/2 inch directly below the text as follows:
 - 1) Each grade-level exterior exit door that is required to comply with CBC Section 1011.1 shall be identified by a tactile exit sign with the word "EXIT".
 - 2) Each exit door that is required to comply with CBC Section 1011.1, and that leads directly to a grade-level exterior exit by means of a stairway or ramp shall be identified by a tactile exit sign with the following words as appropriate: "EXIT STAIR DOWN", "EXIT RAMP DOWN," "EXIT STAIR UP," or "EXIT RAMP UP." At exit discharge level, door sign shall include a raised five-pointed star located to the left of the identifying floor level.
 - 3) Each exit door that is required to comply with CBC Section 1011.1, and that leads directly to a grade-level exterior exit by means of an exit enclosure or an exit passageway shall be identified by a tactile exit sign with the words "EXIT ROUTE".
 - 4) Each exit access door from an interior room or area to a corridor or hallway that is required to comply with CBC Section 1011.1 shall be identified by a tactile exit sign with the words "EXIT ROUTE".
 - 5) Each exit door through a horizontal exit that is required to comply with CBC Section 1011.1 shall be identified by a tactile exit sign with the words "TO EXIT".
- B. Room Capacity Sign: Provide room capacity sign. Text for sign "MAXIMUM OCCUPANT LOAD ____ BY ORDER OF THE STATE FIRE MARSHAL".
 1. Blank Space Text: Coordinate text requirement for blank spaces with Architect prior to sign fabrication and installation.
- C. Digital Cut Door Graphics: Vinyl; size, color and font as shown on Drawings and as selected by Architect.

2.5 LIFE SAFETY SIGNAGE

- A. Exit Signs: Internally illuminated exit signs conforming to NFPA 101, Section 7.10.7; UL listed in accordance with UL 924, with wording in legible characters not less than 4 inch high and text "EXIT".

2.6 FABRICATION

- A. Work shall be assembled in the shop, as far as practical, ready for installation at the site. Work that cannot be shop assembled be trial fit in the shop to ensure proper field assembly.
- B. Drill or punch holes for bolts and screws; produce clean, true lines and surfaces.
- C. Acrylic signs shall have inlaid acrylic copy/characters and Braille symbols as described in this Section.
- D. Aluminum welding shall be in accordance with AWS D1.2. Steel welding shall be in accordance with AWS D1.1. Welding shall be continuous along the entire area of contact. Grind smooth exposed welds.
- E. Galvanized items shall be hot-dip process after fabrication if practical in accordance with ASTM A123/A123M.
- F. Exposed work surfaces shall have a smooth finish and exposed riveting shall be flush. Fastenings shall be concealed where practical.
- G. Joints exposed to the weather shall be formed to exclude water. Provide drainage and weep holes to prevent condensation buildup.

2.7 SHOP FINISHING

- A. Surfaces of miscellaneous metal work, except nonferrous metal, corrosion resisting steel, and zinc-coated work, shall be given one coat of zinc-molybdate primer or an accepted rust-resisting treatment and metallic primer in accordance with manufacturer's standard practice.
- B. Surfaces to be embedded in concrete shall not be painted.
- C. Upon completion of work, damaged surfaces shall be recoated.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install signs and plaques level and plumb.
- B. Mount sign posts directly into concrete foundation. Mount sign to post using tamper resistant mechanical fasteners as recommended by manufacturer and accepted by the Architect.
- C. Accessible Sign Mounting Heights and Locations:
 - 1. Site Signage:
 - a. Parking Signage: Per CBC Section 11B-502.6, signs shall be 60 inches minimum above the finish floor or ground surface measured to the bottom of the sign.
 - b. Accessible Route Signage: Per CBC Section 11B-502.6 (Exception), signs located within an accessible route shall be a minimum of 80 inches above the finish floor or ground surface measured to the bottom of the sign.
 - 2. Mounting Height With Tactile Characters: Per CBC Section 11B-703.4.1, tactile characters on signs shall be located 48 inches minimum above the finished floor or ground surface, measured from the baseline of the lowest Braille cells and 60 inches maximum above the finished floor or ground surface, measured from the baseline of the highest line of raised characters.

3. Mounting Location with Tactile Characters: Per CBC Section 11B-703.4.2 as follows:

- a. Where a tactile sign is provided at a door, the sign shall be located alongside the door at the latch side.
- b. Where a tactile sign is provided at double doors with one active leaf, the sign shall be located on the inactive leaf.
- c. Where a tactile sign is provided at double doors with two active leaves, the sign shall be located to the right of the right hand door.
- d. Where there is no space at the latch side of a single door or at the right side of double doors, signs shall be located on the nearest adjacent wall.
- e. Signs containing tactile characters shall be located so that a clear floor space of 18 inches minimum by 18 inches minimum, centered on the tactile characters, is provided beyond the arc of any door swing between the closed position and 45 degree open position.
- f. Where permanent identification signage is provided for rooms and spaces, they shall be located on the approach side of the door as one enters the room or space. Signs that identify exits shall be located on the approach side of the door as one exits the room or space.

4. Mounting Height With Visual Characters: Per CBC Section 11B-703.5.6, visual characters shall be 40 inches minimum above the finished floor or ground.

5. Toilet and Bathing Facility Signage: Per CBC Section 11B-703.7.2.6, the geometric door symbol shall be mounted at 58 inches minimum and 60 inches maximum above the finished floor or ground surface measured from the centerline of the symbol. The symbol shall be mounted within 1 inch of the vertical centerline of the door.

D. Exterior Accessible Building Entrance Signs, Functional Room Signs, and No Smoking Signs: Mount to exterior door and wall surfaces using tamper proof mechanical fasteners suitable for the mounting substrate as recommended by the manufacturer and accepted by the Architect.

1. Accessible Building Entrance Signs: Apply to exterior glass surfaces using vinyl decals. Install same size blank backer sign on opposite side of exterior sign.

E. Interior Restroom Signs, Functional Room Signs, Exit Signs, and Room Capacity Signs: Mount to door and wall surfaces with tamper proof mechanical fasteners suitable for the mounting substrate as recommended by the manufacturer and accepted by the Architect.

F. Vinyl Door Graphics: Install per manufacturer's recommendations.

3.2 ADJUST AND CLEAN

- A. Clean and Touch-up: Remove all packing and protection blemishes and thoroughly clean and polish all finish surfaces. Restore any marred or abraded surfaces to their original condition by touching up in accordance with the manufacturer's recommendations. Touch-up shall not be obvious.
- B. Defective Work: Remove and replace all defective work that cannot be properly repaired, cleaned or touched-up, as directed by the Architect, with no additional cost to the Owner.
- C. Protect installed work during the construction period to prevent abuse and damage.

3.3 CLEAN-UP

- A. Upon completion of the work of this Section, remove all surplus materials, rubbish and debris from the premises.

END OF SECTION

SECTION 10 21 13.19
PLASTIC SHOWER COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Solid plastic shower stalls with modesty doors, floor supported and overhead braced.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 09 30 00 – Tiling.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ANSI A117.1 – Guidelines for Accessible and Usable Buildings and Facilities.
 - 2. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. ASTM D635 – Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.
 - 4. ASTM D1929 – Standard Test Method for Determining Ignition Temperature of Plastics.
 - 5. ASTM D2843 – Standard Test Method for Density of Smoke From the Burning or Decomposition of Plastic.
 - 6. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. General: Submit under provisions of Division 01.
- B. Samples:
 - 1. Furnish a 1 inch x 4 inch sample of solid plastic partition material showing color face and finished edges.
 - 2. Furnish one each of stainless steel fasteners, door hardware, mounting hardware and aluminum headrail.
- C. Shop Drawings:
 - 1. Provide four copies of all shop drawings.

2. Show fabrication, erection and anchorage of assemblies, to extent not fully described by manufacturer's data sheets.
3. Show anchorage, accessory items and finishes.
4. Show compartment layouts, with field verified dimensions.
5. Provide location drawings for bolt hole locations in supporting members for attachment of partitions.

D. Manufacturer's Data:

1. Provide four copies each of:
 - a. Data sheets.
 - b. Installation instructions.
 - c. Maintenance procedures.
 - d. Independent third party ASTM E84 testing certifying that partitions have a minimum Class B rating.

E. Mock-up

1. Provide mock-up of door and pilaster assemblies showing all hardware proposed for use on this installation.

1.5 REGULATORY REQUIREMENTS

- A. Comply with CBC Chapter 11B and ANSI A117.1 accessibility requirements.
- B. ASTM E84 Flammability Test: Meet the requirements of CBC Chapter 8; minimum Class B rating required.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver items in manufacturer's original unopened protective packaging.
- B. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.
- C. Handle so as to prevent damage to finished surfaces.

1.7 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.8 COORDINATION

- A. Coordinate placement of backing in walls. Backing by others.

1.9 WARRANTY

- A. Twenty-five year warranty covering all plastic components against breakage, corrosion, and delamination.
- B. Five year warranty for all hardware.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Scranton Products.
2. Partition Systems Incorporated of South Carolina (PSISC).
3. Bradley, Sentinel Series400.

B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. High-density polyethylene (HDPE) plastic shall meet the requirements of ASTM D1929 and ASTM D2843.
- B. Pilasters, doors, panels and urinal screens shall be fabricated from high-density polyethylene (HDPE) containing a minimum of ten percent recycled material manufactured under high pressure forming a single component section which is waterproof, nonabsorbent and that has a self-lubricating surface. Color as selected by Architect.
- C. Pilaster shoes shall be 20 gauge Type 304 stainless steel with #4 satin brushed finish.
- D. Headrail: ASTM B221; 6463-T5 alloy aluminum extrusion, with clear anodized finish.

2.3 FABRICATION

- A. Pilasters, doors, and urinal screens shall be 1 inch thick. All edges shall be machined to a radius of 0.250 inch. All exposed surfaces shall be free of saw marks.
 - 1. Panel and door sizes shall be as shown on Drawings.
 - 2. Pilasters shall be 82 inch high.
- B. Aluminum edging strips shall be fastened to the bottom edge of all doors and panels using tamper resistant stainless steel fasteners.
- C. Panels and doors shall be 58 inches high and mounted 12 inches above finished floor.
- D. Leveling devices shall be through-bolted to base of pilaster.
- E. Pilaster shoes shall be one-piece, 3 inches high minimum. Top shall have 90 degree return to pilaster. Shoes shall be secured to pilasters with stainless steel tamper resistant torx head sex bolts.
- F. Headrails and headrail returns shall have anti-grip profile, clamp over pilasters, and be secured to walls with 16 gauge Type 304 stainless steel brackets.

2.4 HARDWARE

A. Door Hardware:

1. Sliding door latch be 6463-T5 alloy extruded aluminum, surface mounted with emergency egress feature. Latch housing shall have bright dip anodized finish; slide bolt and button shall have black anodized finish. Latch shall require less than five pound force to operate and be mounted at 44 inches above finished floor. Do not install door latches at shower stall doors.
2. Door strike/keeper shall be 6 inches long and made of 6463-T5 alloy extruded aluminum with bright dip anodized finish. Bumper shall be made of extruded black vinyl.
3. Hinges shall be integral, fabricated from the door and pilaster with no exposed metal parts.
4. Door shall be furnished with two 11 gauge stainless steel door stop plates with attached rubber bumpers to resist door from being kicked in/out beyond pilaster.
5. Provide clothes hook on inside of each stall of door. Mount hook at 48 inches above the finished floor at all accessible stalls.
6. Provide U-shaped door pulls and wall stop for outswinging doors. Equip accessible doors with inside and outside pulls. Pulls shall be located directly below the latch. Door hardware shall be mounted at 30 inches to 44 inches above finished floor.
7. Accessible water closet compartment shall be equipped with a door that has a self-closing device and shall have a clear, unobstructed opening width of 32 inches when located at the end and 34 inches when located at the side with the door positioned at an angle of 90 degrees from its closed position per CBC Section 11B-604.8.1.2.

B. Miscellaneous Hardware:

1. Provide 1-1/2 inch stirrup type 6463-T5 alloy aluminum wall brackets with bright dip anodized finish. Brackets shall be used for all panels to pilaster, pilasters to wall and panel to wall connections. Wall brackets shall be thru-bolted to panels and pilasters with stainless steel tamper resistant torx fasteners.
2. Fasteners at locations connecting panels to pilasters shall utilize through-bolted, stainless steel, tamper resistant torx fasteners.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that site conditions are ready to receive work and opening dimensions are as required.
- B. Verify correct spacing of plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage and bracing, where required.
- D. Beginning of installation means acceptance of existing substrate.

3.2 INSTALLATION

- A. Install partitions secure, plumb, and level in accordance with manufacturers' instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.

- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to bracket with tamper resistant bolts and nuts.
- E. Secure all elements rigidly in place. Anchor to structure with anchors appropriate for use with type of adjacent construction. Fasteners shall securely fasten items to wall construction involved. Fasteners shall provide stiffness and rigidity to keep items square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the toilet partition manufacturer or as conditions warrant:
 - 1. Concrete/Masonry: 1/4 inch diameter tamper resistant stainless steel wedge anchors with 1-1/2 inch minimum embedment into substrate and 2 inch minimum edge distance to face of substrate.
- F. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.
- G. Install door strike and keeper with door bumper on each pilaster in alignment with door latch.
- H. Adjust hinges to locate doors in partial opening position when unlatched. Hinges shall return outswinging doors to closed position.

3.3 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Set hinge on in-swinging doors to hold door open when unlatched.
- C. Set hinge on out-swinging doors to hold unlatched door in closed position.

3.4 CLEANING

- A. Remove protective masking. Clean surfaces.
- B. Field touch-up of scratches or damaged finish will not be permitted.
- C. Replace damaged or scratched materials with new materials.

END OF SECTION

SECTION 10 21 13.36
COMPOSITE TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Solid color reinforced composite toilet compartments, floor supported and overhead braced.
- B. Solid color reinforced composite urinal screens, wall mounted.

1.2 RELATED SECTIONS

- A. Section 09 22 16 – Non-Structural Metal Framing.
- B. Section 09 29 00 – Gypsum Board.
- C. Section 09 30 00 – Tiling.
- D. Section 10 28 13 – Toilet Accessories.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. General: Submit under provisions of Division 01.
- B. Samples:
 - 1. Furnish a 1 inch x 4 inch sample of solid color reinforced composite partition material showing color face and finished edges.
 - 2. Furnish one each of stainless steel fasteners, door hardware, mounting hardware and aluminum headrail.
- C. Shop Drawings:
 - 1. Provide four copies of all shop drawings.
 - 2. Show fabrication and erection of assemblies, to extent not fully described by manufacturer's data sheets.
 - 3. Show anchorage, accessory items and finishes.
 - 4. Show compartment layouts, with field verified dimensions.

5. Provide location drawings for bolt hole locations in supporting members for attachment of partitions.

D. Manufacturer's Data:

1. Provide four copies each of:
 - a. Data sheets.
 - b. Installation instructions.
 - c. Maintenance procedures.

1.5 REGULATORY REQUIREMENTS

- A. Comply with CBC Chapter 11B and ANSI A117.1 accessibility requirements.
- B. Flammability Test: Meet the requirements of CBC Chapter 8; minimum Class B rating required.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver items in manufacturer's original unopened protective packaging.
- B. Store materials in original protective packaging to prevent soiling, physical damage, or wetting.
- C. Handle so as to prevent damage to finished surfaces.

1.7 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

1.8 COORDINATION

- A. Coordinate placement of backing in walls. Backing by others.

1.9 WARRANTY

- A. Ten year limited warranty for panels, doors, and pilasters against breakage, corrosion, delamination, and defects in factory workmanship.
- B. One year warranty against defects in material and workmanship for stainless steel door hardware and mounting brackets.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Bobrick, 1092.67 Sierra Series floor mounted, overhead braced compartments and 1095 Sierra series urinal screens.
 2. Dupont,™ Ultimate Corian®
 3. WilsonArt®, Gibraltar® or Earthstone™.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Doors, panels, pilasters, and urinal screens shall be constructed of Solid Color Reinforced Composite material, composed of dyes, organic fibrous material, and polycarbonate/phenolic resins. Material shall have a non-ghosting, graffiti-resistant surface integrally bonded to core. Edges of material shall be the same color as the surface. Finish color as selected by Architect.
- B. Leveling devices shall be 7-gauge, 3/16 inch hot rolled steel bar, chromate treated and zinc plated.
- C. Pilaster shoes shall be Type 304 stainless steel with #4 satin brushed finish.
- D. Headrails shall be etched and anodized extruded aluminum.

2.3 FABRICATION

- A. Pilasters, doors, and urinal screens shall be 3/4 inch thick.
- B. Divider panels shall be 1/2 inch thick.
- C. Panels and doors shall be 58 inches high and mounted 12 inches above finished floor.
- D. Leveling devices shall be through-bolted to base of pilaster.
- E. Pilaster shoes shall be one-piece, 4 inches high minimum. Top shall have 90 degree return to pilaster. Shoes shall be fastened to pilasters with concealed retainer clips.
- F. Headrails and headrail returns shall have anti-grip profile, clamp over pilasters, and be secured to walls with stainless steel brackets.

2.4 HARDWARE

- A. Door Hardware:
 - 1. All hardware shall be vandal resistant 18-8, Type 304 stainless steel with satin finish.
 - 2. Sliding door latch and keeper shall be stainless steel, surface mounted with emergency egress feature. Latch shall require less than five pound force to operate and be mounted at 44 inches above finished floor.
 - 3. Latch track shall be attached to door by machine screws into factory-installed threaded metal inserts.
 - 4. Threaded metal inserts shall be factory installed for door hinge and latch connections and shall withstand a direct pull exceeding 1,500 pounds per insert.
 - 5. Through-bolted, stainless steel, tamper resistant fasteners shall be used at latch keeper-to-pilaster connections.
 - 6. Continuous self-closing hinge full height of door shall be Type 304 satin finish stainless steel; extra heavy duty 16 gauge. Through bolt to door and pilaster with 12 theft-resistant, one-way screws fastened into threaded metal inserts.
 - 7. Door shall be furnished with two 11 gauge stainless steel door stop plates with attached rubber bumpers to resist door from being kicked in/out beyond pilaster.
 - 8. Door stops and hinges shall be secured with stainless steel, tamper resistant screws into threaded metal inserts.

9. Provide clothes hook on inside of each stall of door. Mount hook at 48 inches above the finished floor at all accessible stalls.
10. Provide U-shaped door pulls and wall stop for outswinging doors. Equip accessible doors with inside and outside pulls. Pulls shall be located directly below the latch. Door hardware shall be mounted at 30 inches to 44 inches above finished floor.
11. Accessible water closet compartment shall be equipped with a door that has a self-closing device and shall have a clear, unobstructed opening width of 32 inches when located at the end and 34 inches when located at the side with the door positioned at an angle of 90 degrees from its closed position per CBC Section 11B-604.8.1.2.

B. Miscellaneous Hardware:

1. U-channels at pilasters and walls, full height 18 gauge Type 304 satin finish stainless steel.
2. Angle brackets shall be furnished to secure pilasters to walls and panels to walls.
3. Fasteners at locations connecting panels to pilasters shall utilize through-bolted, stainless steel, tamper resistant fasteners. Through-bolted fasteners shall withstand direct pull force exceeding 1,500 pounds per fastener.
4. Wall mounted urinal screen brackets shall be full length, double ear, heavy, Type 6463-T5 alloy extruded aluminum with clear anodized finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that site conditions are ready to receive work and opening dimensions are as required.
- B. Verify correct spacing of plumbing fixtures.
- C. Verify correct location of built-in framing, anchorage, and bracing, where required.
- D. Beginning of installation means acceptance of existing substrate.

3.2 INSTALLATION

- A. Install partitions secure, plumb, and level in accordance with manufacturer's instructions.
- B. Maintain 3/8 inch to 1/2 inch space between wall and panels and between wall and end pilasters.
- C. Attach panel brackets securely to walls using anchor devices.
- D. Attach panels and pilasters to bracket with through sleeve tamper resistant bolts and nuts.
- E. Anchor urinal screen panels to walls with length panel brackets.
- F. Secure all elements rigidly in place. Anchor to structure with anchors appropriate for use with type of adjacent construction. Fasteners shall securely fasten items to wall construction involved. Fasteners shall provide stiffness and rigidity to keep items square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the toilet partition manufacturer or as conditions warrant:

1. Metal Framing: #14 stainless steel self-tapping sheet metal screws by length as required to penetrate framing or backing member 1/4 inch minimum.
- G. Provide adjustment for floor variations with screw jack through steel saddles integral with pilaster. Conceal floor fastenings with pilaster shoes.
- H. Install door strike and keeper with door bumper on each pilaster in alignment with door latch.
- I. Adjust hinges to locate doors in partial opening position when unlatched. Return outswinging doors to closed position.

3.3 ADJUSTING

- A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.
- B. Set hinge in-swinging doors to hold door open when unlatched.
- C. Set hinge on out-swinging doors to hold unlatched door in closed position.

3.4 CLEANING

- A. Remove protective masking. Clean surfaces.
- B. Field touch-up of scratches or damaged finish will not be permitted.
- C. Replace damaged or scratched materials with new materials.

END OF SECTION

SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wall guards.
- B. Corner guards.

1.2 RELATED SECTIONS

- A. Section 04 22 00 – Concrete Unit Masonry.
- B. Section 09 22 16 – Non-Structural Metal Framing.
- C. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM)
 - 1. ASTM E84 – Standard Test Method for Surface Burning Characteristics of Building Materials.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specification for each product.
- C. Shop Drawings: Indicate typical layout including dimensions and mounting details.
- D. Samples:
 - 1. Three 12 inch long wall and corner guards.
 - 2. Three fasteners.
- E. Quality Assurance/Control Submittals
 - 1. Manufacturer's Installation Instructions
- F. Closeout Submittals
 - 1. Cleaning and maintenance data.

1.5 QUALITY ASSURANCE

- A. Qualifications
 - 1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum of three years' experience.
- B. Pre-Installation Meetings:
 - 1. Conduct pre-installation meeting in accordance with provisions of Division 01.

2. Convene pre-installation meeting one week prior to commencing work of this Section.
3. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of Division 01.
- B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.
- C. Storage: Store materials in a cool and dry location, elevated from the ground and protected from the elements.

1.7 SEQUENCING

- A. Install wall and corner guards after application of wall finishes.

1.8 MAINTENANCE

- A. Submit cleaning and maintenance data.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers
 1. Basis-of-Design: Pawling Corporation, distributed by Lindsay Associates, Inc., (650) 324-1133.
- B. Substitutions: Under provisions of Division 01.

2.2 WALL GUARDS

- A. Pawling Style WG-6P.
 1. Properties:
 - a. Extruded high impact vinyl with embossed matte finish.
 - b. Shore D Hardness: 79 minimum per ASTM D2240.
 - c. Size: 6 inches high x 1 inch deep x 0.100 inch thick.
 - d. Color: As selected by Architect.
 - e. Flammability (ASTM E84): Class A.
 2. Accessories:
 - a. Overlapping urethane end caps – Pawling No. ECMD-5.
 - b. Splice splines: Six inches long, installed at all wall guard splices – Pawling No. D-2.
 - c. Retainer: Continuous 6063-T5 mill finish aluminum in conformance with ASTM B221, 0.080 inches thick, with continuous flexible impact cushion.
 - d. Fasteners: 1/4 inch by 2 inch Torx security concrete screws, hex washer head, Perma-Seal coated carbon steel.

2.3 ALUMINUM CORNER GUARDS

A. Pawling Style CG-402.

1. Properties:

- a. Material: Aluminum alloy 5052-H32, custom length. Factory punched holes for anchors on one leg only.
- b. Custom Size: 2-1/2 inches x 2-1/2 inches x 1/8 inch.
- c. Fasteners: 3/16 inch x 1-1/2 inch Torx security flat head concrete screws.
- d. Finish: Mill finish.

2. Accessories:

- a. Adhesive: Pawling ADH-50.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas to receive items and verify following:

1. That dimensions are correct to receive items.
2. That adjacent or adjoining surfaces are clean, dry, reasonably smooth, and free from defects.
3. Absence of other conditions that will adversely affect installation.

B. Inspect gypsum board wall on metal stud assembly to be sure a 5 inch galvanized metal backing (minimum 16 gauge) is installed behind gypsum board to receive mechanical fasteners.

C. Report unacceptable conditions to Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 PREPARATION

A. Condition wall and corner guards to room climate 48 hours before installation.

B. Clean surfaces to receive wall and corner guards. Walls to receive adhesive must be free from dirt, oil, and moisture.

3.3 INSTALLATION – WALL GUARDS

A. Install products in accordance with manufacturer's printed instructions and approved shop drawings.

B. Install double row of wall guards as indicated on Drawings.

C. Install wall guards level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with adjacent surfaces.

- D. Install fasteners at 16 inches on centers – offset. Use proper diameter Torx drill bit. Drill hole into the substrate 1/2 inch deeper than the required embedment. Select Torx installation tool and hex head drive socket and place the point of fastener through wall guard and into pre-drilled hole. Drive the fastener in one continuous motion until fully seated at the proper embedment. The driver will automatically disengage from the head of the fastener.
- E. Install end caps at all openings and corners.

3.4 INSTALLATION – CORNER GUARDS

- A. Install in accordance with manufacturer's printed instructions and approved shop drawings.
- B. Install wall guards plumb, square, and free from warp or twist while maintaining dimensional tolerances and alignment with adjacent surfaces.
- C. Install where indicated on Drawings.
- D. Use manufacturer's recommended adhesive. Roll corner guards using a J-hand roller after installation to ensure proper bonding.
- E. Remove excess adhesive from corner guards without damage.

3.5 CLEANING

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction

END OF SECTION

SECTION 10 26 41
BULLET RESISTANT PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Bullet resistant fiberglass panels.

1.2 RELATED SECTIONS

- A. Section 09 22 16 – Non-Structural Metal Framing.
- B. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. American Society for Testing and Materials:
 - 1. ASTM E119 - Standard Test for One-Hour Fire-Rating of Building Construction and Materials
 - 2. ASTM F1233 - Standard Test Method for Forced Entry Testing of Materials/Assemblies, Class IV
- B. International Organization for Standardization:
 - 1. ISO 9001:2008 Quality Management System
- C. National Institute of Justice Ballistic Standards:
 - 1. NIJ Standard 0108.01 – Type III-A
- D. Small Business Administration:
 - 1. SBA Small Business Size Standard
- E. Underwriters Laboratories:
 - 1. UL 752 Specifications and Ammunition, 11th Edition, Standard for Bullet Resisting Equipment published September 9, 2005, revised December 21, 2006, Level 3
- F. The United States Department of State:
 - 1. The International Traffic in Arms Regulations (ITAR).

1.4 SUBMITTALS

- A. Submittals: Submit under provisions of Division 01 prior to fabrication.
 - 1. Product Data: Include specifications, brochures, and samples.
 - 2. Recommendations for installation of Bullet Resistant Fiberglass Panels.
- B. Certificates: Submit printed data to indicate compliance with following requirements:
 - 1. UL Listing Verification and UL752 Current Test Results as provided by Underwriters Laboratories.
 - 2. ASTM E119-98 One-Hour Fire Rating of Building Construction and Materials.

3. ASTM F1233-98 Standard Test Method for Forced Entry Testing of Materials/Assemblies.
4. Manufacturer's third party certificate of registration with ISO 9001:2008.
5. Manufacturer's U.S. Dept. of State ITAR Statement of Registration.
6. Manufacturer's SBA Profile verifying small business status by the SBA.

1.5 DELIVERY, HANDLING, AND STORAGE

- A. Deliver materials to project with manufacturer's UL Listed labels intact and legible.
- B. Handle material with care to prevent damage. Store materials inside under cover, stack flat and off the floor.

1.6 WARRANTY

- A. Warrant all materials and workmanship against defects for a period of ten years from the date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Waco Composites, Waco, TX; 866-688-3088, www.armorcore.com. Product: ArmorCore.
- B. Armortex, Schertz, Texas; 800-880-8306, www.armortex.com.
- C. Strongwell, Bristol, VA; 276-645-8000, www.strongwell.com.
- D. Bullet Guard Corporation, West Sacramento, CA; 916-373-0402, www.bulletguard.com.
- E. Substitutions: Under provisions of Division 01

2.2 PERFORMANCE CRITERIA

- A. Bullet resistant fiberglass panels shall be non-ricochet type to permit the encapture and retention of an attacking projectile lessening the potential of a random injury or lateral penetration.
- B. Panel Rating: UL 752 Level 3.
- C. Bullet Resistance of Panel Joints: Equal to that of the panel.

2.3 MATERIALS

- A. Panels fabricated of multiple layers of woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets.
- B. Thickness: 7/16 inch nominal thickness.
- C. Nominal Weight: 4.8 pounds per square foot.
- D. Available Panel Sizes: [3' x 8'] [3' x 9'] [3' x 10'] [4' x 8'] [4' x 9'] [4' x 10'] [5' x 8'] [5' x 9'] [5' x 10'] [Custom].

- E. Panels shall manufactured in the United States of America with raw materials sourced from the U.S.A. for quality assurance purposes and to comply with applicable "Buy American" provisions.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Prior to starting installation, verify work of related trades is complete to the point where work of this Section may properly commence.

3.2 JOINTS

- A. Reinforce joints with a back-up layer of bullet resistive material. Minimum width of reinforcing layer at joint shall be four inches, centered on panel joints.

3.3 APPLICATION

- A. Install panels in accordance with manufacturer's printed recommendations and as required by Drawings.
- B. Secure armor panels using screws of type recommended by panel manufacturer.
 - 1. Install panels minimizing vulnerabilities by fitting tightly to adjacent surfaces including concrete floor slab, concrete roof slab, bullet resistive door frames, and bullet resistive window frames.

END OF SECTION

SECTION 10 28 13
TOILET ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Toilet accessories.
- B. Attachment hardware.

1.2 RELATED SECTIONS

- A. Section 09 22 16 – Non-Structural Metal Framing.
- B. Section 09 29 00 – Gypsum Board.
- C. Section 09 30 00 – Tiling.
- D. Section 10 21 13.36 – Composite Toilet Compartments.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A167 – Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - 2. ASTM A269 – Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Submit data on accessories describing size, finish, details of function, attachment methods.
- C. Manufacturer's Installation Instructions: Submit installation instructions, special procedures, and conditions requiring special attention.

1.5 KEYING

- A. Master key all accessories.

1.6 REGULATORY REQUIREMENTS

- A. Conform to applicable code for installing work in conformance with Title 24 Accessibility Requirements.
 - 1. Toilet accessories required to be accessible shall be mounted at heights according to CBC Section 11B-603.5.
 - 2. Toilet accessories shall not be located closer than 1-1/2 inches clear of the bottom of the grab bar and 12 inches clear of the top of the grab bar per CBC Section 11B-609.3.
 - 3. Toilet tissue dispensers shall be continuous flow type per CBC Section 11B-604.7.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate the work of this Section with the placement of internal wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Bobrick.
- B. American Specialties, Inc.
- C. Bradley.
- D. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Stainless Steel Sheet: ASTM A167, Type 304.
- B. Tubing: ASTM A269, stainless steel.
- C. Fasteners, Screws, and Bolts: Hot dip galvanized, tamperproof.
- D. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FABRICATION

- A. Weld and grind smooth joints of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints.
- C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.
- E. Shop assemble components and package complete with anchors and fittings.
- F. Provide steel anchor plates, adapters, and anchor components for installation.
- G. Hot dip galvanize exposed and painted ferrous metal and fastening devices.

2.4 FACTORY FINISHING

- A. Stainless Steel: No. 4 satin luster finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that site conditions are ready to receive work and dimensions are as instructed by the manufacturer.
- B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- B. Provide templates and rough-in measurements as required.
- C. Verify exact location of accessories for installation.

3.3 INSTALLATION

- A. Install fixtures, accessories and items in accordance with manufacturers' instructions.
- B. Install all items plumb and level.
- C. Secure all items rigidly in place. Anchor to structure with anchors appropriate for use with type of adjacent construction. Fasteners shall securely fasten items to wall construction involved. Fasteners shall provide stiffness and rigidity to keep items square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the toilet accessory manufacturer or as conditions warrant:
 - 1. Metal Framing: #10 corrosion resistant self-tapping sheet metal screws by length as required to penetrate framing member 1/4 inch minimum.
 - 2. Concrete/Masonry: #10 corrosion resistant screws 2-1/2 inches long with expansion shields.

3.4 SCHEDULE

- A. Bobrick Washroom Equipment or other manufacturers' model numbers indicated on Drawings are listed to establish a quality standard. Refer to Drawings for items required.

END OF SECTION

SECTION 10 44 00
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Fire Extinguishers.
- B. Cabinets.
- C. Accessories.

1.2 RELATED SECTIONS

- A. Section 09 22 16 – Non-Structural Metal Framing: Blocking/backing for attachment.
- B. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. California Fire Code (CFC) – Section 906, Portable Fire Extinguishers.
 - 2. California Code of Regulations (CCR), Title 19, Division 1, Chapter 3, Fire Extinguishers.
 - 3. UL 299 – Dry Chemical Fire Extinguishers.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, and locations.
- C. Product Data: Provide extinguisher operational features, color and finish, and anchorage details.
- D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.
- E. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.5 OPERATION AND MAINTENANCE DATA

- A. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.6 REGULATORY REQUIREMENTS

- A. Conform to CFC Section 906 and CCR Title 19 for requirements for extinguishers.
- B. Location and Operation: Fire extinguishers and fire extinguisher cabinets shall conform to CBC Sections 11B-307, 11B-308, 11B-309, and 11B-403.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers and Products:
 - 1. J.L. Industries, Inc., Bloomington, MN; phone: 800.554.6077; fax: 952.835.2218; URL: <http://www.jlindustries.com> . Products:
 - a. Fire Extinguisher: Cosmic Series, Model No. 5E.
 - b. Cabinets:
 - 1) Non-Rated: Ambassador Series, Model No. 1817V10.
 - 2) Fire Rated: Ambassador Series, Model No. FX1817V10.
 - c. Fire Extinguisher Wall Bracket: Model No. MB818.
 - 2. Larsen's Manufacturing Co., Minneapolis, MN; phone: 763.571.1181; fax: 763.571.6900; URL: <http://www.larsensmfg.com> .
 - 3. Potter-Roemer, Santa Ana, CA; phone: 800.366.3473; fax: 888.404.7960; URL: <http://www.potterroemer.com> .
- B. Substitutions: Under provisions of Division 01.

2.2 EXTINGUISHERS

- A. Dry Chemical Type, UL 299, five pound capacity, enameled steel tank, with pressure gauge; minimum 3A-40B:C Rating.

2.3 CABINETS

- A. Metal: Formed sheet steel, primed 18 gauge thick base metal, semi-recessed.
- B. Door Glazing: 1/8 inch thick clear acrylic.
- C. Cabinet Hardware: Cylinder lock with break-away handle at 48 inches maximum above finished floor.
- D. Cabinet Mounting Hardware: Appropriate to cabinet.

2.4 FABRICATION

- A. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim and door stiles.
- B. Pre-drill for anchors.
- C. Hinge doors for 180 degree opening with continuous piano hinge. Provide roller type catch.
- D. Weld, fill and grind components smooth.

2.5 FINISHES

- A. Extinguisher: Manufacturer's standard finish.
- B. Cabinet Exterior Trim and Door: Manufacturer's standard finish.
- C. Cabinet Interior: White baked enamel finish.
- D. Wall Bracket: Red baked enamel finish.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify rough openings for cabinet are correctly sized and located.
- B. Verify blocking/backing for wall brackets are correctly sized and located.

3.2 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Mount cabinets and wall brackets such that the fire extinguisher handle is at 48 inches maximum above the finished floor.
- C. Install cabinets and wall brackets plumb and level.
- D. Secure cabinets and wall brackets rigidly in place. Anchor to structure with anchors appropriate for use with type of adjacent construction. Anchorage shall securely fasten items to wall construction involved. Fasteners shall provide stiffness and rigidity to keep items square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the cabinet/bracket manufacturer or as conditions warrant:
 - 1. Metal Framing:
 - a. Cabinets: Three-#10 self-tapping sheet metal screws each side of cabinet by length as required to penetrate framing or backing member 1/4 inch minimum.
 - b. Wall Brackets: Three-#10 self-tapping sheet metal screws each bracket by length as required to penetrate framing or backing member 1/4 inch minimum.
 - 2. Concrete/Masonry:
 - a. Cabinets: Six-1/4 inch diameter tamper resistant stainless steel wedge anchors with 1-1/2 inch minimum embedment into substrate and 2 inch minimum edge distance to face of substrate.
 - b. Wall Brackets: Three-1/4 inch diameter tamper resistant stainless steel wedge anchors with 1-1/2 inch minimum embedment into substrate and 2 inch minimum edge distance to face of substrate.
- E. Place extinguishers in cabinets and on wall brackets.

END OF SECTION

SECTION 10 51 00

LOCKERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Staff locker units with hinged doors.
- B. Hardware.
- C. Accessories.
- D. Benches.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 09 22 16 – Non-Structural Metal Framing: Metal blocking/backing.
- C. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ADA – Americans with Disabilities Act - 2010 Standards for Accessible Design.
 - 2. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. CBC – 2013 California Building Code, Chapter 11B.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate locker and bench plan layout, locker elevations, numbering plan, and anchorage details.
- C. Product Data: Provide data on locker and bench types, sizes, and accessories.
- D. Samples: Submit two samples, 3 inches x 6 inches in size, of color selected; applied to specified base metal.
- E. Manufacturer's Installation Instructions: Indicate component installation.

1.5 SYSTEM DESCRIPTION

A. Locker Units:

1. Width: 18 inches.
2. Depth: 24 inches.
3. Height: 36 inches.
4. Configuration: Double tier.
5. Mounting: Floor and wall.
6. Base: 7-inch high concrete base (by others).
7. Locking: Equipped for padlocks.
8. Ventilation Method: Door louvers.

1.6 REGULATORY REQUIREMENTS

- A. Accessible lockers and benches shall comply with the requirements of the Americans with Disabilities Act (ADA) and CBC Chapter 11B.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect, and handle products to site under provisions of Division 01.
- B. Protect locker and bench finish and adjacent surfaces from damage.

1.8 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Republic Storage Systems, LLC. Product: Quiet Lockers.
2. Lyon Workspace Products.
3. Penco Products, Inc.

- B. Substitutions: Under provisions of Division 01.

2.2 FABRICATION

- A. Material: All major steel parts shall be made of mild cold rolled steel, free from imperfections and capable of taking a high grade powder coat paintfinish.
- B. Construction: Lockers shall be built on the unit principle. Each locker shall have an individual door and frame, an individual top, bottom, back, and shelves with common intermediate uprights separating units.

- C. Door Frames: Shall be 16 gauge formed into deep, 1 inch' face channel shapes with a continuous vertical door strike integral with the frame on both sides of the door opening. Double tier locker cross frame members shall be 16 gauge channel shaped securely welded to vertical framing members to ensure a square and rigid assembly.
- D. Doors: Doors shall be 16 gauge or 18 gauge steel for short or narrow doors as required by manufacturer's design, formed with a full channel shape on lock side to fully conceal the lock bar, channel formation on the hinge side and right angle formation across the top and bottom. Doors 18 inches wide shall have a diagonal reinforcing angle welded to the inner surface. Ventilation shall consist of full perimeter opening.
- E. Pre-Locking Device: All tiered lockers shall be equipped with a positive automatic pre-locking type, whereby the locker may be locked while door is open and then closed without unlocking and without damaging locking mechanism.
- F. Latching: Latching shall be one-piece, pre-lubricated, spring steel latch completely contained within the lock bar under tension to provide rattle-free operation. The lock bar shall be securely contained in the door channel by self-lubricating polyethylene guides that isolate the lock bar from metal-to-metal contact with the door. There shall be two latching points for all tiered lockers 42 inches and under in height. The lock bar travel shall be limited by contacting resilient elastomeric cushioning devices located inside the lock bar. Frame hooks to accept latching shall be of heavy gauge steel, set close in and welded to the frame. Continuous vertical door strike shall protect frame hooks from door slam damage. A soft rubber silencer shall be securely installed on each frame hook to absorb the impact caused by closing of the door.
- G. Handles: A non-protruding 14 gauge lifting trigger and slide plate shall transfer the lifting force for actuating the lock bar when opening the door. The exposed portion of the lifting trigger shall be encased in a molded ABS thermoplastic cover that provides isolation from metal-to-metal contact and be contained in a formed 20 gauge stainless steel recessed pocket. This stainless steel pocket shall contain a recessed area for a padlock and a mounting area for the number plate.
 - 1. Accessible Lockers: Latch and locking hardware at accessible lockers shall not require twisting, pinching or grasping, or more than five pounds of force to operate per CBC Section 11B-309.4. Product: Model No. T-30 button key lock for use with vertical locking bars, and Power Jumper Unit as manufactured by Digilock or accepted equal.
- H. Hinges: Hinges shall be 2 inches high, 5-knuckle, full loop, tight pin style, securely welded to frame and double riveted to the inside of the door flange. Locker doors 42 inches high and less shall have two hinges.
- I. Body: The body of the locker shall consist of 24 gauge upright sheets, backs, tops, bottoms, and shelves. Tops, bottoms, and shelves shall be flanged on all four sides; backs shall be flanged on two sides. Uprights shall be offset at the front and flanged at the rear to provide a double lapped rear corner.
- J. Interior Equipment: All double tier lockers shall have one double prong rear hook (single prong in 9 inches width) and two single prong side hooks in each compartment. All hooks shall be made of steel, formed with ball points, zinc-plated, and attached with two bolts or rivets.

- K. Number Plates: Each locker shall have a polished aluminum number plate with black numerals not less than 1/2 inch high. Plates shall be attached with rivets to the lower surface within the recessed handle pocket.
- L. Provide ADA compliant bottom riser kit and ADA compliant signage at accessible lockers.
- M. Finish: Surfaces of the steel shall be thoroughly cleaned, phosphatized and prepared for powder coat paint finish in accordance with paint manufacturer's instructions.
- N. Color: Doors and exposed body parts shall be finished in colors selected from manufacturer's collection of standard colors. Non-exposed body parts shall be finished in Tan color.
- O. Assembly: Assembly of all locker components shall be accomplished by the use of zinc plated, low round head, slotless, fin neck machine screws with hex nuts, producing a strong mechanical connection.

2.3 BENCHES

- A. Locker Room benches with the following characteristics:
 - 1. Sizes:
 - a. Standard: 9-1/2 inches deep x 17-1/2 inches high x lengths indicated on Drawings.
 - b. Accessible: 48 inches long x 24 inches deep x 17-1/2 inches high, with two pedestals per bench.
 - 2. Benchtop: Hardwood with two coats of acrylic clear finish.
 - 3. Pedestals: 14-gauge enameled steel with 1-5/8-inch tubing uprights. Color: Same as locker color. Provide two pedestals at four foot long benches; provide three pedestals at benches over four feet long.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.
- B. Verify bases are properly sized.

3.2 INSTALLATION

- A. Install lockers and benches in accordance with manufacturer's instructions.
- B. Fasten lockers to each other, to walls, and to curbs per manufacturer's recommendations to meet CBC seismic requirements.
- C. Secure lockers and benches with anchor devices to suit substrate materials. Minimum pullout force per anchor: 100 pounds.
- D. Install lockers plumb and square.
- E. Place and secure on prepared base.
- F. Bolt adjoining locker units together to provide rigid installation.

- G. Install sloping tops and metal fillers using concealed fasteners. Provide flush hairline joints against adjacent surfaces.
- H. Locker Benches: Install locker benches by fastening bench tops to pedestals and securely anchoring to floor using appropriate anchors.

3.3 ADJUSTING

- A. Adjust doors, latches, locks, and operating hardware to function properly for smooth operation without binding. Verify that latches are operating satisfactorily.
- B. Adjust built-in locks to prevent binding of dial or key and ensure smooth operation.
- C. Touch-up with factory-supplied paint and repair or replace damaged products.

3.4 CLEANING

- A. Clean work under provisions of Division 01.
- B. Clean interior and exterior surfaces in accordance with manufacturer's recommendations.
 - 1. Do not use harsh cleaning products or methods that could damage finish.

3.5 PROTECTION

- A. Protect installed products through completion of project.

END OF SECTION

SECTION 10 51 13
PERSONAL STORAGE LOCKERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Personal storage lockers with built-in bench drawers.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 09 22 16 – Non-Structural Metal Framing: Metal blocking/backing.
- C. Section 09 29 00 – Gypsum Board.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ADA – Americans with Disabilities Act - 2010 Standards for Accessible Design.
 - 2. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 3. ASTM D3451 – Standard Guide for Testing Coating Powders and Powder Coatings.
 - 4. CBC – 2013 California Building Code, Chapter 11B.
 - 5. American National Standards Institute (ANSI) Standards:
 - a. Applicable standards for fasteners used for assembly.
 - 6. American Institute Of Steel Construction (AISC) Standards:
 - a. Applicable standards for steel materials used for fabrication.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installation instructions for each type of welded metal locker required. Include certification substantiating that products to be furnished comply with requirements of the Contract Documents.
- B. Shop Drawings: Show fabrication, assembly, and installation details, including descriptions of procedures and diagrams. Show complete locker installation layout, including quantities, locations, and types of accessory units required. Include notations and descriptions of all installation items and components.
 - 1. Show installation details at non-standard conditions.
 - 2. Provide layout, dimensions, and identification of each unit, corresponding to sequence of installation procedures.

- 3. Provide installation schedule and procedures to ensure proper installation.
- C. Samples: Provide minimum three inch square example of each color and texture on actual substrate for each component to remain exposed after installation.
- D. Selection Samples: For initial selection of colors and textures, submit manufacturer's color charts, consisting of actual product pieces, showing full range of colors and textures available.
- E. Warranty: Submit draft copy of proposed warranty for review.
- F. Maintenance Data: Provide written certification that the lockers are maintenance free.
- G. Reference List: Provide a list of recent installations of welded metal lockers to aid in verifying the suitability of manufacturer's products and comparison with materials and product specified in this Section. Include contact name, address, and phone numbers.

1.5 DESCRIPTION

- A. General: Provide welded metal lockers with end-user reconfigurable interior. Specialized lances shall provide the flexibility of on-site, end-user reconfiguration/addition of internal components.
- B. Finish: All components shall be painted with an electro-statically applied powder coat paint that meet or exceed test requirements of ASTM D3451, Standard Guide for Testing Coating Powders and Powder Coatings.
- C. Size: Nominal height shall be 72 inches, built-in bench drawer nominal height shall be 18 inches, and nominal depth shall be 36 inches.

1.6 PERFORMANCE REQUIREMENTS

- A. Design Requirements: Overall width shall not exceed specified nominal width; locker width shall be designed for zero growth.
- B. Seismic Performance: Provide welded metal lockers capable of meeting the CBC seismic requirements for the location of the work.
- C. ADA Requirements: Personal storage lockers shall meet ADA and CBC Chapter 11B requirements.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacturer shall be ISO 9001:2008 certified for the design, production, installation, and service of welded metal lockers. Furnish certification attesting ISO 9001:2008 quality system registration.
- B. Installer Qualifications: Installer shall be manufacturer's authorized representative for the specified products with minimum of one year of experience installing welded metal lockers of comparable size and complexity to specified project requirements.

1.8 DELIVERY, STORAGE AND HANDLING

- A. Follow manufacturer's instructions and recommendations for delivery, storage, and handling requirements.

1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify quantities of welded metal locker units before fabrication. Indicate verified measurements on shop drawings. Coordinate fabrication and delivery to ensure no delay in progress of the work.

1.10 SEQUENCING AND SCHEDULING

- A. Sequence welded metal lockers installation with other adjacent work to minimize possibility of damage and soiling for the remainder of construction period.
- B. Schedule installation of welded metal lockers after finishing operations, including painting, have been completed.
- C. Pre-installation Conference: Schedule and conduct conference on project site to review methods and procedures for installing welded metal lockers including, but not limited to, Owner's Representative, Contractor or representative, Architect, manufacturer's representative, and subcontractors or installers whose work may affect, or be affected by, the work of this Section.

1.11 WARRANTY

- A. Provide a written warranty, executed by Contractor, Installer, and Manufacturer, agreeing to repair or replace units which fail in materials or workmanship within the established warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have under General Conditions provisions of the Contract Documents.
- B. Limited Lifetime Warranty: Subject to the terms in the written warranty, warrant the original purchaser exclusively that the locker frames manufactured by it will be free from defects in materials and workmanship for the lifetime of the locker.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Spacesaver Corporation, Fort Atkinson, WI; 800-492-3434, www.spacesaver.com. Product: FreeStyle Personal Storage with built-in bench drawers.
- B. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Provide materials and quality of workmanship which meets or exceeds established industry standards for products specified. Use furniture grade sheet metal, solid hardwood benches, and fasteners for component fabrication unless indicated otherwise. Material thicknesses/gauges as standard with manufacturer.

2.3 MANUFACTURED COMPONENTS

- A. Welded Frame:
 - 1. The welded frame shall consist of top, bottom, back, and sides constructed of a minimum of 18-gauge steel. All frame components shall be joined using resistance welding. Riveting of structural members will not be permitted.

2. Horizontal front flanges will be a minimum of 2 inches. Vertical front flanges will be a minimum of 1 inch. Horizontal and vertical flanges shall overlap and be secured with a minimum two resistance welds per corner.
3. Corner gussets shall be MIG and spot welded in each of the four front corners of the locker for increased stiffness and rigidity.
4. Provide side panel lances evenly spaced on 3 inch centers. Lances shall provide the flexibility of on-site, end-user reconfiguration/addition of internal components.
5. Bench Housing for Built-in Bench Drawer:
 - a. Welded frame construction shall consist of top, bottom, and side components joined by using resistance welding. Riveting of bench housing structural members will not be permitted.
 - b. Corner gussets shall be welded in the two front bottom corners of the bench housing for increased stiffness and rigidity.
 - c. Horizontal front flanges shall be a minimum of 1 inch.
 - d. Vertical front flanges shall be a minimum of 1 inch.
 - e. Horizontal and vertical front flanges shall overlap and shall be secured with minimum of one resistance weld per corner.
 - f. Side Panels: Lances shall be symmetric and evenly spaced to provide optimum component locations. Standard shall be based on 3 inch on center vertical placement to match mating locker lance design.
 - g. Return flanges on housing to securely fasten housing to welded frame of locker.
 - h. Base of bench housing shall include four 3/8 inch-16 UNC threaded weld-nuts and corresponding leveling feet.
 - i. Top of bench housing shall include hole pattern for mating bench seat.
 - j. Sides of bench housing shall include mounting holes in the event lockers are ganged together.
6. Lockers with built-in bench drawer and built-in external access drawer shall have intermediate base shelf with interlocking mechanism for securing drawer when locker door is closed.
7. Provide four 0.875 inch diameter electrical knock-outs per locker, two located on top of the locker in both right and left rear corners, and two located in the back of locker centered at a spacing no greater than 24 inches from the top and bottom. Knock-outs shall allow end-user flexibility of adding electrical capability to lockers.
8. Provide a minimum of four duplex receptacle electrical knock-outs per locker.
 - a. Top of the locker shall have four duplex electrical knock-outs.
 - b. Top of locker shall have electrical duplex receptacle knock-outs located on both right and left side of locker.
 - c. Back panel of locker shall have a minimum of two duplex electrical knock-outs.
 - d. Back of locker shall have electrical duplex receptacle knock-outs located on both right and left side of locker and no farther than 24 inches from the top of the locker.
9. Provide ventilation holes in top of locker to allow mechanically extracted air to be pulled up through the locker system as required. Ventilation shall be controlled by eight evenly spaced 0.625 inch diameter holes. Ventilation system shall ensure odors are removed from locker system.

10. Lockers shall be prepared with mounting holes for attaching necessary trim components.
11. Locker shall be prepared with mounting holes for ganging lockers back-to-back or side-by-side.
12. Base of lockers shall include four 3/8 inch-16 UNC threaded weld-nuts and corresponding leveling feet.
13. Base shelf for lockers with built-in external access drawers and bench drawers shall have holes to accommodate double-door lock rod and door stop bracket.
14. End Panels: End panels with no exposed fasteners shall be provided on the end of each locker run; thus providing a clean and aesthetically pleasing appearance.
15. Locker Sizes:
 - a. Width: 24 inches.
 - b. Height: 72 inches.
 - c. Depth:
 - 1) Lockers: 24 inches.
 - 2) Bench Drawers: 36 inches.
 - 3) Bench Seat Depth 13.0 inches.
 - 4) Leading edge of bench seat shall extend 1.125 inches from front of bench drawer.

B. Ventilation:

1. Provide louvered air vents in drawer front when built-in bench drawer or built-in external access drawer models are required.
2. Minimum 0.500 inch gap between back of shelving components and back of locker to provide uninterrupted air flow up the rear of the locker system.
3. Minimum 2.00 inches gap between front of shelving and locker door to provide uninterrupted air flow up the front of the locker system.

C. Drawers:

1. Drawer body wrapper shall have welded frame construction. Riveting of structural members will not be permitted.
2. Drawers for locker with built-in bench drawers and built-in external access drawers shall have box-formed drawer front.
3. Provide interlock system for securing drawer when main locker doors are closed and provide access only when main locker door/s is opened.
4. Built-in bench drawer shall have a nominal 36 inches depth.
5. Provide a flush mounted pull handle.
6. Drawer Slides: Provide 200 pounds maximum load capacity and pass 50,000 cycle performance testing (maximum load, uniform distribution). Test data shall be provided by manufacturer upon request.
7. Drawer base minimum 21 inches drawer extension.
8. Bench drawer minimum 26.5 inches drawer extension.
9. Provide louvered air vents in drawer front.

D. Bench Seat:

1. Provide 13.0 inches deep laminated kiln dried maple bench seat; material thickness 1.25 inches.
2. Front (leading edge) of bench seat shall have 0.625 inch radius bull nose.
3. Finish of bench seat shall be sanded smooth and have two coats of catalyzed varnish applied.

E. Single-Piece Welded Doors:

1. Shall be formed from two pieces of minimum 18-gauge cold rolled steel box formed and welded together using modern GMAW techniques. Single-piece door with inner and outer door panels shall have a combined steel thickness of no less than 0.096 inches thick. Welded door design with inner panel shall optimize structural integrity of locker door system over and above any single frame door design.
2. Exterior door panel shall be constructed with formed flanges and return flanges to add stiffness.
3. Internal door panel shall be constructed with formed flanges for added stiffness.
4. All inner door panel heights shall be minimum 70 percent of external door height.
5. Single-piece welded door frame shall consist of internal door panel nested inside exterior door panel and welded per the following requirements:
 - a. Top / bottom. Exterior and Interior panels shall be welded in a minimum of three places with weld spacing not to exceed 6 inches between adjacent welds and 1 inch from any corner.
 - b. Sides. Exterior and interior panels shall be welded with spacing not to exceed 12 inches between adjacent welds and 1 inch from any corner.
6. Inner door panel shall have peg board style hole pattern, allowing the attachment of Document Holder and any standard peg board accessory.
7. Inner door panel shall have 4 inch rectangular slot centered towards the top of the locker.
8. External door panel shall have louvers to provide adequate air circulation throughout locker system.
 - a. Louvered air vents shall be located at the bottom of the locker door to enhance circulation of mechanically extracted air from the bottom of the locker out of the top.
 - b. Louvered air vents shall be approximately 3 inches in width and 0.75 inches in height and spaced on 1 inch centers.
9. Single door width shall be 24 inches.
10. All doors shall have neoprene silencers on each door for noise reduction.
11. Door torsional deflection shall not exceed 0.1875 inch with a 20 pound point load. Test data shall be provided by manufacturer upon request.
12. Hinge:
 - a. Provide 16-gauge full length hinge for increased strength and security of locker system.
 - b. Hinges shall be welded to door frame with spot welds not to exceed 6 inch separation.
13. Door assembly shall be riveted to door frame on factory pre-established hole pattern.

14. Locking Mechanism:

- a. Padlock hasp only.

F. Interior/Accessory Components:

1. All interior components shall be constructed of minimum 18 gauge steel.
2. For added security, internal component can be secured utilizing blind rivets, threaded fasteners, or bending specially designed tab.
3. Shelves:
 - a. Shelf with integral hanger bracket:
 - 1) Size specified by locker width.
 - 2) Hanger bracket designed with perforations on approximately 3 inch centers to insure clothing separation for optimum ventilation.
 - 3) Performance: Uniform load rating 300 pounds.
 - b. Plain:
 - 1) Size specified by locker width.
 - 2) Performance: Uniform load rating 100 pounds.
 - c. Shelf rear return flange stops minimum 0.50 inch short of locker back panel on order to allow air circulation throughout entire locker assembly
 - d. All performance test data shall be provided by manufacturer upon request.
4. Modular Shelf:
 - a. Approximate compartment size: 9 inches wide and 12 inches high.
 - b. Modular shelves shall have tabs to interlock with frame side panel lances.
 - c. Modular shelves vertical sides shall have lances that match with opposing side panel lances.
 - d. Modular shelves shall have two locations on vertical side panel for attaching hooks, and one location on bottom for attaching double hook accessories.
 - e. Shelf rear return flange stops approximately 1 inch short of locker back panel on order to allow air circulation throughout modular shelf.
 - f. Provide modular shelf with slots for connection with file dividers and shelf back stop. File dividers will aid in maintaining a neat and orderly locker system.
5. Provide lockable compartment for small valuables:
 - a. Lockable compartment shall be integral to modular shelf accessory.
 - b. Provide a 14-gauge padlock-able compartment door.
 - c. Provide 0.188 inch diameter zinc plated steel hinge rod.
 - d. Door shall be mounted with zinc plated steel hinge rod and two shoulder washers for smooth, quiet operation.
 - e. Provide an 18-gauge hasp bracket for securing lockable compartment door.
6. Document Holder:
 - a. Width: 10.5 inches.
 - b. Height: 6 inches.
 - c. Depth: 1.5 inches.

- d. Design shall include matching hole pattern to allow various attachment locations on inner door panel.
- 7. Boot Tray
 - a. Material: Rubber.
 - b. Dimensions:
 - 1) Width: 12.90 inches.
 - 2) Depth: 19.90 inches.
 - 3) Height: 1.25 inches.
 - c. Manufactured from natural rubber compounds, environmentally friendly, durable, water repellant easily cleaned with soap and water, resistant to alkalis and weak acids, mold, mildew, and dust mites.
- 8. Internal Drawers:
 - a. Drawer shall have a depth of approximately 19 inches.
 - b. Shall be available in 6 inch height.
 - c. Drawer shall have locking option.
 - d. Drawer shall have a tested weight capacity rating of 50 pounds.
- 9. File Dividers (modular shelf).
- 10. Hooks:
 - a. Single hooks shall have the ability to attach single hooks on the side of the Modular Shelf and on the side panel lances.
 - b. Hook bracket hanger assembly shall have the ability to attach a three-hook bracket assembly to any lanced location on the side panels of the locker.

G. Locker Tag Numbers: Provide locker numbers on each locker.

H. Accessories:

- 1. ZeeBase System: Provide manufacturer's standard.
- 2. Trim and Fillers: Provide manufacturer's standard.

2.4 FABRICATION

A. General: Coordinate fabrication and delivery to ensure no delay in progress of the work.

2.5 FINISHES

- A. Colors: Selected by Architect from manufacturer's standard available colors.
- B. Paint Finish: Textured. Provide factory applied electrostatic powder coat paint. Meet or exceed specifications of the American Society for Testing and Materials (ASTM) Standards.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine lockers scheduled to receive accessories with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of specified accessory items.
- B. Proceed with accessory installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Follow manufacturer's written instructions for installation of each type of accessory item specified.

3.3 FIELD QUALITY CONTROL

- A. Verify accessory unit alignment and plumb after installation. Correct if required, following manufacturer's instructions.
- B. Remove components that are chipped, scratched, or otherwise damaged and which do not match adjoining work. Replace with new matching units, installed as specified and in manner to eliminate evidence of replacement.

3.4 ADJUSTING

- A. Adjust all accessories to provide smoothly operating, visually acceptable installation.

3.5 CLEANING

- A. Immediately upon completion of installation, clean components and surfaces. Remove surplus materials, rubbish and debris, resulting from installation, upon completion of work and leave areas of installation in neat, clean condition.

3.6 DEMONSTRATION/TRAINING

- A. Schedule and conduct demonstration of installed accessory items and features with Owner's personnel.
- B. Schedule and conduct maintenance training with Owner's maintenance personnel. Training session shall include lecture and demonstration of all maintenance and repair procedures that end-user personnel would normally perform.

3.7 PROTECTION

- A. Protect system against damage during remainder of construction period. Advise Owner of additional protection needed to ensure that system will be without damage or deterioration at time of project completion.

END OF SECTION

SECTION 10 56 13
METAL STORAGE SHELVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal storage shelving.

1.2 SUBMITTALS

- A. Submit product data under provisions of Division 01.
- B. Submit product data for sizes, types and methods of construction.
- C. Provide floor and wall anchorage calculations and details, signed and stamped by a registered Structural Engineer with a current and valid State of California license.

1.3 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Protect metal shelving from damage by other trades. Store in dry protected areas. Replace any damaged items at no cost to Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. InterMetro Industries Corporation. Products:
 - 1. Metro Heavy Duty Solid Shelving:
 - a. Shelves: Model #1842HFS.
 - b. Posts: Model #74HPS.
 - 2. Metro Solid Shelving at Janitor's Room:
 - a. Shelves: Model #1436FS.
 - b. Posts: Model #74PS.
- B. Western Pacific Storage Solutions.
- C. Rapid Rack Industries, Inc.
- D. Republic Storage Systems, LLC.
- E. Substitutions: Under provisions of Division 01.

2.2 EQUIPMENT

- A. Solid Shelving Units:
 - 1. Shelves: 16 gauge Type 304 stainless steel shelves.
 - 2. Posts: Type 304 stainless steel posts with rolled grooves for shelf adjustability in 2 inch increments along entire length of post.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install shelving per manufacturer's recommendations.
- B. Install metal shelving units in locations as designated on the Drawings. Units shall be set plumb and level. Shelving units shall be connected to each adjacent shelf unit using manufacturer's standard clips.
 - 1. Fasten shelving units to floors and walls per accepted anchorage details.

END OF SECTION

SECTION 10 56 26.23
MOBILE STORAGE SHELVING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Carriage mounted high-density mobile storage units in Control Station Room #363, support deck, fabrication, and installation.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 09 68 13 – Carpet Tile.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes in effect as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. American National Standards Institute (ANSI) Standards:
 - a. Applicable standards for fasteners used for assembly.
 - 2. American Society for Testing and Materials (ASTM) Standards:
 - a. Applicable standards for steel sheet materials used for fabrication.
 - 3. American Institute of Steel Construction (AISC) Standards:
 - a. Applicable standards for steel materials used for fabrication.

1.4 SUBMITTALS

- A. Product Data: Submit manufacturer's product literature and installation instructions for each type of shelving, track, and installation accessories required. Include data substantiating that products to be furnished comply with requirements of the Contract Documents.
- B. Shop Drawings: Show fabrication, assembly, and installation details including descriptions of procedures and diagrams. Show complete extent of installation layout including clearances, spacing, and relation to adjacent construction in plan, elevation, and sections. Indicate clear exit and access aisle widths; access to concealed components; assemblies, connections, attachments, reinforcement, and anchorage; deck details, edge conditions, and extent of finish flooring within area where units are to be installed.
 - 1. Show installation details at non-standard conditions. Furnish floor layouts, technical and installation manuals for every unit shipment with necessary dimensions for system configuration at the project site. Include installed weight, load criteria, furnished specialties, and accessories.

2. Provide layout, dimensions, and identification of each unit corresponding to sequence of installation and erection procedures. Specifically include the following:
 - a. Location, position and configuration of base deck on all floors.
 - b. Plan layouts of positions of carriages, including all required clearances.
 - c. Details of shelving, indicating method and configuration of installation in carriages.
 3. Provide location and details of anchorage devices to be embedded in or fastened to other construction.
 4. Provide installation schedule and complete erection procedures to ensure proper installation.
 5. Show locations of wiring and disconnects required for operating movable carriage units.
- C. Samples: Provide minimum 3 inch square example of each color and texture on actual substrate for each component to remain exposed after installation.
- D. Selection Samples: For initial selection of colors and textures, submit manufacturer's color charts consisting of actual product pieces, showing full range of colors and textures available.
- E. Installer Certificates: Furnish signed certification by manufacturer attesting that installers comply with specified requirements. Submit manufacturer's certification that products comply with requirements of the Contract Documents.
- F. Warranty: Submit draft copy of proposed warranty.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Engage an experienced manufacturer for the design, production, installation and service of programmable electric, carriage mounted high-density mobile storage units.
- B. Installer Qualifications: Engage an experienced installer who is a manufacturer's authorized representative for the specified projects for installing carriages and anchoring shelving units to carriages.
 1. Minimum Qualifications: One year experience installing systems of comparable size and complexity to specified project requirements.
- C. Manufacturer's Certification: Provide separate written certifications by manufacturer on manufacturer's letterhead stating compliance with all specifications of mobile and shelving systems. Shelving certification must confirm compliance with all actual shelf sizes as noted in these specifications. Provide separate certifications for mobile and shelving, if from different manufacturers.
 1. Certifications from entities other than the original manufacturer are unacceptable.
 2. Guaranteed 24-hour minimum response time to service call.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Follow manufacturer's instructions and recommendations for delivery, storage and handling requirements.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify dimensions before fabrication. Indicate verified measurements on Shop Drawings. Coordinate fabrication and delivery to ensure no delay in progress of the Work.

1.8 SEQUENCING AND SCHEDULING

- A. Sequence storage shelving system installation with other work to minimize possibility of damage and soiling during remainder of construction period.
- B. Schedule installation of specified products and accessories after finishing operations, including painting, have been completed.
- C. Provide components, which must be built in at a time which causes no delays in the progress of the Work.
- D. Pre-installation Conference: Schedule and conduct conference on project site to review methods and procedures for installing mobile storage units including, but not limited to, the following:
 - 1. Review project conditions and levelness of flooring and other preparatory work.
 - 2. Review and verify structural loading limitations.
 - 3. Recommended attendees include:
 - a. Owner's Representative.
 - b. Prime Contractor or representative.
 - c. Architect.
 - d. Manufacturer's representative.
 - e. Subcontractors or installers whose work may affect, or be affected by, the work of this Section.

1.9 WARRANTY

- A. Provide a written warranty, executed by Contractor, Installer and Manufacturer, agreeing to repair or replace units, which fail in materials or workmanship within the established warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have under provisions of the Contract Documents.
- B. Warrant the entire movable compact shelving installation against defects in materials and workmanship for a period of five years from date of final project acceptance by the Owner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Spacesaver Corporation. Product: Bi-File Lateral System.
- B. Kardex.
- C. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

A. General:

1. Provide materials and quality of workmanship which meet or exceed established industry standards for products specified. Commercial grade or case-type shelving will not be acceptable. Use furniture grade sheet metal for component fabrication unless indicated otherwise.
2. Size and configuration of system as indicated on Drawings.

B. Base Deck and Rails:

1. Base deck shall be 1-1/2 inch low profile, single piece construction per Bi-File section extending fully under stationary shelving for maximum stability. Deck walking surface shall be finely textured non-directional black matting, which cleans easily and has excellent abrasion resistance. Mat shall be permanently secured to base deck. Rails shall be brushed stainless steel for maximum durability and appearance. Front rail shall be formed with a 90-degree flange to completely cover the front deck edge. All exposed deck sides shall have a brushed stainless steel end cap. All end rail runs shall have a brushed stainless steel end stop assembly with a round neoprene bumper to provide cushioned stops. All adjoining deck sections shall have tongue and groove interlocking connectors and have interlocking rail sections. Decks shall have pin levelers that allow for easy leveling during installation or readjustment after installation. Stationary housing shall be securely attached to the base deck and be positioned at the same height as the moveable units.

C. Lateral Movement Assemblies:

1. A wheel housing assembly shall bolt into a welded carriage assembly that has a 3/4 inch recess for the shelving to securely fit into with containment on all four sides. The shelving shall be firmly attached to the carriage assembly through the base shelf supports, which are interlocked into the uprights. Each wheel housing assembly shall have two precision machined and hardened wheels with two permanently shielded bearings per wheel. Spacers shall be provided on both sides of each wheel to eliminate all friction between the wheels and the wheel housing assembly. A 1 inch thick round neoprene bumper shall be provided between each moveable unit to protect the operator's fingers and provide soft stopping.

D. Overhead Anti-Tip Assemblies:

1. Overhead anti-tip assemblies shall be provided and securely attached to the lateral units. Two cam-follower type guide bearings shall guide in a fully captive guide channel securely attached to the stationary units. Each guide channel shall have a neoprene bumper at each end to provide cushioned stopping.

E. Filler Strips:

1. Stationary housing units shall have a filler strip between adjacent units to provide equal spacing as the moveable units and to provide a flush finished assembly.

F. Housing:

1. Case type shelving shall have a clean self-locking design that assembles without special tools or fasteners. Units shall consist of three modular components: case-type double wall flush panel vertical uprights, shelf supports, and shelves. Rivets on shelf supports shall lock into keyholes in inner walls of uprights on 1-1/2 inch centers. Steel shelves shall fit over shelf supports to form a solid unit. Color as selected by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine floor surfaces with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of mobile storage units.
- B. Verify that building structural system is adequate for installing mobile storage units at locations indicated on approved shop drawings.
- C. Verify that intended installation locations of mobile storage units will not interfere with, nor block required exit paths or similar means of egress once units are installed.
- D. Prepare written report, endorsed by Installer, listing conditions detrimental to proper performance of mobile storage units, once installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install mobile storage shelving system per manufacturer's written recommendations.
- B. Shelving Units Installation:
 - 1. General: Follow layout and details shown on accepted shop drawings and manufacturer's printed installation instructions. Position units level, plumb; at proper location relative to adjoining units and related work.
 - 2. Carriages:
 - a. Place movable carriages on base deck. Ensure that all wheels track properly and centering wheels are properly seated. Fasten multiple carriage units together to form single movable base where required.
 - b. Position fixed carriage units to align with movable units; make final leveling adjustments with leveling screws.
 - 3. Shelving Units:
 - a. Permanently fasten shelving units to fixed and movable carriages with vibration-proof fasteners.
 - b. Stabilize shelving units following manufacturer's written instructions. Reinforce shelving units to withstand the stress of movement where required and specified.

3.3 FIELD QUALITY CONTROL

- A. Verify shelving unit alignment and plumb after installation. Correct if required following manufacturer's instructions.
- B. Remove components which are chipped, scratched, or otherwise damaged and which do not match adjoining work. Replace with new matching units, installed as specified and in a manner to eliminate evidence of replacement.

3.4 ADJUSTING

- A. Adjust components and accessories to provide smoothly operating, visually acceptable installation.

3.5 CLEANING

- A. Immediately upon completion of installation, clear components and surfaces. Remove surplus materials, rubbish and debris resulting from installation upon completion of work and leave areas of installation in neat, clean condition.

3.6 DEMONSTRATION/TRAINING

- A. Schedule and conduct demonstration of installed equipment and features with Owner's personnel.
- B. Schedule and conduct maintenance training with Owner's maintenance personnel. Training session should include lecture and demonstration of all maintenance and repair procedures that end user personnel would normally perform.

3.7 PROTECTION

- A. Protect system against damage during remainder of construction period.

END OF SECTION

SECTION 10 75 00

FLAGPOLES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Aluminum flagpoles, ground-mounted.
- B. Halyards and accessories.
- C. Flags.
- D. Concrete foundation.

1.2 PRODUCTS FURNISHED BUT INSTALLED UNDER OTHER SECTIONS

- A. Furnish anchor devices and foundation tube sleeve to Section 03 11 00, Concrete Forming, for placement.

1.3 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete; for concrete foundation.
- B. Division 26 Sections for grounding, and related work.

1.4 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. American Architectural Manufacturers Association; AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.
 - 2. American Association of State Highway and Transportation Officials; AASHTO M-36 – Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewer and Drains.
 - 3. ASTM B241/B241M – Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.
 - 4. ASTM C33 - Standard Specification for Concrete Aggregates.
 - 5. ASTM C1107/C1107M - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 - 6. ASTM D1187 - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
 - 7. National Association of Architectural Metal Manufacturers (NAAMM) - Metal Finishes Manual for Architectural and Metal Products.
 - 8. NAAMM FP 1001 - Guide Specifications for Design of Metal Flagpoles.

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Division 01.
- B. Indicate on shop drawings, detail dimensions, base attachment details, anchor requirements and imposed loads.
- C. Provide product data on pole, accessories and configurations.
- D. When requested by Architect or Owner, submit one 3-inch cutaway sample of flagpole tube with specified finish. Submit samples under provisions of Division 01.
- E. Submit manufacturer's installation instructions under provisions of Division 01.

1.6 SYSTEM DESCRIPTION

- A. Pole with Flag: Designed for 100 mph wind speed, without permanent deformation, non-resonant, design safety factor of 2.5, equipped with one five-foot by eight-foot flag; meeting applicable requirements of NAAMM FP 1001.
- B. Type: Ground set; fixed type.
- C. Pole Design: Tapered top end.
- D. Nominal Height: 30 feet, measured from ground.
- E. Halyard: Internal type.
- F. Foundation: Cast-in-place concrete, as indicated on Drawings; and in accordance with manufacturer's recommendations.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store and protect products under provisions of Division 01.
- C. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- D. Protect flagpole and accessories on site from damage or moisture.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Flagpoles:
 - 1. L.Ph. Bolander & Sons, San Francisco, CA; 800-434-5611, www.bolanderflagpole.com. Product: Catalog #HTJ30, one-piece, 30-foot exposed height flagpole.
 - 2. Baartol Company, Kenton, OH; 800-558-6044, www.baartol.com.
 - 3. American Flagpole, Abingdon, VA; 800-368-7171, www.americanflagpole.com.
- B. Flags:
 - 1. The Flag Company, Inc., Acworth, GA; 800-962-0956, www.flagco.com.

2. Annin & Co., Roseland, NJ; 973-228-9400, www.annin.com.
3. The Flag Zone, Gilbertsville, PA; 800-976-4201, www.theflagzone.com.

C. Substitutions: Under provisions of Division 01.

2.2 POLE MATERIALS

A. Aluminum Tube: ASTM B241; 6063 alloy, T6 tempered.

2.3 POLE FABRICATION

- A. All flagpoles shall be of one-piece construction.
- B. Outside Butt Diameter: 6 inches.
- C. Outside Top Diameter: 3-1/2 inches.
- D. Nominal Wall Thickness: 0.188 inch.

2.4 FLAGPOLE COMPONENTS

- A. Internal Halyard and Truck Assembly: Provide pole with an internal halyard system including a manually operated cam cleat, a halyard of 5/16-inch diameter, braided, UV-resistant polypropylene rope, and a concealed revolving truck assembly. Halyard and cam cleat shall be serviced through a flush hinged access door with a continuously reinforced periphery.
 1. Provide a hinged access door assembly. Door shall hinge on a heavy-duty piano hinge and shall be secured with a cylinder lock.
 2. Interior Platform: Provide 24-inch or longer round, solid piece of flexible plastic foam to serve as a platform inside the flagpole tube. Foam shall be adhesively attached to tube wall at two feet below the door opening.
 3. The halyard device shall permit a flag to be raised, lowered and flown from any position on the pole without entanglement or slippage.
 4. The flag attachment arrangement shall consist of a beaded cable sling encircling the pole and a counterweight to assure descent of flag in all weather conditions. Provide with stainless steel snap hooks.
- B. Flags:
 1. Material: Polyester, 100 percent, two-ply, spun, woven fabric.
 - a. Flag of the United States of America: Embroidered stars, sewn stripes, double-stitched; heavy-duty, non-shrink canvas header; and brass grommets.
 - b. Flag of the State of California: Printed graphics; heavy-duty, non-shrink canvas header; and brass grommets.
 2. Quantity and Size: Provide two flags as follows; one flag per pole.
 - a. One five-foot by eight-foot flag of the United States of America.
 - b. One five-foot by eight-foot flag of the State of California.
- C. Finial Ball: Flush-seam ball, spun aluminum, 0.0641-inch wall thickness, minimum; 6 inches diameter.

2.5 MOUNTING COMPONENTS

- A. Foundation Tube: AASHTO M-36, corrugated tube, 16 gauge (uncoated metal thickness 0.060-inch, minimum) steel, galvanized, with 3/8-inch thick welded plates for setting; tube depth as indicated.
- B. Lightning Protection: Grounding rod (spike), 3/4-inch diameter, welded to foundation tube assembly.
- C. Pole Base Attachment: Flush; aluminum base with cover.

2.6 ACCESSORIES

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107.
- B. Sand: ASTM C33, fine aggregate.
- C. Elastomeric Joint Sealant: Single-component nonsag urethane or single-component neutral-curing silicone joint sealant complying with requirements in Section 07 92 00 for "Use NT (nontraffic)" and for "Use M, G, A," and, as applicable to joint substrates indicated, for "Use O."
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

2.7 ALUMINUM FINISHES

- A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
 - 1. Protection of Dissimilar Surfaces: Coat dissimilar metals and metal surfaces in contact with concrete with bituminous paint.
- B. Aluminum Surfaces Except Finial: Architectural Class I finish per Aluminum Association Standard AA-M10C22 A41, clear anodized, complying with AAMA 611.
- C. Finial Ball: Gold anodized finish; AAMA 611, AA-M32C22A43 (Class I, 0.018 mm or thicker); gold color.

PART 3 EXECUTION

3.1 INSPECTION

- A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.
- B. Beginning of installation means acceptance of existing conditions.

3.2 PREPARATION

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with a heavy coat of bituminous paint.
- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.

- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
- D. Place concrete, as specified in Section 03 30 00. Compact concrete in place by using vibrators. Moist-cure exposed concrete for not less than seven days. Nonstaining curing compound may be used for curing.

3.3 INSTALLATION

- A. Install flagpole, base assembly and fittings in accordance with manufacturer's printed instructions.
 - 1. Verify and ensure that plastic foam platform inside the flagpole tube is firmly attached to tube wall.
- B. Install welded base assembly for flagpoles in concrete and fasten in place.
- C. Ground Setting:
 - 1. Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure. Install flagpole, plumb, in foundation tube.
 - 2. Place flagpole on bottom plate between steel centering wedges and install hardwood wedges to secure flagpole in place. Place and compact sand in foundation tube and remove hardwood wedges. Seal top of foundation tube with a 2-inch layer of non-shrink grout, and joint sealant, and cover with flashing collar. Seal space between flagpole and collar with joint sealant.
- D. Electrically ground flagpole installation.
- E. Install flags and check flagpole assemblies for smooth operation in presence of Owner's Representative.

3.4 TOLERANCES

- A. Maximum Variation from Plumb: 1 inch.

3.5 ADJUSTING AND CLEANING

- A. Clean surfaces as recommended by flagpole manufacturer.
- B. Adjust operating devices so that halyard functions smoothly.

END OF SECTION

SECTION 10 90 00
MISCELLANEOUS SPECIALTIES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Miscellaneous specialty items.
- B. Accessory anchors, bolts, screws and braces.

1.2 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings:
 - 1. Indicate fabrication, materials, installation details, finishes, and any other required anchoring, fastenings, and hardware.
 - 2. Submit drawing layout for product configuration, support attachment and anchorage details.

1.3 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store in manufacturer's original unopened containers and packaging. Protect and handle products to prevent damage to products or finishes.

PART 2 PRODUCTS

2.1 ARTISTIC DIMENSIONAL WALL PANELS

- A. Volta Artistic Dimensional Panels as manufactured by Marlite or accepted equal, with the following characteristics:
 - 1. Material: High quality, 48 pounds per cubic foot density medium density fiberboard.
 - 2. Profile: CNC created dimensional surface, Tydel pattern.
 - 3. Finish: Factory-applied two part, water-based enamel gloss paint finish. Color as indicated on Drawings.
 - 4. Panel Sizes and Configuration: As indicated on Drawings.

2.2 LOBBY SEATING

- A. Bernu Aero Series as manufactured by Arconas or accepted equal, with the following characteristics:
 - 1. Supporting Beam: Supporting beam shall be 3 inch x 1 1/2 inch rectangular aluminum extrusion with 3/16 inch thick walls. Extrusion design includes two internal webs to maintain the rectangular shape when forming curves. Beams shall be heat treated to T5 temper.

2. Legs: Legs shall be cast in aluminum and fixed to supporting beam with a 3/4 inch diameter steel pin. Legs have adjustable leveling glides.
 - a. Glides: Provide glides for floor mounting.
3. Seat and Back Supports:
 - a. Seat Sides: Solid cast aluminum, to withstand the requirements of ANSI - BIFMA 5.4. Seat sides shall protect the full length of seats and backs from damage. Grooves on inner surfaces of the castings shall support the seat and back pans in an ergonomic shape.
 - b. Seats shall be made of 12 gauge perforated steel. Seat backs shall be made of 14 gauge perforated steel. Seat and back pans shall be secured to seat sides by concealed mechanical fasteners.
 - c. Seats shall be fixed to the supporting beam by 3/4 inch diameter steel pins.
4. Arms: Arms shall be cast aluminum, and fixed to the supporting beam using 3/4 inch diameter steel pins.
 - a. Cantilever Arm: Arm shape sweeps up from the supporting beam to form a thin horizontal arm rest. Exposed cast aluminum surface finish shall be satin polished with bright accents. Cantilever arm shall be capped with a polyurethane foam arm pad.
5. Finish:
 - a. Aluminum Castings: Satin with bright highlights.
 - b. Aluminum Extrusions: Clear anodized.
 - c. Steel Parts: Powder coated.
6. Fabrication: Units shall be shipped knocked-down. Seats and backs shall be factory-assembled.

2.3 METAL STORAGE CABINETS

- A. Heavy duty metal storage cabinets as manufactured by Spacesaver Corporation or accepted equal, with the following characteristics:
 1. Heavy duty, 12 gauge steel, welded construction, fully assembled.
 2. Size: 48 inches wide x 78 inches high x 24 inches depth.
 3. Double doors.
 4. Five adjustable 12 gauge steel shelves.
 5. Factory finish consisting of one prime coat and two finish coats in color selected by Architect from manufacturer's full range of standard colors.

2.4 JIB CRANES

- A. Acceptable Manufacturers:
 1. Basis-of-Design: SPANCO, Inc. Product: Model No. WC 501-1000-8 Workstation wall-mounted, manually operated cantilever jib crane.
 2. Ederer.
 3. Checo.
 4. Substitutions: Under provisions of Division 01.

B. Jib Crane Characteristics:

1. Crane shall be designed, fabricated, and installed in accordance with ANSI B30.11, MH27.2, OSHA 1910.179, and CBC.
2. Structural Design: Live load capacity plus 15 percent for hoist and trolley weight and 25 percent for impact. Crane shall be designed to withstand:
 - a. Crane and hoist deadload and impact factors.
 - b. Live load capacity equal to net rated hook load.
 - c. Inertia forces from crane and load movement.
3. Crane shall be designed to manually move load with maximum force of 1/100 load weight.
4. Maximum Deflection: $L/225$.
5. Capacity: 1000 pounds.
6. Span: 8 feet.
7. Lifting Distance: 29 feet.
8. Thrust / Pull: 2670 pounds.
9. Rotation: 200 degrees.
10. Material: ASTM A36 steel.
11. Fabrication:
 - a. Trolley Track: Enclosed, cold-formed box track that serves as bottom cord of horizontal boom and permits trolley and festoon carrier to move on lower inside flanges.
 - b. Top and Bottom Pivot Mounting Assemblies: Designed to anchor boom/mast to support structure, allow boom and mast rotation, and resist drift. Assembly shall include steel bracket, bearings, and cotter pins.
 - c. Hoist Trolley: Rigid body trolley designed to ride inside enclosed track and carry hoist and load. Constructed from two-piece stamped steel body with two wheels on each side and tapered clevis positioning hoist hook at center of trolley to evenly distribute weight to trolley wheels. Provide four removable, self-centering wheels with sealed lifetime lubricated bearings and tapered two degrees to match track profile. Drop lugs shall be provided on both sides of trolley to limit dropping in the event of wheel, axles, or load bar failure.
 - d. End Stops: Molded composite bumper installed in track at boom end to prevent hoist trolley and festoon carriers from rolling out of track.
 - e. Accessories:
 - 1) Rotation Stops: Steel plate stops to limit boom rotation shall be welded to formed channels of top and bottom brackets.
 - 2) Balancer Trolleys: Air or manual for all manufacturers.
 - 3) Festoon Flat Cable: Four conductor.
 - 4) Festoon Air Hose: Flat or round 3/8 inch diameter electrical cable used to supply lifting device and festoon along boom.
 - 5) Anchor Bolts.
12. Finish: Factory finish with electrostatic spray paint in yellow color.

2.5 ELECTRIC CHAIN HOISTS

A. Acceptable Manufacturers:

1. Basis-of-Design: Coffing. Product: Model No. ECT-1009 plain trolley electric chain hoist.
2. Harrington Hoists, Inc.
3. Substitutions: Under provisions of Division 01.

B. Electric Chain Hoist Characteristics:

1. Capacity: 1000 pounds.
2. Small frame hoist with parallel trolley mount.
3. Headroom: 17-1/4 inches.
4. Alloy Steel Gears: Precision machined and lubricated in oil bath.
5. Five-pocket load sheave.
6. Mechanical Load Brake: Multiple disc type to control load lowering and prevent load drift; holds rated load independent of multiple disc motor brake.
7. Limit Switches: Adjustable upper and lower limit switches to regulate load travel.
8. Motor Brake: Heavy duty multiple disc type, direct acting to stop load when push button is released and power off.
9. Mechanical overload device.
10. Helical gearing for quiet operation.
11. Steel Chain: Precision pitch, treated for optimum strength and wear resistance.
12. Chain guide.
13. Load blocks.
14. Hooks with latches.
15. Hoist Motor: High torque, H4 duty class motor with class F insulation.
 - a. Electrical Requirements: 230 VAC, three phase, 60 hertz.
16. Trolley Wheels: Machined stainless steel wheels with sealed, lifetime lubricated ball bearings. Provide four wheels per trolley.
17. Wrap-around side plates shall act as safety lugs and as bumpers to protect trolley wheels.
18. Push Button Control: Impact and chemical/corrosive atmosphere resistant, NEMA 3R weather resistant enclosure. 24 VAC operation.

2.6 SPRINKLER PIPE SOFFIT SYSTEM

A. Enforcer Security Soffit L-Shield fire sprinkler pipe interlock concealment interior soffit system as manufactured by JG Innovations, Inc. or accepted equal, with the following characteristics:

1. The soffit/cover shall be smooth in appearance and shall be fabricated of 14 gauge A60/G90 galvanized steel with a factory prime paint finish. The cover shall have a snap-lock interfacing with the clips such that once assembled, is rendered virtually irremovable with the use of ordinary tools.

2. Cover joints shall be interlocking integral joints with provision for securement utilizing stainless steel rivets. Rivet spacing shall be at no greater than 2 inch intervals along the joint and positioned at a distance no greater than 1 inch from the end of the overlapping section. External couplings will not be allowed.
3. Provide spring steel shield clips of the size recommended by manufacturer, for securement of the cover. Clips shall be produced from 21 gauge minimum zinc-plated spring steel and shall have a reverse curvature design such that the clips soundly secure the soffit from easy removal. Each clip shall be able to resist a force of 200 pounds uplift at the free end.
4. The soffit/cover shall be sized in accordance with requirements to accommodate the specific application size as indicated on the Drawings.

PART 3 EXECUTION

3.1 INSTALLATION

- A. All products in this Section shall be installed according to manufacturer's instructions and as detailed on Drawings.
- B. Metal storage cabinets shall be anchored to concrete masonry walls from the inside of the cabinet using 1/2 inch diameter stainless steel expansion anchors with 2 inch square washers, minimum of three anchors equally spaced high and low in cabinet.

3.2 ADJUST AND CLEAN

- A. Clean and Touch-up: Remove all packing and protection blemishes and thoroughly clean and polish all finish surfaces. Restore any marred or abraded surfaces to their original condition by touching up in accordance with the manufacturer's recommendations. Touch-up shall not be obvious.
- B. Defective work: Remove and replace all defective work which cannot be properly repaired, cleaned or touched up, as directed by Architect, with no additional cost to the Owner.
- C. Protect installed work during the construction period to prevent abuse and damage.

END OF SECTION

DIVISION 11
EQUIPMENT

SECTION 11 19 00
DETENTION EQUIPMENT CONTRACTOR

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Detention Equipment Contractor.
- B. Suppliers.
- C. Installers.

1.2 RELATED SECTIONS

- A. Section 07 92 00 – Joint Sealants: Security sealants.
- B. Section 08 34 63 – Detention Doors and Frames.
- C. Section 08 71 63 – Detention Door Hardware.
- D. Section 08 88 53 – Security Glazing.
- E. Section 11 19 23 – Detention Fasteners.
- F. Section 12 55 00 – Detention Furnishings.
- G. Division 26 – Electrical.
- H. Division 28 – Electronic Safety and Security.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A36 – Structural Steel.
 - 2. ASTM A366 – Steel, cold rolled.
 - 3. ASTM A526 – Galvanized Steel.
 - 4. ASTM A569 – Commercial Grade, hot rolled and pickled steel.
 - 5. FS FF-S325 – Expansion Anchors, and Anchor Bolts.
 - 6. FS QQ-A325 – Finish for Wedge Type Expansion Anchor.

1.4 SUBMITTALS

- A. Submit shop drawings under provisions of Division 01.

- B. Submit complete shop drawings for fabrication, erection and installation of all items of detention equipment. Include plans, elevations and large scale details. Show anchorage and accessory items, and include electrical junction boxes, conduit and wiring locations and connections, to insure a complete and proper installation. All shop drawings shall be referenced to Architect's Door Schedule, Glazing Schedule, Detail Numbers and Hardware Group as applicable.
- C. The Detention Equipment Contractor shall coordinate and submit "Composite"-type shop drawings. Show complete details of construction including glazing, glazing stops, relites, doors, door frames, all hardware and electronic products, reinforcements, joints, connections, and all other related types of construction; also include methods of installation including anchorage and include diagrams showing the sequence of installation. All shop drawings shall be referenced to Architect's Door Schedule, Glazing Schedule, Detail Number and Hardware Group Number as applicable.
- D. Architect will not process submittals that are nonconforming to this Article. All delays and time overruns caused by incomplete submittals may be assessed to Contractor.
- E. Composite-type shop drawings shall include materials and installation of Sections 08 34 63, 08 71 63, 11 19 23, and 12 55 00, and shall be coordinated with all other related Sections including those listed above in Article 1.2, Related Sections.
- F. Submit product data under provisions of Division 01.
- G. Submit manufacturer's product data and installation instructions for each standard equipment and hardware item.

1.5 OPERATIONS AND MAINTENANCE DATA

- A. Submit operation data under provisions of Division 01.
- B. Detention equipment manufacturer shall furnish operating and specifications manuals for all detention equipment and provide instruction for the care of finishes and materials.

1.6 QUALITY ASSURANCE

- A. The Detention Equipment Contractor shall be responsible for:
 - 1. Providing and installing all items and equipment specified in Sections 08 34 63, 08 71 63, 11 19 23, and 12 55 00.
 - 2. Installation of Owner-furnished Detention Equipment.
 - 3. Coordination of all interfaces of his work with fabrication and installation of items specified in Sections listed in Article 1.2, Related Sections.
 - 4. Compliance with all requirements as listed in each section of specifications for which he is responsible.
- B. The Detention Equipment Contractor shall exhibit the following qualifications: Subcontract the provision of detention equipment to a single firm. The firm shall meet the following minimum requirements:
 - 1. Detention Equipment Provider shall be regularly and presently engaged in the design, fabrication, and installation of detention equipment as one of its principal products.
 - 2. Detention Equipment Provider shall have technically qualified, experienced and trained personnel, with a minimum of five years experience, to install specified items.

3. Detention Equipment Provider shall have executed as least five separate detention and/or correction projects equal or greater in size than this Project which embody the same type of detention equipment as proposed for this Project. These Projects shall have been in actual and satisfactory use for not less than one year.
- C. Proposals will be considered only from competent and reputable companies who specialize in this particular service and who can show to the satisfaction of the Architect that they are fully capable of completing detention equipment-type work in accordance with these construction documents.
- D. Detention Equipment Contractors shall provide the following information to obtain approval of qualification:
 1. Brief description of the firm including length of time in business.
 2. List of all projects the firm has worked on in the last five years. List Title, Location, Owner Contact, General Contractor, Architect, services provided and dollar value of your service. Identify those projects of equal size and service to this project.
 3. List of five references with phone numbers who can attest to your qualifications, expertise and quality of work.
 4. Résumés of key personnel within your company and of those who will be involved with this project as a manager, fabricator or installer, along with each person's particular expertise and years of service.
 5. Provide a brief financial statement describing the stability of the company.
 6. Provide a letter from Surety Company outlining bonding capabilities, overall limit and current bonds outstanding. List occurrences in the last five years where a bonding company was drawn upon to complete any work on your projects.
 7. If you propose subcontracting any of your services, provide information and bonding capabilities on this subcontractor.
 8. Provide a list of services you propose to provide as part of this project. Include also a list of those services you will specifically exclude from this project.

Note: Approval of a firm as Detention Equipment Contractor does not relieve them from furnishing all materials and services required by the Contract Documents.
- E. Qualification of Detention Equipment Subcontractors: Use only subcontractors acceptable to all detention equipment manufacturers and to the Detention Equipment Contractor. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts, who are completely familiar with the specified requirements and methods needed for proper performance of the work.
- F. Qualifications of Manufacturers: Products used in the work of these Sections shall be produced by manufacturers regularly engaged in manufacture of detention equipment and with a history of successful production acceptable to the Architect.
- G. Furnish all items to be embedded in other work. Include instructions for placement. Review installation of embedded items and report status of installation to the Architect.
- H. Detention equipment Provider shall perform final field installation of detention doors, hardware, and other detention equipment.

PART 2 PRODUCTS

2.1 MATERIALS

A. General

1. The manufacturers, suppliers and warrantors shall make special efforts to comply with General Contractor's scheduling requirements with regard to early delivery of hollow metal frames and other items needed to proceed with adjacent or related work.
2. The Detention Equipment Contractor is responsible for providing detention equipment detention metal frame assemblies, complete with all products required, for putting in operable condition all items of work and for furnishing all items required for complete installation of products including anchors, and other necessary fasteners/accessories for anchorage as required by conditions of installation.

- B. Materials, Components and Fabrication: Comply with requirements in each Section of detention equipment and/or furnishings; provide direct to Contractor each type of detention equipment only from a "single" detention equipment contractor.

2.2 DETENTION EQUIPMENT SUPPLIERS

- A. Detention Equipment Supplier does not qualify as approved Detention Equipment Contractor. Detention Equipment Contractor must comply with Article 1.6 hereinbefore mentioned in order to qualify as an approved Detention Equipment Contractor.

B. Pre-Approved Detention Equipment Providers:

1. Cornerstone Detention Products
14000 AL-20
Madison, AL 35756
Tel: 256-355-2396
2. Argyle Security
12903 Delivery
San Antonio, TX 78247
Tel: 210-495-5245
3. Maximum Security Products Corp.
S. 2406 Dishman Mica Road, Suite 3
Spokane, WA 99206
Tel: 509-928-5616
4. Norment Security Group, Inc.
6144B Industrial Way
Livermore, CA 94550
Tel: 925-455-1131
5. Universal Security Products, Inc.
2010 Crow Canyon Place
San Ramon, CA 94583
Tel: 510-785-8222
6. Forderer Cornice Works
3364 Arden Road
Hayward, CA 94545
Tel: 510-783-4200

7. ISI Detention Contracting Group
12903 Delivery Drive
San Antonio, TX 78247
Tel: 210-495-5245
8. CML Security
400 Young Court, Unit 1
Erie, CO 80516
Tel: 720-466-3650
9. Or accepted equal.

2.3 OTHER MANUFACTURERS, SUPPLIERS

A. Substitutions: Under provisions of Division 01. In addition, submit:

1. Résumés of personnel in manufacturer's/supplier's organization that have sufficient documented experience in the design, fabrication and installation of equipment comparable in quality and type to that required herein, and a listing of not less than five projects, comparable in quality and type to this project, that have been executed under direction of said personnel.
2. Names and locations of detention installations completed within last year.
3. List of five separate jails equal in size or greater than this project which embody the same systems as proposed for use under these specifications and which have been in actual and satisfactory use under detention conditions and in continuous operation for at least two years.
4. Proposals will be considered only from competent and reputable manufacturers/suppliers who specialize in this particular branch of work and who can show to the satisfaction of the Architect that they are fully capable of completing detention equipment work in accordance with Contract Documents.
5. In the Contract Documents preparation, specific materials and methods have been described and drawn in order to establish a standard of quality and of effect desired. The Architect reserves the right to consider each request for substitution on merits of material furnished by any one manufacturer or supplier and to reject any or all requests which are not in Owner's best interest.
6. Provide a letter from Surety Company outlining bonding capabilities, overall limit and current bonds outstanding. List occurrences in the last five years where bonding company was drawn upon to complete any project.
7. Outline the following:
 - a. Approved installers or list of persons within the firm that are currently installing products or services, with clarification of:
 - 1) How many years each person has provided this service and what particular product comprises his expertise. In other words, which portion(s) of this project do you propose he install? List each installer/product separately.
 - 2) How many installations of this size or larger have they completed?
 - 3) If you propose using a subcontractor for any portion of the installation, provide information of bonding capabilities, or how you will insure their work/liabilities.
 - b. A critical path outlining time line from award of contract to delivery of your product on-site and installation/follow-up proposals.

- c. A complete list of what you consider to be your "standard" services and all miscellaneous appurtenances that you will provide for installation of your product, and its total function in a "standard" application.
- d. A list of all exclusions of materials that you interpret as not being a part of your contract.
- e. All warranty information on your particular product/service in a "standard" application.
- f. List of all technical/managerial staff that will assist on this project, the qualifications/experience of each on a project of this size, their particular involvement, and the number of years with your firm.

PART 3 EXECUTION

3.1 INSTALLATION

A. General:

- 1. Do not install products that are damaged or defective.
- 2. Securely anchor products in locations indicated on drawings, or as recommended by manufacturer and accepted by Architect.
 - a. Install in alignment, free from warp, twist or distortion, plumb, level and true.
 - b. Comply with reviewed shop drawings, manufacturer's instructions and recommendations for both handling and installation of the products for particular conditions of installation in each case, except:
 - 1) Where more stringent requirements are indicated or specified.
 - 2) Where project conditions require extra precautions or provisions for satisfactory performance of work.
- 3. Where printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding.

B. Cutting, Fitting and Placement

- 1. Perform cutting, drilling and fitting required for installation of detention equipment.
- 2. Set work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels with lines visually parallel.
- 3. Cut necessary holes for installation of mechanical and electrical work in detention equipment; comply with templates or detail drawings furnished by other trades prior to fabrication and installation of detention work.

C. Provide all anchors and other attachment devices necessary to install Owner-furnished Contractor-installed detention equipment.

3.2 ADJUSTING, REPAIRING AND CLEANING

- A. After connections to electrical power are made, test products to verify operational characteristics.
- B. Adjust and lubricate moving parts to operate smoothly, quietly and without binding.
- C. Remove from product surfaces the manufacturer's temporary labels, protective coatings and marks of identification if provided; thoroughly wash surfaces and remove foreign material.

- D. After erection, prior to touch-up painting, remove objectionable foreign material from metal surfaces including connections. Where surfaces are to be exposed to view, grind welds smooth; finish holes, defects, and other imperfections so surfaces will be smooth when painted. Use metal body filler to fill joints at metal-to-metal joints or other gaps as directed by Architect including all joints or gaps in field assembled detention hollow metal items or detention equipment. Any gaps greater than 1/4 inch between detention hollow metal or detention equipment and CMU walls to be closed with 1/8 inch steel angle or 1/8 inch steel plate and sealed with security sealant as appropriate for a neat installation. All gaps of less than 1/4 inch are to be sealed. This shall include all areas in secure perimeter as the Architect shall deem necessary.
- E. Touch-up welds, bolted connections and all abraded/damaged areas in shop-applied finish with same type paint as metal primer used in fabrication shop.
- F. Work shall be free from scratches, dents, permanent discoloration and other defects. Remove and replace damaged parts, and surfaces with imperfections, or items damaged during installation or thereafter before time of final project acceptance. Leave entire work in neat, orderly, clean condition.

3.3 PROTECTION

- A. Protect products installed by detention equipment installer from damage.

3.4 EXTRA STOCK/SPARE PARTS

- A. Provide six sets of special tools to manually operate motor controlled doors. Delivery shall be by registered mail direct to Owner.
- B. Provide quantity of hardware specified in Section 08 71 63.
- C. Provide at least three screwdrivers (or special wrenches, if applicable) for each size and type of countersunk flat security head metal screw.
- D. Deliver extra stock/spare parts to authorized Owner's representative at project site packed in a carton to provide protection during transit and project site storage; store where directed and obtain written receipt when delivered.

3.5 INSTRUCTION AND TRAINING PERIOD

- A. Provide operating/maintenance manuals and instructions as specified in the Contract.
- B. Detention equipment supplier shall provide a representative acceptable to Architect and specially trained in operation of detention equipment, with thorough knowledge of its mechanisms, for an on-site instruction and training period involving Owner's designated personnel (which will not exceed five 8-hour days in length but shall be a minimum of three 8-hour days in length). Representative must be capable of training personnel in operation of detention equipment and instructing maintenance personnel in its operation, repair and upkeep. Detention equipment supplier shall obtain signatures from these designated personnel verifying their participation in this training, and shall forward this verification to Architect and Owner for review.

END OF SECTION

SECTION 11 19 19
DETENTION LOCKERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Wardrobe locker units and hardware.
- B. Evidence locker units and hardware.

1.2 RELATED SECTIONS

- A. Section 11 19 00 – Detention Equipment Contractor.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Shop Drawings: Indicate locker plan layout and numbering plan.
- C. Product Data: Provide data on locker types, sizes and accessories.
- D. Samples: Submit two samples, 3 inches x 6 inches in size, of color selected; applied to specified base metal.
- E. Manufacturer's Installation Instructions: Indicate component installation.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store, protect and handle products to site under provisions of Division 01.
- B. Protect locker finish and adjacent surfaces from damage.

1.6 FIELD MEASUREMENTS

- A. Verify that field measurements are as indicated on shop drawings.

PART 2 PRODUCTS

2.1 MANUFACTURERS – WARDROBE LOCKERS

A. Acceptable Manufacturers:

1. Republic Storage Systems Co., Inc. Product: Double Tier Quiet Lockers.
2. Penco Products, Inc.
3. Lyon Metal Products, Inc.

B. Substitutions: Under provisions of Division 01.

2.2 MANUFACTURERS – EVIDENCE LOCKERS

A. Tiffin Metal Products, Model 1563-18P and Model 961-18P.

B. Substitutions: Under provisions of Division 01.

2.3 MATERIALS

A. Sheet Steel: ASTM A653/A653M galvanized to G90 coating, stretcher leveled; to the following minimum thicknesses:

- | | |
|--------------------|-----------|
| 1. Body and Shelf: | 24 gauge. |
| 2. Door Face: | 16 gauge. |
| 3. Door Frame: | 16 gauge. |
| 4. Cross Member: | 16 gauge. |
| 5. Locker Frame: | 16 gauge. |

2.4 ACCESSORIES – WARDROBE LOCKERS

A. For Each Locker: Hat/book shelf, coat hooks and metal number plate, and padlock attachment.

B. Trim Piece: 24 gauge, locate as indicated on drawings.

2.5 FABRICATION

A. Locker Body: Formed and flanged; with steel stiffener ribs, welded, bolted, or riveted construction using corrosion resistant nuts and bolts, and stainless steel rivets; wardrobe lockers shall have sloped top.

B. Frames: Formed channel shape with continuous vertical door strike integral with the frame, cross frame members welded to vertical framing members for rigidity.

C. Doors: Hollow construction, manufacturer's standard thickness, channel reinforced top and bottom. Flush design without louvers or perforations.

1. Evidence Locker Customer Side: Louverless, self-closing and flange formed three sides; full length stainless steel continuous, spring loaded hinge; welded on reinforcement; stainless steel welded-on handle plate with press in number. The customer side of each evidence locker door is to have a 3/16 inch wide x 5/8 inch tall slot in upper right corner for key deposit after locked.

2. Evidence Locker Control Side: Louverless; full length stainless steel continuous hinge; welded on reinforcement and readable compartment numbers.
- D. Hinges: 2 inches high, five knuckle. Two for doors under 42 inches high; three for doors over 42 inches high; weld to frame and rivet securely to inside of door flange.
- E. Locking devices:
 1. Wardrobe locker locking devices shall be supplied by Owner.
 2. Evidence locker, customer side shall be key operated with key retained in the cylinder when door is unlocked and opened. Lock to be single control key relockable by Owner without removing lock mechanism.
 3. Evidence locker, control side shall be locked by a 12 gauge, plated steel latch/strap. Top and bottom are bayonet engaged until raised and pivoted clear to allow door to open. No handling linkage mechanical parts for this lock is permitted.
- F. Number Plates: Provide rectangular shaped plates, attached with rivets. Provide numbers in black, not less than 1/2 inch high.
- G. Form recess for operating handle and locking device for wardrobe lockers. Manufacturers' standard for storage lockers.
- H. Finish edges smooth without burrs.
- I. Base: Refer to Drawings for height and construction.
 1. Evidence Locker: 4 inches high, four-sided base, ventilated style, fabricated from 16 gauge stainless steel.

2.6 FINISHES

- A. Wardrobe Lockers: Clean, degrease and neutralize metal; prime and finish with one coat of baked enamel. Submit colors from manufacturer's standard colors for architect selection. Finish exposed ends.
- B. Evidence Lockers: Phosphate treated, baked on prime paint with baked finish coat of enamel prior to final assembly; color as selected from manufacturer's standard colors.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that prepared bases are in correct position and configuration.
- B. Verify bases are properly sized.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
- B. Install lockers plumb and square.
- C. Place and secure on prepared base.
- D. Secure lockers with anchor devices to suit substrate materials. Minimum Pullout Force: 100 pounds per anchor.

E. Bolt adjoining locker units together to provide rigid installation.

3.3 CLEANING

A. Clean work under provisions of Division 01.

B. Clean locker interiors and exterior surfaces.

END OF SECTION

SECTION 11 19 23
DETENTION FASTENERS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Security Screws.

1.2 RELATED SECTIONS

- A. Section 08 34 63 – Detention Doors and Frames.
- B. Section 08 71 63 – Detention Door Hardware.
- C. Section 11 19 00 – Detention Equipment Contractor.
- D. Section 12 55 00 – Detention Furnishings.

1.3 SHOP DRAWINGS

- A. Submit shop drawings under provisions of Division 01.

1.4 COORDINATION

- A. Coordinate Work and scheduling of the Work of this Section with other trades for anchorage and location.

1.5 INSPECTION

- A. Examine all subsurfaces to receive Work and report, in writing, to General Contractor, with a copy to the company, any conditions detrimental to work. Failure to observe this injunction constitutes a waiver to any subsequent claims to the corrections the company may require. Commencement of Work will be construed as acceptance of all subsurfaces.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver all manufactured materials in original containers bearing manufacturer's name and brand. Use only one brand for material throughout job. Store materials within building in locations directed by General Contractor.

PART 2 PRODUCTS

2.1 SECURITY SCREWS

- A. All exposed fasteners in the project, including fasteners used in fabrication of project components, shall be security screws as specified herein, whether called for on the drawings or not, unless the components or location is specifically excluded by inclusion on the list below.
- B. Excluded Items and Locations:
 - 1. Mechanical, electrical, generator or electronic equipment rooms, including roof-mounted equipment.

2. Control rooms and attendant equipment in those rooms, except control panel.
 3. Above suspended ceilings, behind access panels and within pipe or duct chases.
 4. Kitchen, medical, property and laundry equipment.
 5. Shower doors or standard (porcelain) plumbing fixtures.
 6. Movable furnishings, storage shelving, cabinet hardware.
 7. Wall board screws.
 8. All areas not within the secure perimeter of the facility.
- C. All security screws shall be operable by tools produced for use on the specified security screws by manufacturer or other fabricators licensed by them.
- D. Security screw head style and plating shall be selected as appropriate for installation requirements, strength and finish of adjacent materials except that all screws in painted materials shall be stainless steel. Size and shape variation shall be such that no more than six different tools/wrenches are required for all security screws on projects.
- E. Types Allowed:
1. Pinned "Torx" head.
 2. Pinned "Allen" head.
- F. Provide three complete sets of tools required for all security screws on the project.

2.2 MANUFACTURERS

- A. Security screws may be obtained through the following dealers:
1. Tamper-Pruf Screws, Inc., Paramount, CA; 213-531-9364.
 2. Camcar Division of Textron, Inc., Rockford, IL; 815-226-7721.
 3. Safety Socket Screw Corporation, Chicago, IL; 312-763-2020.
 4. Bryce Fastener Company, Inc., Seattle, WA; 800-542-7031.
- B. Substitutions: Under provisions of Division 01.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation detention fasteners in accordance with the manufacturer's instructions.
- B. Check and adjust all operating mechanisms to insure proper function in accordance with the manufacturer's recommendation.

3.2 CLEAN-UP

- A. Clean work under provisions of Division 01.

END OF SECTION

SECTION 11 66 00
ATHLETIC EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Athletic Equipment.

1.2 RELATED SECTIONS

- A. Section 03 45 00 – Precast Concrete.
- B. Section 05 12 00 – Structural Steel Framing.

1.3 QUALITY ASSURANCE

- A. Installer's Qualifications: Installation shall be by manufacturer's authorized representative employing skilled mechanics thoroughly trained and experienced in this type of installation and who are completely familiar with the requirements of the work specified.
- B. All material and equipment shall be furnished by manufacturers regularly engaged in production of these items. Manufacturer's recommendations shall be followed in all cases for installation and conditions.
- C. Comply with all local, State or Federal codes and regulations. Manufacturer and manufacturer's representative shall have a minimum of prior ten successful jobs, similar in scope.
- D. The installer and/or manufacturer shall maintain a regular service facility within a 150 mile radius of the area in which the equipment installation is located.
- E. For convenience in identifying equipment items, manufacturer's catalog numbers are scheduled. Unless modified by Specifications or notation on Drawings, catalog description for indicated number shall constitute basic requirements for each item. Equipment shall incorporate all features set forth in catalog for standard item, except for such modifications thereto as may be indicated.
- F. Provide Manufacturer's standard one year warranty. Backboards provided with center strut attachment shall have manufacturer's limited lifetime warranty. Ultra Flex Goals shall have manufacturer's limited two year warranty.

1.4 SUBMITTALS

- A. Submit shop drawings under provisions of Division 01.
- B. Shop drawings shall include engineering design calculations and shall clearly show all pertinent dimensions, data, sizes and fastening requirements. Calculations shall be provided by a licensed California Structural Engineer. No fabrication or placing shall be started until the Architect has reviewed the shop drawings.
- C. Submit Maintenance Manuals under provisions of Division 01.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver to project site in manufacturer's original, unopened and undamaged packaging. Store in original packaging under protective cover and protect from damage. Handle materials in such a manner as to prevent damage to products or finishes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Porter Athletic Equipment Co.
- B. Draper, Inc.
- C. Substitutions: Under provisions of Division 01.

2.2 WALL MOUNT BACKSTOP WITH BACKBOARD AND GOAL

- A. Porter Model No. 01312-016.
 - 1. Backstop: Backstop shall be wall braced type with face of backboard extended 1 foot - 6 inches from supporting assembly. Extension frames shall be fabricated of three 1-7/8 inch outside diameter tubes. Both ends of extension frame assemblies shall terminate in heavy steel flanges for attachment to backside of backboard and wall pad attachments. Goal shall mount directly through backboard and into a heavy steel flange at the lower extension frame. Backstop shall be braced internally with 7/8 inch outside diameter steel tension braces attached at both ends with precision die-formed clamps for rigidity and support of the goal mount plate. Southern yellow pine wall pads shall be provided at all wall attachment points. All edges of wall pads shall be chamfered and finished with two finish coats of natural gloss lacquer. All metal parts shall be painted with one coat of flat black enamel paint.
 - 2. Backboard: Aluminum fan board shall be official size (54 by 39 inches) and shape, with orange perimeter and target area markings. Perimeter flange and structural rib pattern shall be 1-1/2 inch deep. Tensile strength of board shall be 8,900 psi – 11,700 psi. Goal mounting shall be reinforced with a 3/16 inch by 6 inch wide plated steel plate secured to backside of board. Eight 3/8 – 16 stainless steel threaded inserts shall be molded into backside of backboard at standard mounting centers.
 - 3. Goal: Double rim, continuous net support and heavy-duty side and center support gusset plates. Double rim shall be formed to an official 18 inch inside diameter with 5/8 inch diameter solid cold rolled steel bars. Rims shall be further supported by a continuous 3/16 inch by 1 inch steel net tie strip. Net support shall be precision die cut with twelve net attachment opening to eliminate breakage associated with conventional type wire formed net tie clips. Rims shall be supported by a heavy mounting backplate with formed side plates tangentially connecting into the net support strip for maximum strength. Center reinforcing steel gusset shall provide additional rim support. Mounting backplate shall be slotted to provide universal mounting centers from 5 by 5 inches to 5 by 4 inches. Orange powder-coat finish. Provide Grade 5 carriage bolts, mounting hardware and heavy-duty chain net.

2.3 COLUMN MOUNT BACKSTOP WITH BACKBOARD AND GOAL

A. Porter Model No. 00310-100.

1. Backstop: Backstop shall be designed and furnished with all necessary fittings and hardware to mount a fan-shaped backboard and goal on a tube steel column. System shall be furnished with special attachment assemblies equipped with precision, die-formed clamp fittings and all hardware for mounting to a tube steel column. Attachment assemblies shall be finished with one coat of black enamel paint. Backboard shall be secured to system with upper backboard extension assembly and lower center strut weldment. Goal shall mount directly through the backboard and into a heavy steel flange center strut at the lower attachment assembly to eliminate any strain on the backboard.
2. Backboard: Aluminum fan board shall be official size (54 by 39 inches) and shape, with orange perimeter and target area markings. Perimeter flange and structural rib pattern shall be 1-1/2 inch deep. Tensile strength of board shall be 8,900 psi – 11,700 psi. Goal mounting shall be reinforced with a 3/16 inch by 6 inch wide plated steel plate secured to backside of board. Eight 3/8 – 16 stainless steel threaded inserts shall be molded into backside of backboard at standard mounting centers.
3. Goal: Double rim, continuous net support and heavy-duty side and center support gusset plates. Double rim shall be formed to an official 18 inch inside diameter with 5/8 inch diameter solid cold rolled steel bars. Rims shall be further supported by a continuous 3/16 inch by 1 inch steel net tie strip. Net support shall be precision die cut with twelve net attachment opening to eliminate breakage associated with conventional type wire formed net tie clips. Rims shall be supported by a heavy mounting backplate with formed side plates tangentially connecting into the net support strip for maximum strength. Center reinforcing steel gusset shall provide additional rim support. Mounting backplate shall be slotted to provide universal mounting centers from 5 by 5 inches to 5 by 4 inches. Orange powder-coat finish. Provide Grade 5 carriage bolts, mounting hardware and heavy-duty chain net.

PART 3 EXECUTION

3.1 CONDITION OF SURFACES

- A. Examine all framing, grounds, and blocking required to secure backstops. Coordinate work of this section with work of other Sections to assure proper location of all solid blocking. Do not proceed with the work of this Section until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install all products specified in this Section per the manufacturer's recommendations.
- B. Backstops shall be installed and fastened in place in accordance with manufacturer's printed instructions and in accordance with CBC requirements.
- C. Final Adjustment: Check backstop installation for correct rigidity of main frame installation. Any movement not permitted by the manufacturer shall be additionally braced to comply with the manufacturer's permitted tolerances.
- D. Defective Work: Remove and replace all defective work that cannot be properly repaired, cleaned or touched-up, as directed by the Architect, with no additional cost to the Owner.
- E. Protect the installed work against damage from other construction.

3.3 CLEAN UP

- A. Upon completion of the work of this Section, remove all surplus materials, rubbish and debris from the premises.
- B. Cleaning and Finishing: Upon completion, clean all exposed surface, removing any discoloration or foreign matter. Touch-up abraded or cut areas and exposed edges with finishing material recommended by the manufacturer. Touch-up shall not be obvious.

END OF SECTION

DIVISION 12
FURNISHINGS

SECTION 12 21 13
HORIZONTAL LOUVER BLINDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Horizontal slat louver blinds with valance.
- B. Operating hardware.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 09 29 00 – Gypsum Board.

1.3 SUBMITTALS

- A. General: Submit under provisions of Division 01.
- B. Submit shop drawings indicating opening sizes, tolerances required, installation of blind at window opening, method of attachment, clearances and operation.
- C. Submit product data under provisions of Division 01.
- D. Submit product data indicating physical and dimensional characteristics and operating features.
- E. Submit two samples 6 inches long illustrating slat materials and finish and color.
- F. Submit manufacturer's installation instructions.

1.4 SYSTEM DESCRIPTION

- A. Horizontal metal slat louver blinds installed at window openings, manual control of raising and lowering by cord; blade angle adjustable by control wand.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing the products specified in this Section.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Deliver blinds wrapped and crated in a manner to prevent damage to components or marring of surfaces.
- C. Store and protect products under provisions of Division 01.
- D. Store in a clean, dry area, laid flat and blocked off ground to prevent sagging, twisting or warping.

1.7 EXTRA MATERIALS

- A. Furnish ten additional slats under provisions of Division 01.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Spring Window Fashions, Product: Bali® Classics™ 1 inch Mini Blind.
- B. Hunter-Douglas Contract.
- C. Levolor Contract.
- D. Substitutions: Under provisions of Division 01.

2.2 MATERIALS

- A. Louver Slats: Slats shall be aluminum alloyed for maximum strength, flexibility and resistance to corrosion. Slats shall be nominally 1 inch wide and 8 gauge minimum thickness. Slats shall have a pre-coating treatment to bond the polyester baked enamel finish coat that features Advanced Finishing Technology (AFT) which provides a smoother, harder, less porous surface that provides anti-static performance to help repel dust and anti-microbial qualities to help resist fungal and bacterial growth.
- B. Steel Channel Headrail: "U" shaped 1-inch by 1-1/2 inches deep channel shall measure 0.025 inch thick and be fabricated from phosphate treated steel with rolled edges at top and with prime coat of vinyl primer and finished coat of polyester baked enamel to match bottomrail and end support brackets and to coordinate with slats. Headrail shall be roll-formed.
- C. Head Channel Hardware: Hardware shall be acetal low friction thermoplastic and guide lift cords and ladders in the head channel preventing wear and discoloration. Operating hardware shall be mechanically locked into head channel, by means of snap-in fittings with no mechanical cleats visible from underside of headrail.
- D. Enclosed Metal Bottomrail: Completely enclosed tubular shape, phosphate treated steel with prime coat of vinyl primer and finished coat of polyester baked enamel matching headrail and coordinating with slat color. Bottomrail shall be roll-formed with locking groove to receive dust cover. Thermoplastic protective caps in bottom of rail shall be used to secure ladder ends and assure window sill protection. Hold-down bracket pins shall be available. Bottomrail shall measure 0.025 inch thick.
- E. Tilt Rod Support: Tilt rod support shall be acetal low friction thermoplastic and shall support tilt rod. It shall provide a smooth bearing and center the ladder drum over ladder hole. Incorporated with tilt rod support shall be a grommet guide to guide lift cord and braided ladder through bottom of headrail. Acetal grommet shall have beveled edges to prevent cord and braided ladder wear and discoloration.
- F. Ladder Drum: Shall be injection molded thermoplastic with smooth hole edges to position ladder. Ladders shall be securely attached by means of a snap down top, eliminating the need for braided ladder clips.

- G. Cord Lock: Cord lock shall be of a snap-in design and incorporate a stainless steel wear guard over which cords pass and a floating shaft-type locking pin. Locking pin shall be free of abrasive teeth and offer minimum wear to cord. Cord lock shall incorporate a "crash-proof" safety feature that shall lock blind automatically upon release of cord. End of lift cords shall be treated with plastic tassels.
1. Cord Guide: Cord guide shall be nickel plated steel and shall guide and center lift cords into cord lock opening.
 2. Ring Pull: When supplied with a standard nominal 4 inch cord length, a single ring shall be attached to two and four cord blinds. Non-standard lengths of 8 inches or greater shall have a joiner ball located nominally 4 inches from the headrail and shall have two separate cords coming down from the joiner ball, each with a separate ring, to the specified non-standard length.
- H. Shaft Type Tilter: The tilter shall be of a worm and gear arrangement in a totally enclosed gear case (housing). The worm shall be of clear polycarbonate, the gear of nylon and the gear housing of acetal thermoplastic. The tilter shall be designed for smooth low friction operation and shall incorporate a clutch mechanism to eliminate damage due to over tilting. Tilter shall be a snap-in component allowing for field removal if required.
1. Tilt Wand: The tilt wand shall be a clear polycarbonate hollow rod, with a hexagonal shape measuring approximately 1/4 inch across the points, providing a positive, comfortable grip. The wand shall hang vertically by its own weight and should be of sufficient length for easy access and operation. Wand shall be attached to the tilter shaft by means of a spring clip and shall be easily detached and reattached in the field.
- I. Hexagonal Tilt Rod: Tilt rod shall be electro-zinc coated solid steel. Tilt rod shall be hexagonal in cross-section measuring 1/4 inch at its widest points. Tilt rod shall limit torsional deflection to six degrees in a 30 inch test length with a torque application of one-foot pound.
- J. Braided Ladders: Slat supports shall have braided ladder which will assure proper control with adequate overlap of slats in the closed position. Distance between end ladder and end of slats will not exceed 6-1/2 inches; distance between braided ladders shall not exceed 24 inches.
1. Braided Ladder Material: Material shall be 100 percent high tenacity polyester yarn. Vertical component shall be not less than 0.045 inch diameter nor greater than 0.066 inch diameter, and shall provide maximum strength and flexibility with minimum stretch. Horizontal component, or rungs, shall be not less than two threads and shall be approximately 31.0 mm long. Ladders shall be of sufficient length for bottom of blind to hang with a tolerance of plus one half/minus zero inches of the specified length. Standard ladder shall provide 20 mm minimum distance between the slats. Ladders shall be dyed to manufacturers color standard.
- K. Lift Cords: Lift cords shall be braided with polyester jacket and center core. Size of cord shall be 1.4 mm. Cords shall be detachable, if required, and shall be of sufficient length to properly control the raising or lowering of the blind. Lift cords shall be equipped with plastic tassels. Cord shall be securely anchored to the bottomrail and it shall be possible to detach and attach cords. Cording arrangements shall comply with assembly standards set for the size and weight of the blind. Cords shall be dyed to manufacturers color standard.

- L. Cord Lock and Tilter Operation Locations: Blinds shall be made with the following cord lock and tilter location options when viewed from within the room:
 - 1. Tilter at left, cord lock at right.
- M. End Support Brackets: Standard hinged cover end support brackets of phosphate treated steel with prime coat of vinyl primer and finished coat of polyester baked enamel in color to match headrail. Brackets shall be marked left and right to facilitate installation and shall have 1-1/4 inch extra wide top to accommodate power screwdriver. Brackets shall facilitate easy removal of head channel. Each bracket shall be installed with a minimum of two installation screws. Optional turn clip pivot brackets shall be provided for mounting headrail of blind within extruded aluminum blind pockets.
- N. Intermediate Support Brackets: Brackets shall be furnished for blinds over 48 inches wide. Maximum spacing for intermediate support brackets shall be 48 inches wide.
- O. End Stiffeners:
 - 1. To add rigidity to the headrail, electroplated steel end stiffeners shall be inserted at each end of the headrail.
 - 2. To eliminate lateral movement and to center the blind in the window, each end stiffener shall have a lateral adjustment tab.
- P. General: Blinds shall be free of sharp edges, burrs or other defects.
- Q. Accessory Hardware: Type recommended by blind manufacturer.
- R. Fabrication: Fabricate blinds to fill openings from head to sill and jamb to jamb. Locate blind divisions at mullions.

2.3 FACTORY FINISHING

- A. Blind Slat and Head Rail Housing: Color as selected by Architect.
- B. Cord and ladder color to match slats and rail color.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that openings are ready to receive the work.
- B. Do not commence fabrication until field measurements are confirmed.
- C. Ensure structural supports are correctly placed.
- D. Beginning of installation means installer accepts existing surfaces.

3.2 INSTALLATION

- A. Install blinds in accordance with manufacturer's instructions.
- B. Place controls for most accessible location.
- C. All lift cords and tilt wands shall be of sufficient length to be accessible from a maximum of 48 inches above the finished floor.

D. Secure in place with concealed fasteners.

3.3 TOLERANCES

A. Maximum Variation of Gap at Window Opening Perimeter: 1/4 inch.

B. Maximum Offset From Level: 1/8 inch.

3.4 ADJUSTING

A. Adjust blinds for smooth operation.

3.5 CLEANING

A. Clean work under provisions of Division 01.

END OF SECTION

SECTION 12 24 13
ROLLER WINDOW SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Manually Operated Roller Window Shades.
- B. Electric Motor Operated Roller Window Shades.
 - 1. Local group and master control system for shade operation.

1.2 RELATED SECTIONS

- A. Section 05 40 00 – Cold-Formed Metal Framing.
- B. Section 08 41 13 – Aluminum-Framed Entrances and Storefront.
- C. Section 09 29 00 – Gypsum Board.
- D. Division 26 – Electrical.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. AAMA 2603 – Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 - 2. ASTM G21 – Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.
 - 3. NFPA 70 – National Electrical Code.
 - 4. NFPA 701 – Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.
 - 5. NFPA 703 – Standard for Fire-Retardant Treated Wood and Fire-Retardant Coatings for Building Materials.

1.4 SUBMITTALS

- A. General: Submit in accordance with Division 01.
- B. Product Data: Submit manufacturer's descriptive literature and product specification for each product.
 - 1. Preparation instructions and recommendations.

2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes, and operating instructions.
 3. Storage and handling requirements and recommendations.
 4. Submit Environmental Certification and Third Party evaluation for Solar Shade Cloth Fabric.
 - a. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified below. Materials that are PVC-free without identifying their inputs shall not qualify as meeting the intent of this specification.
 - b. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, and have been evaluated for human and environmental safety. Identify any and all inputs which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Identify items that are toxic to aquatic systems, contain heavy metals, or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet applicable fire codes and regulations.
 - c. Recycling Characteristics: Provide documentation that the shade cloth is part of a closed loop of perpetual use and not be required to be down-cycled, incinerated, or otherwise disposed of. Scrap material shall be capable of being sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material without down-cycling. Certify that this process is currently available and will be utilized for this project.
 - d. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yard for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.
- C. Shop Drawings:
1. Provide plans, elevations, sections, product details, installation details, operational clearances, and relationship to adjacent work.
 2. Provide window treatment schedule for all roller shades. Use same room designations as indicated on Drawings and include opening sizes and key to typical mounting details.
 3. Provide wiring diagrams including integration of motor controllers with applicable building control systems.
- B. Samples:
1. Submit complete roller shade assembly showing component parts.
 2. Selection of metal component finishes.
 3. Selection of shade and blackout fabric colors, weaves, and types.
- C. Manufacturer's Operation and Maintenance Instructions: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, and instructions for operating hardware and controls.

1.5 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of ten years experience in manufacturing products comparable to those specified in this Section.
2. Supplier Qualifications: The manufacturer or its subsidiary or licensed agent approved to supply products of this Section and honor any claims against the product presented in accordance with the warranty.
3. Installer Qualifications: Firm specializing in installing work specified in this Section acceptable to manufacturer with documented experience on at least five projects of similar nature in past three years.

B. Electrical components shall be labeled by UL, ETL, or other testing agency acceptable to Authority Having Jurisdiction, marked for intended use, and tested as a system.

C. Fabric Anti-Microbial Characteristics: No Growth per ASTM G21 results for fungi ATCC9642, ATCC 9644, and ATCC 9645.

D. Field Samples: Provide large size sample of selected fabric for final verification of color, weave, and density as directed by Architect.

E. Pre-Installation Meetings:

1. Conduct pre-installation meeting in accordance with provisions of Division 01.
2. Convene pre-installation meeting one week prior to commencing work of this Section.
3. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Division 01.

B. Deliver products when all concrete, masonry, plaster, painting, and other wet work has been completed and dried.

C. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.

D. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings.

E. Store materials in a dry secure place. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Solar shade cloth and blackout fabric shall be PVC-free.

B. Maintain ambient temperature between 60 degrees F and 85 degrees F and relative humidity between twenty percent and fifty percent 24 hours before installation and maintain until Owner's final acceptance.

C. Condition products at designated work areas 24 hours before installation.

1.8 WARRANTY

- A. Comply with provisions of Division 01.
- B. Warrant installed units to be free from defects in material and workmanship as follows:
 - 1. Manual Roller Shade Hardware, Chain, and Blackout Fabric: Manufacturer's standard non-depreciating twenty-five year limited warranty
 - 2. TPO Solar Shadecloth: Manufacturer's standard non-depreciating ten year limited warranty.
 - 3. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five-year warranty.
 - 4. Roller Shade Installation: One year.
- C. In the event a warranted product or component fails, facilitate materials replacement at no cost to the Owner under the provisions of Division 01.

1.9 MAINTENANCE

- A. Operations and Maintenance Data:
 - 1. Comply with requirements of Division 01.
 - 2. Include operation and cleaning information.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. MechoSystems, Inc., Long Island City, NY; phone: 925.605.9068, URL: <http://www.mechosystems.com>.
 - 2. Nysan Shading Systems, Calgary, AB Canada, phone: 403.204.8675, URL: <http://www.nysan.com>.
 - 3. Draper, Inc., Spiceland, IN; phone: 800-238-7999, URL: <http://www.draperinc.com>.
- B. Substitutions: Under provisions of Division 01.

2.2 MANUALLY OPERATED WINDOW SHADES

- A. Manufacturers and Products:
 - 1. MechoSystems, Inc. Product: Mecho/5.
 - 2. Nysan Shading Systems. Product: Manual Chain Operated Shades.
 - 3. Draper, Inc. Manual FlexShade Systems.
 - 4. Substitutions: Under provisions of Division 01.
- B. Manual operated tubular roller shades: Provide brackets for mounting conditions indicated on Drawings.
- C. Roller Tube:
 - 1. Extruded aluminum alloy roller tube.

2. Diameter: Sufficient diameter and thickness to prevent excessive deflection.
- D. Operator and Clutch/Brake Mechanism: Manual operated chain and sprocket system with a bi-directional clutch/brake mechanism designed to hold shade fabric at any position.
- E. Chain: No. 10 stainless steel 90 pound test ball chain with connector and upper and lower ball stops. Provide wall mounted pulley wheel at bottom of chain to keep chain tracking straight and in-line during operation. Provide locking chain clips at each chain.

2.3 MOTOR OPERATED WINDOW SHADES

- A. Manufacturers and Products:
 1. MechoSystems, Inc. Product: Electro/2.
 2. Nysan Shading Systems. Product: Motorized Roller Shades.
 3. Draper, Inc. Product: Motorized FlexShade Systems.
 4. Substitutions: Under provisions of Division 01.
- B. Motor operated tubular roller shades: Provide brackets for mounting conditions indicated on Drawings.
- C. Roller Tube:
 1. Provide double rollers at motorized roller shades.
 2. Extruded aluminum alloy roller tube.
 3. Diameter: Sufficient diameter and thickness to support shade fabric without excessive deflection. Minimum 2.50 inch diameter for widths up to 120 inches.
- D. Motors:
 1. UL listed asynchronous capacitor start and run with built-in thermal overload protection and limit switch adjustments.
 2. Addressable 'intelligent' motors capable of up to eight group (zone) assignments without the need for additional outboard shade controllers.
 3. Quiet operation: Less than 46db in 3 feet of open air, across all lift capacities necessary for project.
 4. 110/120 Volts, 60 Hz, single phase.
 - a. Switches shall operate at 24 Volts.
 5. Motors shall be totally enclosed within the roller tube.
 6. Motors must include built-in dry-contact interface capabilities.
 7. Total hanging weight of shade fabric shall not exceed 80 percent of motor's lifting capacity.

2.4 MOTOR CONTROLS

- A. Group Control System: Microprocessor controlled, programmable for unlimited intermediate stop positions and navigable sub grouping capabilities without need for rewiring. This system must be network capable and able to operate from local switching alone.

2.5 SHADE FABRIC

A. Manufacturers and Products:

1. MechoShade, Product: EcoVeil 1550 Series, 100 percent thermoplastic olefin, basketweave pattern with 3 percent openness factor.
2. Nysan, Product: Phifer Sheerweave Infinity 2 3%.
3. Draper Inc., Product: Phifer SheerWeave Infinty2 3%.
4. Substitutions: Under provisions of Division 01.

B. Visually transparent non-raveling shade fabric.

C. Shade fabric shall be PVC-free. All fabrics shall be TPO based; 'PVC-free' alone will not qualify for consideration.

D. Characteristics:

1. Meet or exceed requirements of NFPA 701.
2. Washable, colorfast and fade resistant.
3. Color: As indicated on Drawings.

2.6 BLACKOUT FABRIC

A. Manufacturers and Products:

1. MechoShade, Product: Equinox 0100 Series.
2. Nysan, Product: SuperSol.
3. Draper Inc., Product: SW7000.
4. Substitutions: Under provisions of Division 01.

B. First quality materials with no pinholes, breaks, or cracks.

C. Blackout fabric shall be PVC-free.

D. Characteristics:

1. Meet or exceed requirements of NFPA 701 and 703.
2. Thickness: 16 mils minimum.
3. Weight: 11 ounces per square yard minimum.
4. Openness Factor: 0 percent (total blackout). Will not admit light.
5. Washable, colorfast and fade resistant.
6. Fungal and Bacterial Resistance. No growth result as per ASTM G21.
7. Color: As indicated on Drawings.

2.7 ACCESSORIES

A. Fascia:

1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
2. Fascia shall be able to be installed across two or more shade bands in one piece.

3. Fascia shall fully conceal brackets, shade roller, and fabric on the tube.
4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
5. Notching of fascia for manual chain will not be acceptable.

B. Room Darkening Side and / or Sill Channels:

1. Extruded aluminum with polybond edge seals and snap lock mounting brackets with concealed fastening. Exposed fastening is not acceptable. Channels shall accept one-piece exposed blackout hembar with vinyl seal to assure side light control and sill light control.
2. Motorized shade side channels, 2-1/2 inches wide by 1-3/16 inches deep; two-band center channels 5 inches wide by 1-3/16 inches deep. The 2-5/8-inch double-center channels may be installed at center-support positions of multi-band-shade motorized shades.
3. Color: Selected by Architect from manufacturer's standard colors.

2.8 FINISH

A. Extruded Aluminum (panels, fascias, covers, bars, and channels):

1. Standard baked enamel paint finish. Colors selected by Architect from manufacturer's standard colors.

B. Shade Fabric: Type and color as selected by the Architect from samples submitted.

C. Blackout Fabric: Type and color as selected by the Architect from samples submitted.

2.9 FABRICATION

- A. Take accurate field measurements to verify required dimensions prior to fabrication.
- B. Fabricate fabric to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or reveling.
- C. Fabricate unguided fabric to roll true and straight without shifting sideways more than 1/8 inch in either direction for every eight feet of shade height due to warp distortion or weave design.
- D. Fabricate with bottom hem weights as needed or exposed hem bar with light seal as applicable.
- E. Railroading of solar fabrics will not be allowed, except by permission of the Architect during submittal phase.
- F. Provide battens in standard shades as required to assure proper tracking and uniform rolling of fabric.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrate conditions and dimensions. Verify if substrate is ready and acceptable to receive window shade system.

- B. Report unacceptable conditions to the Architect. Begin installation only when unacceptable conditions have been corrected.

3.2 INSTALLATION

- A. Install in accordance with manufacturer's printed instructions and approved shop drawings.
- B. Install units plumb, level, and square, and free from warp or twist while maintaining dimensional tolerances and alignment with adjacent surfaces.
- C. Make low voltage electrical control connections as required. All line and low voltage wire runs and line voltage terminations shall be made by a licensed electrician and will be the responsibility of Division 26 contractors. Shade contractor shall provide all wiring diagrams.
- D. Installation Tolerances:
 - 1. Maximum variation of gap at window opening perimeter: 1/4 inch per 8 feet of shade height.
 - 2. Maximum offset from level: 1/16 inch per 5 feet of shade width.

3.3 ADJUSTING

- A. Adjust parts for smooth, uniform operation.
- B. Adjust shade assembly and fabric to hang flat without buckling and distortion.
- C. Replace any units or components, which do not hang properly or operate smoothly at no additional cost to Owner.

3.4 CLEANING

- A. Clean exposed surfaces, including metal and fabric using non-abrasive materials and methods as recommended by manufacturer.
- B. Do not use materials or methods, which may damage finish or surrounding construction.
- C. Remove and replace work which cannot be satisfactorily cleaned at no additional cost to Owner.

END OF SECTION

SECTION 12 31 00

STAINLESS STEEL COUNTERTOPS AND CABINETS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Stainless steel casework.

1.2 RELATED SECTIONS

- A. Section 06 41 00 – Architectural Wood Casework.
- B. Section 07 92 00 – Joint Sealants.
- C. Division 22 – Plumbing.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ASTM A276 – Standard Specification for Stainless Steel Bars and Shapes.
 - 2. ASTM A666 – Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate and Flat Bar.

1.4 SUBMITTALS

- A. Shop Drawings: Provide 3/4 inch = 1 foot – 0 inch scale drawings of countertop work surfaces including plan views and cross sections, rough-in and anchor placements, tolerances and clearances. Indicate relation of units to casework base units, sinks, surrounding walls, windows, doors and other building components.
- B. Product Data: Submit manufacturer's data for each item specified. Include component dimensions, configurations, construction details, joint details, attachments, utility and service requirements and locations.
- C. Product Samples: Five 6 inch by 6 inch samples of stainless steel in type and finish specified.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Schedule delivery of countertop work surfaces so that spaces are sufficiently complete that material can be installed immediately following delivery.
- B. Protect finished surfaces from soiling or damage during handling and installation. Keep covered with polyethylene film or other protective coating.

- C. Protect all work surfaces throughout construction period with 1/4-inch corrugated cardboard completely covering the top and securely taped to edges. Mark cardboard in large lettering "No Standing".

1.6 PROJECT CONDITIONS

- A. Do not deliver or install equipment until the following conditions have been met:
 - 1. Windows and doors are installed and the building is secure and weather tight.
 - 2. Ceiling, overhead ductwork and lighting are installed.
 - 3. All painting is completed.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Thermo Fisher Scientific, Two Rivers, WI, 920-794-6800.
 - 2. Jamestown Metal Products, Inc., Jamestown, NY, 716-665-5313.
 - 3. Substitutions: Under provisions of Division 01.

2.2 MATERIALS AND FABRICATION

- A. Stainless Steel Casework:
 - 1. Counter Tops, Backsplashes, and Cabinets:
 - a. Bars and Shapes: ASTM A276, Type 304; AISI No. 4 satin finish.
 - b. Sheet Material: ASTM A666 Type 304 stainless steel; 18 gauge unless otherwise noted below; AISI No. 4 satin finish; grain direction shall be horizontal.
 - 1) Leg stretcher and leg rail support brackets: 11 gauge.
 - 2) Bottom corner gussets: 12 gauge.
 - 3) Hinge reinforcements and suspension channels: 14 gauge.
 - 4) Cross rails, apron rails, and end rails: 16 gauge.
 - 5) Inner door panels, filler stiles, fixed back panels, and drawer bodies: 14 gauge.
 - 6) Back panels: 14 gauge.
 - c. Configuration: As indicated on Drawings.
 - d. Tops: Form tops with 1 inch lip and 1/2 inch return flange, with 16 gauge reinforcing applied to underside as required for rigidity and sound dampening. Coat underside with sound dampening material.
 - 1) Sound Dampening Material: Waterborne, non-flammable, with flame retardant clay, with no VOCs; film thickness of 20 mils.
 - 2) Provide integral 4 inch high stainless steel backsplash. Form edges, flanges, and backsplashes integrally with top, from one sheet of metal.

e. Cabinets:

- 1) Flush Inset Construction: Surface of doors, drawers, and panel faces shall align with cabinet fronts without overlap of case ends, top, or bottom rails. Horizontal and vertical case shell members (panels, tops, rails, and bottoms) shall meet in the same plane without overlap.
- 2) Units shall have a load capacity of 500 pounds per lineal foot.
- 3) Units shall have a completely welded shell assembly without applied panels at ends, backs, or bottoms.
 - a) End panels and back shall be one piece formed with internal reinforcing front posts.
 - b) Front post shall be fully closed with full height reinforcing upright.
 - c) Tall cabinet units shall have full formed backs, recessed 1/8 inch for mounting purposes.
 - d) Bottom shall be one piece with formed front edge spot welded to front rail, rabbeted as required for drawers and swinging doors.
 - e) Top rail shall interlock with and be welded to end panels, flush with front of unit.
 - f) Formed base shall provide a minimum 3-3/4 inches high by 3 inch deep toe-kick space.
- 4) Doors:
 - a) Units less than 30 inches wide shall have one hinged door.
 - b) Units 30 inches and wider shall have two hinged doors.
 - c) Solid Panel Doors: 5/8 inch thick, double wall construction, telescoping box construction with interior sound deadening, outer corners fitted smooth. Doors shall close against rubber bumpers.
- 5) Drawers:
 - a) Drawer Fronts: 3/4 inch thick, double wall construction, assembled with sound deadening honeycomb; top front corners fitted smooth.
 - b) Drawer Bodies: Stainless steel bottom and all sides formed into one-piece construction with all sides coved; formed top edges.
 - c) Drawer Suspension: Removable full extension ball bearing drawer guides with minimum load rating capacity of 150 pounds static, 100 pounds dynamic.
 - d) Provide rubber bumpers to prevent metal-on-metal contact.
- 6) Shelves:
 - a) Stainless steel with front and back edges formed down and back one inch; ends formed down 3/4 inch; adjustable in 1/2 inch increments.
 - b) Shelf clips shall be die formed steel, zinc plated.
- 7) Hardware:
 - a) Hinges: Stainless steel five knuckle hospital type; frictionless; not less than two inches long with fast pin and rounded ends. Minimum two hinges per door; doors over 36 inches in height shall have a minimum of three hinges.
 - b) Pulls: Stainless steel bar type; 4 inch centers.

- c) Locks: Five disk tumbler cam type.
- 2. Fabrication:
 - a. Fabricate and assemble casework components at the shop to the maximum extent possible.
 - b. Closely fit casework at site. Provide filler inserts and trim where necessary, scribe for a tight fit.
 - c. Provide cutouts for inserts and fittings where indicated. De-burr and polish surfaces of cut edges.
 - d. Joints:
 - 1) Shop Joints: Electrically welded, ground smooth and polished to match exposed surfaces.
 - 2) Field Joints: Mechanically bolted and supported full length, resulting in a hair line seam with flat, level surfaces each side of joint.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Work surface installation:
 - 1. Where required due to field conditions, scribe to abutting surfaces.
 - 2. Only factory prepared field joints, located per approved shop drawings, shall be permitted. Secure joints in field, where practicable, in the same manner as in factory, with dowels, splines, adhesive or fasteners recommended by manufacturer.
 - 3. Secure work surfaces to casework and equipment components with material and procedures recommended by the manufacturer.
- B. Sink installation: Sinks which were not factory installed shall be set in chemical resistant sealing compound and secured and supported per manufacturer's recommendations.
- C. Accessory installation: Install accessories and fittings in accordance with manufacturer's recommendations. Turn screws to seat flat; do not drive.

3.2 ADJUSTING

- A. Repair or remove and replace defective work, upon completion of installation.

3.3 CLEANING

- A. Clean shop finished casework, repair as required. Repairs shall not be obvious.
- B. Clean countertops with diluted dishwashing liquid and water leaving tops free of all grease and streaks. Use no wax or oils.

3.4 PROTECTION OF FINISHED WORK

- A. Provide all necessary protective measures to prevent exposure of casework and equipment to damage by other construction activity.

END OF SECTION

SECTION 12 55 00
DETENTION FURNISHINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Dayroom tables and seats.
- B. Classroom workbenches.
- C. Wall mounted bunks.
- D. Wall mounted mirrors.
- E. Recessed shelves at bunks.
- F. Security grab bars.
- G. Floor mount benches.
- H. Floor mount stools.
- I. Wall hung desk.
- J. Telephone pedestal.
- K. Video/voice cabinets.
- L. Pistol lockers.
- M. Key cabinets.
- N. Speaking ports.
- O. Pass hoppers.
- P. Toilet paper holders.
- Q. Gun port / tactical device deployment port.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 04 22 00 – Concrete Unit Masonry.
- C. Section 11 19 00 – Detention Equipment Contractor.
- D. Section 11 19 23 – Detention Fasteners.

1.3 SUBMITTALS

- A. Submit under provisions of Division 01.

B. Shop Drawings

1. Indicate fabrication, materials, installation details, finishes, and required anchoring, fasteners, and hardware for each product specified in this Section.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver products to site under provisions of Division 01.
- B. Store in manufacturer's original unopened containers and packaging. Protect from damage. Handle products to prevent damage to products or finishes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Norix Group, Inc.
2. Lyon Workspace Products, LLC.
3. Acorn Engineering Company.
4. Telecom Products, Inc.
5. Viking Products.

B. Substitutions: Under provisions of Division 01.

2.2 DAYROOM TABLES AND SEATS

A. Norix Group, Inc. Max-Master Table Model No. MX5400-6-GT, (six-seat round) dayroom tables and seats with game tops.

1. Table Tops:
 - a. Six Seat Table Top: 54 inches diameter, 45 pound density particle board with permanently embedded T-nuts for securing top to base. Finish shall be Wilsonart Titanium Evolve #4810-60 high pressure plastic laminate with black Slammer Stone radiused edges and Nu-Stone checkerboard inlay game top.
2. Seats: 12 inches diameter, one piece, 14 gauge Type 304 stainless steel with #4 brushed finish. Provide 1-1/2 inch drop edge and stainless steel mounting studs.
3. Base: 3 inch diameter, 14 gauge steel tubing with 6 inch x 6 inch x 1/4 inch thick steel mounting plates for top and seats. Provide powder coat paint finish.
4. Installation: Tamper-resistant bolt-down system.

B. ADA Compliance: One table unit within each housing unit shall omit one seat at six seat table to accommodate a disabled inmate.

2.3 CLASSROOM WORKBENCHES

A. Flared-Leg Workbench: Lyon Workspace Products, LLC, Model 2618 and model 2540 pre-engineered steel leg work benches.

1. Leg assembly: Heavy channel flared steel, 32-1/4 inches tall.
 - a. Color: As selected by Architect from manufacturer's standard colors.

2. Tops: Laminated hardwood, 1-3/4 inches thick, 28 inches deep, 96 inches wide (Model 2618) and 60 inches wide (Model 2540).
3. Assemble table units using tamper-proof fasteners.

2.4 WALL MOUNTED BUNKS

A. Norix Group, Inc. Model No. B525-EXXX-001 wall mounted bunk.

1. Overall Size: 30.605 inches wide x 84 inches long.
2. Pan Size: 30 inches wide x 80 inches long.
3. Materials:
 - a. Pan: 10 gauge steel.
 - b. End Cap: 12 gauge steel.
 - c. Mounting Plate: 0.375 inch thick x 12 inch high steel.
 - d. End Rails: 2 inch x 4 inch x 1/4 inch steel tube.
 - e. Front Rail: 2 inch x 2 inch x 3/16 inch steel tube.
 - f. Embedded Wall Plate: By others.
4. Finish: Powder coat paint finish; color: grey.

2.5 WALL MOUNTED MIRRORS

A. Norix Group, Inc. Model No. R565-411 wall mounted stainless steel mirror.

1. Overall Size: 17-1/4 inches high x 11-1/4 inches wide.
2. Materials: 18 gauge Type 430 stainless steel with #8 finish; mirror surface highly polished.
3. Provide countersunk holes for tamper resistant stainless steel fasteners.

2.6 RECESSED SHELVES AT BUNKS

A. Acorn Engineering Company, Model No. 1820 stainless steel recessed shelf.

1. Overall Size: 7 inches high x 18 inches wide. Depth for wall thickness up to 4-1/4 inches.
2. Opening Size: 5 inches high by 16 inches wide.
3. Materials: Type 304 stainless steel with #4 satin finish.
4. Provide welded anchor nuts at back of shelf to receive threaded studs.

2.7 SECURITY GRAB BARS

A. Norix Group Inc., Model No. IGS-42 grab bars, 42 inches long and Model No. IGS-36 grab bars, 36 inches long.

1. Flanges: 11 gauge, 3-1/8 inch diameter, Type 304 (18-8) stainless steel with #4 brushed finish.

2. Tubing: 18 gauge, 1-1/2 inch outside diameter, seamless Type 304 (18-8) stainless steel with #4 brushed finish. Bent ends of tubing pass through the flanges and shall be heliarc welded into a single structural unit for maximum strength. Intermediate supports shall be contour cut and joined by heliarc welding to form an integral part of the grab bar. All welds shall be ground and polished to blend. Fabricate using mandrel bending process to maintain uniform bar diameter. Returns shall provide 1-1/2 inch minimum clearance between wall and bar.
3. Closure Plate: 11 gauge, Type 304 (18-8) stainless steel with #4 brushed finish, heliarc welded to edge between tube and wall.
4. Fasteners: Stainless steel, torx-head mounting screws.

2.8 FLOOR MOUNT BENCHES

- A. Norix Group, Inc. Model Nos. IBF-48 steel floor bench (no cuff rings).
 1. Overall Size: 18 inches high x 18 inches wide x 48 inches long.
 2. Materials: 12 gauge stainless steel seating surface with 1/8 inch thick steel legs.
 3. Finish: Powder coat paint system on legs.

2.9 FLOOR MOUNT STOOLS

- A. Norix Group, Inc. Model No. S561-120, 12 inches diameter, 14 gauge Type 304 stainless steel seat with #4 finish and 18 inch high, 14 gauge, 2-1/2 inch diameter steel tube post welded to 6 inch x 6 inch x 1/4 inch steel plates. Steel components shall receive baked-on epoxy powder coat paint finish.

2.10 WALL HUNG DESK

- A. Norix Group, Inc. Model No. DS560-400 Wall hung fully enclosed, tamper-resistant cell desk.
 1. Overall Size: 20 inches wide x 16 inches deep x 10 inches high at wall.
 2. Material: 16 gauge, type 304 stainless steel, #4 finish.

2.11 TELEPHONE PEDESTAL

- A. Telecom Products, Inc., Inmate Pedestal, or accepted equal, for attachment of inmate telephone.
 1. Size: 10 inches wide by 10 inches deep by 55.5 inches height.
 2. Material: 1/8-inch solid steel construction.
 3. No entry points for inmates.
 4. Finish: Black powdercoat.

2.12 VIDEO/VOICE CABINETS

- A. Norix Group Inc., Model No. LEWON1 wall mounted enclosed cabinets at attorney visitation and LEWON Series wall mounted enclosed cabinets at public visitation in unit numbers/gangs to best fit quantity shown on Drawings.
 1. Materials:
 - a. Sides and Writing Surface: Heavy-duty graffiti-resistant Wilsonart high pressure plastic laminate on 45 pound density particle board. Provide glued-on black T-mold vinyl edging on panel edges.

- b. Top and Face Plate: 14 gauge black powder coated steel attached with security fasteners. Provide 3/8 inch thick protective polycarbonate screen at monitor cut-out.
 - 2. Fabrication:
 - a. Bolt panels together with tamper-resistant internal barrel bolts.
- B. Norix Group Inc., Model No. LEWOS Series wall mounted enclosed cabinets with seat at Housing Units in unit numbers/gangs to best fit quantity shown on Drawings.
 - 1. Materials:
 - a. Sides and Writing Surface: Heavy-duty graffiti-resistant Wilsonart high pressure plastic laminate on 45 pound density particle board. Provide glued-on black T-mold vinyl edging on panel edges.
 - b. Top and Face Plate: 14 gauge black powder coated steel attached with security fasteners. Provide 3/8 inch thick protective polycarbonate screen at monitor cut-out.
 - c. Legs: 3 inch diameter, 14 gauge steel with black powder coat paint finish.
 - d. Seats: 12 inch diameter, one piece, 14 gauge Type 304 stainless steel with #4 satin finish and 1-1/2 inch drop edge.
 - 2. Fabrication:
 - a. Legs and Seat Support: 10 inch radius curved portion of the leg supports the top and shall be fully welded to the vertical tube that supports the seat. The top of the curved tube and top of the seat support tube shall be fully welded to 6 inch x 6 inch x 1/4 inch thick steel plate. The bottom of the seat tube shall be fully enclosed to conceal floor mounting anchors.
 - 3. ADA Compliance: Where indicated on Drawings, omit seat to accommodate a disabled inmate.

2.13 PISTOL LOCKERS

- A. Norix Group, Inc. Model No. IPL-600 recessed six compartment steel pistol lockers.
 - 1. Overall Size: 33-1/2 inches high x 39 inches wide x 6 inches deep.
 - 2. Materials: Steel; cut, formed, welded, and ground smooth; 7 gauge at body front and sides and drawer fronts; 10 gauge at body back and drawer sides and backs.
 - a. Provide 1/8 inch thick felt lining in drawers.
 - 3. Mounting Flange: 2 inch x 2 inch x 3/16 inch steel.
 - 4. Hinges: 14 gauge steel.
 - 5. Locks: One pin tumbler snap lock at each drawer, individually keyed and master keyed.
 - a. Provide two keys per compartment and two master keys per locker.
 - 6. Finish: Powder coat paint finish in color selected by Architect.

2.14 KEY CABINETS

- A. Norix Group, Inc. Model No. IKC-300 surface mounted locking cabinet with two hinged inside panels to accommodate maximum 300 paracentric and mogul keys.
 - 1. Material: Cut, formed, and welded 10 gauge steel.
 - 2. Dimensions: 24 inches high by 16-5/8 inches wide x 7 inches deep.
 - 3. Door Hardware: Continuous hinge, institutional lever tumbler dead bolt with one key.

4. Finish: Primed.

2.15 SPEAKING PORTS

- A. Norix Group, Inc. Model No. ISP-100 speaking port in detention area.
 1. Material: Cast stainless steel with brushed finish.
 2. Size: 6 inch diameter.
 3. Refer to Drawings for glass thickness in which speaking port will be installed.

2.16 PASS HOPPERS

- A. Norix Group, Inc. Model No. IPH-200 pass hopper with tilt mechanism that latches on one side.
 1. Material: Stainless steel with #4 finish.
 2. Size: 10-1/8 inches high x 16 inches wide x 7-3/4 inches deep.
 3. Fabrication: Cut, formed, and welded stainless steel components.
 4. Accessories: Stainless steel mounting flange.

2.17 TOILET PAPER HOLDERS

- A. Norix Group, Inc. Model No. ITP-110 toilet paper holder, front mount.
 1. Material: Type 304 stainless steel with bead blasted satin finish.
 2. Fabrication: One-piece drawn 16 gauge stainless steel seamless well welded to 14 gauge stainless steel flange to ensure tight fit to wall surface. Back of holder shall have welded anchor nuts to receive threaded studs.
 3. Accessories: Back plate of 11 gauge die-formed galvanized steel, reversible for shallow or deep wall installation.

2.18 GUN PORT / TACTICAL DEVICE DEPLOYMENT PORT

- A. Norix Group, Inc. Model No. IFP-500 Fasport security access port.
 1. Materials and Fabrication: Die cast body and lid. A12 aluminum body and slap handle. A2 tool steel latch and body cover. Steel hinge.
 2. Finish: Brushed aluminum.
 3. Accessories:
 - a. Spacers to accommodate glazing thickness.
 - b. 1/4-20 security screws.
 - c. Silicone sealant.
 4. Refer to Drawings for glass thickness in which security access port will be installed.

PART 3 EXECUTION

3.1 INSTALLATION

- A. All products and materials specified in this Section shall be installed according to manufacturer's instructions and as detailed on the Drawings.

3.2 ADJUST AND CLEAN

- A. Clean and Touch-up: Remove all packing and protection blemishes and thoroughly clean and polish all finish surfaces. Restore any marred or abraded surfaces to their original condition by touching up in accordance with the manufacturer's recommendations. Touch-up shall not be obvious.
- B. Defective work: Remove and replace all defective work which cannot be properly repaired, cleaned or touched up, as directed by Architect, with no additional cost.
- C. Protect installed work during the construction period to prevent abuse and damage.

END OF SECTION

SECTION 129300
SITE FURNISHINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION OF WORK

- A. Extent: Furnish all labor, material, equipment, tools, and incidentals necessary for the provision and installation of Site Furnishings as shown on the Drawings and as specified in this Section. The work includes all miscellaneous hardware, foundations, footings and miscellaneous appurtenances associated with the installation. Items to be installed include:
 - 1. Trash Receptacle
 - 2. Recycling Receptacle
 - 3. Stone Bench
 - 4. Bike Rack
 - 5. Fixed Bollard
 - 6. Tree Grate
- B. Related work includes but is not limited to:
 - 1. Site Concrete
 - 2. Stabilized D.G. Paving

1.3 STANDARDS

- A. Unless otherwise shown or specified, all materials and methods shall conform to the appropriate current sections of: he State of California Department of Transportation (CALTRANS) Standard Specifications, latest edition, except for measurement and payment requirements.
- B. Applicable ASTM International Standards (latest revisions) as they apply to this work and related test methods.
- C. Applicable ISO Testing Standards (latest revisions) as they apply to this work.

1.4 SUBMITTALS

- A. Product Data: Submit Product Data for review and approval by the Engineer for all site furnishings and accessories.
- B. Shop Drawings: Submit Shop Drawings for review and approval by the Engineer for all site furnishings and accessories. Show all locations, markings, quantities, materials, sizes, and shapes and indicate all methods of connecting, anchoring, fastening, bracing, and attaching to the work of other trades.

- C. Maintenance Data: At Substantial Completion submit maintenance information for site furnishings and accessories where applicable for inclusion in the Owner's maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Manufacturer's Instructions: Materials, products, processes, equipment or the like shall be installed or applied in strict accordance with printed instructions furnished by the manufacturer of the material for use under conditions similar to those at the job site.
- B. Perform all work in accordance with all applicable State and local laws, codes and regulations.

1.6 DELIVERY, STORAGE & HANDLING

- A. Delivery & Handling: Transport, store and handle precast units and manufactured items in a manner to avoid hairline cracks, staining or other damage. .
- B. Storage & Protection Store units free of the ground and protected from mud or rain splashes. Cover units, secure covers firmly, and protect the units from dust, dirt or other staining material.

PART 2 PRODUCTS

2.1 FURNISHINGS

A. Trash Receptacle

Description: Urban Renaissance Trash Receptacle

Manufacturer: Forms + Surfaces

Model #: N/A

Finish / color: Stainless Steel

Distributor/Contact: Forms + Surfaces, www.forms-surfaces.com

-OR-

Description: Petoskey Trash Receptacle

Manufacturer: Landscape Forms

Model #: N/A

Finish / color: Stainless Steel

Distributor/Contact: Landscape Forms, www.landscapeforms.com

-OR-

Description: Model MF3001

Manufacturer: Wausau Tile

Model #: MF3001

Finish / color: Stainless Steel

Distributor/Contact: Wausau Tile, www.wausautile.com

B. Recycling Receptacle

Description: Urban Renaissance Trash Receptacle with laser cut blue recycling symbol and text

Manufacturer: Forms + Surfaces

Model #: N/A

Finish / color: Stainless Steel

Distributor/Contact: Forms + Surfaces, www.forms-surfaces.com

-OR-

Description: Petoskey Trash Receptacle with laser cut blue recycling symbol and text

Manufacturer: Landscape Forms

Model #: N/A

Finish / color: Stainless Steel

Distributor/Contact: Landscape Forms, www.landscapeforms.com

-OR-

Description: Model MF3001 with laser cut blue recycling symbol and text

Manufacturer: Wausau Tile

Model #: MF3001

Finish / color: Stainless Steel

Distributor/Contact: Wausau Tile, www.wausautile.com

C. Stone Bench

Description: Stone Quarry rough-backs, Sierra Salt and Pepper Stone from Cold Spring Granite

Source: Academy Quarry, Raymond CA

Size: 6' long x 3' long minimum

Finish / color: Top thermal finish, Sides natural split face

Distributor/Contact: Cold Spring Granite, www.coldspringusa.com; ph 559-689-3257

D. Bike Rack

Description: Bike Hitch

Manufacturer: American Bicycle Security Company

Model #: N/A

Finish / color: Stainless Steel

Distributor/Contact: American Bicycle Security Company, www.ameribike.com

-OR-

Description: Bike Rack

Manufacturer: Reliance Foundry

Model #: R-2-8212SS

Finish / color: Stainless Steel

Distributor/Contact: Reliance Foundry, www.reliance-foundry.com

-OR-

Description: U/2 Rack

Manufacturer: Cycle-Safe

Model #: N/A

Finish / color: Stainless Steel

Distributor/Contact: Cycle-Safe, www.cyclesafe.com

D. Bollard

Description: Bollard

Manufacturer: CalPipe

Model #: SSF06080

Finish / color: Stainless Steel

Distributor/Contact: CalPipe, www.calpipebollards.com

-OR-

Description: Bollard

Manufacturer: Fair Weather Site Furnishings

Model #: B-4-5A2

Finish / color: Stainless Steel

Distributor/Contact: Fair Weather Site Furnishings, www.fairweathersf.com

-OR-

Description: Bollard

Manufacturer: Reliance Foundry

Model #: R-846X

Finish / color: Stainless Steel

Distributor/Contact: Reliance Foundry, www.reliance-foundry.com

D. Tree Grate

Description: 4' Coho Tree Grate

Manufacturer: Urban Accessories

Model #: N/A

Finish / color: Stainless Steel

Distributor/Contact: Urban Accessories, www.urbanaccessories.com

-OR-

Description: 4' Corona Tree Grate

Manufacturer: Iron Age Designs

Model #: N/A

Finish / color: Stainless Steel

Distributor/Contact: Iron Age Designs, www.ironagegrates.com

-OR-

Description: 4' Sunrise Tree Grate

Manufacturer: Ironsmith

Model #: 4848

Finish / color: Stainless Steel

Distributor/Contact: Ironsmith, www.ironsmith.cc

PART 3 EXECUTION

3.1 GENERAL

- A. Review and Adjustment: All site furnishings shall be located as shown on the Drawings. Review all site furnishing locations prior to proceeding with any installation. Adjustments shall be made as approved by the Engineer.
- B. Embedment: It is the intent of the Drawings that all embedded site furnishings be installed in concrete paving areas prior to the concrete pour. Furnishings shall be completely protected during the concrete pour. Furnishings damaged due to the concrete pour shall be replaced at the discretion and to the satisfaction of the Engineer, and not repaired or cleaned.

- C. Scheduling: The contractor shall be responsible for scheduling the receiving of equipment in conjunction with the concrete pour. Any block outs of concrete pour due to scheduling conflicts shall be approved by the Engineer and shall be included in this contract. Finish of any block out areas shall match adjacent paving.
- D. Provide photos of stone samples from quarry for review by Engineer. Landscape Architect to hand select at quarry site prior to shipping to project site.

3.2 INSTALLATION

- A. Site Furnishings: Shall be installed per manufacturer's recommendations and as shown on the Drawings and as specified herein.
- B. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- C. Set all work true and square, plumb and level. Provide spacers under furniture to level as acceptable to Owner's Representative

3.3 CLEAN-UP

- A. After completion of all operations, Contractor shall remove all trash, excess soil and other debris. All walks, walls, and pavement shall be swept and washed clean, leaving the entire area in a neat, orderly condition.

END OF SECTION

DIVISION 13
SPECIAL CONSTRUCTION

SECTION 13 34 23
MODULAR PRECAST CONCRETE CELLS

PART 1 GENERAL

1.1 SUMMARY

- A. This Section includes pre-engineered, prefinished modular precast concrete cells and related precast concrete elements, complete and in-place. Work includes the following:
 - 1. Modular precast concrete units including mezzanine balcony slabs as applicable.
 - 2. Thermally enhanced stainless steel security/detention windows with security glazing.
 - 3. Detention doors, door frames, hinges, and hardware preparation; prime painted.
 - 4. Chase access doors, door frames, hinges, and hardware preparation; prime painted.
 - 5. Embeds in concrete and connecting devices for precast concrete modular units.
 - 6. Epoxy paint for interior cell walls and ceilings.
 - 7. Security light fixtures with lamps.
 - 8. Embedded electrical nonmetallic tubing conduit, wiring, electrical boxes, devices, and security cover plates at interior of cell.
 - 9. Prefinished security grilles at supply and exhaust air with opposed blade dampeners.
 - 10. Stainless steel combination plumbing units with valving for typical and disabled accessible cells.
 - 11. Security sealants and tamperproof fasteners at interior of cell.
 - 12. Prefinished wall mounted detention bunks, desks, stools, shelf with hooks.
 - 13. Stainless steel mirrors, and grab bars in disabled accessible cells.

1.2 RELATED SECTIONS

- A. Section 03 30 00 - Cast-In-Place Concrete: Installing anchors and imbedded items in cast-in-place concrete.
- B. Section 03 45 00 – Precast Concrete.
- C. Section 05 50 00 – Metal Fabrications: Metal stairs and handrails.
- D. Section 08 71 63 – Detention Door Hardware: Door locks.
- E. Section 09 91 00 – Painting: Field painting of doors and frames.

1.3 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.

C. Referenced Standards:

1. ACI 315 – Details and Detailing of Concrete Reinforcement.
2. ACI 318 – Building Code Requirements for Structural Concrete and Commentary.
3. ASHRAE/IESNA 90.1 – Energy Standard for Buildings Except Low-Rise Residential Buildings.
4. ASTM A36 – Standard Specification for Carbon Structural Steel.
5. ASTM A307 – Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60,000 PSI Tensile Strength.
6. ASTM A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
7. ASTM A615 – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.
8. ASTM A653 – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
9. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
10. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
11. ASTM C31 – Standard Practice for Making and Curing Concrete Test Specimens in the Field.
12. ASTM C33 – Standard Specification for Concrete Aggregates.
13. ASTM C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
14. ASTM C150 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
15. ASTM C172 – Standard Practice for Sampling Freshly Mixed Concrete.
16. ASTM C173 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
17. ASTM C231 – Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
18. ASTM C272 – Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions.
19. ASTM C494 – Standard Specification for Chemical Admixtures for Concrete.
20. ASTM C578 – Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.
21. ASTM C581 – Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-Fiber-Reinforced Structures Intended for Liquid Service.
22. ASTM C618 – Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete.
23. ASTM C989 – Standard Specification for Slag Cement for Use in Concrete and Mortars.

- | | |
|-----------------|---|
| 24. ASTM C1611 | – Standard Test Method for Slump Flow of Self-Consolidating Concrete. |
| 25. ASTM D1735 | – Standard Practice for Testing Water Resistance of Coatings Using Water Fog Apparatus. |
| 26. ASTM D3363 | – Standard Test Method for Film Hardness by Pencil Test. |
| 27. ASTM D4060 | – Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser. |
| 28. ASTM D4541 | – Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers. |
| 29. ASTM E283 | – Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen. |
| 30. ASTM E331 | – Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference. |
| 31. ASTM F1450 | – Standard Test Methods for Hollow Metal Swinging Door Assemblies for Detention and Correctional Facilities. |
| 32. ASTM F1592 | – Standard Test Methods for Detention Hollow Metal Vision Systems. |
| 33. AWS D1.1 | – Structural Welding Code – Steel. |
| 34. PCI MNL 116 | – Standard for Quality Control of Precast and Prestressed Concrete Products. |
| 35. PCI MNL 123 | – Design and Typical Details of Connections for Precast and Prestressed Concrete. |

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for prefinished precast concrete modular cells.
- B. Shop Drawings: Include the following:
 - 1. Overall geometry, elevations, sections, and dimensions of all modular precast units, reinforcement, anchors inserts, embedded to cast-in place items, lifting devices, and connections to other work. Detail reinforcement in accordance with ACI 315.
 - 2. Mechanical and electrical layouts indicating location of all equipment and routing of conduit, and specified wire colors as coordinated through responsible party.
 - 3. Cut sheets for all fixtures, furniture, and detention equipment.
 - 4. Concrete mix designs for review and acceptance by Architect prior to release for manufacturing of each item.
- C. Schedule: Including dates for submittals, approvals, production, delivery, and erection.
- D. Erection Drawings And Calculations: For prefinished precast concrete modular cells indicating compliance with design requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Separate drawings of individual components will not be required for this submission.

- E. Maintenance Data: For prefinished precast concrete modular cells, components and accessories, to include in maintenance manuals.
- F. Engineer's Qualifications: For manufacturer's structural engineer responsible for engineering.
- G. Electronic Files: If requested by the Architect, submit manufacturer's BIM model for use in Architect's and Contractor's BIM models for the project.

1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, erection drawings and structural calculations, and other data prepared by a qualified professional engineer.
 - 1. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of prefinished precast concrete modular cells that are similar to those indicated for this Project in material, design, and extent.
- B. Precast Cell Manufacturer (PCM) Qualifications: For manufacturers not named in this specification, submit documentation for the following during the addenda period for response by the Architect. Bids will only be accepted from acceptable manufacturers.
 - 1. The PCM shall have a minimum of ten years experience in design and production of precast concrete pre-finished modular cells.
 - 2. The PCM shall have a minimum of ten completed projects of equal or greater size as this project.
 - 3. The PCM must have daily production capability to meet the schedule for this project.
 - 4. The production facility must be certified by PCI or NPCA, prior to bid date.
 - 5. The PCM shall submit to the Architect information listed below:
 - a. List of similar projects including: Project name, location of project, name of owner, date of project, Number of cells.
 - b. References for projects listed above including the name, address, phone number and contact person for all the following: Owner, Architect, Construction Manager, and Contractor.
 - c. Information regarding insurance and bonding capability including name of carrier, types and limits.
 - d. Current staff including resumes of all key personnel including Engineer performing structural design.
 - e. Description of facilities to be used for this project and provide list of all established production facilities available to the PCM.
 - f. Other pertinent data, which would assist in the evaluation of qualification.
 - 6. The PCM shall list all deviations from individual manufactured products specified in this Section.
 - 7. The Owner reserves the right to inspect the previous projects and contact any or all parties to determine qualifications.
- C. Erector's Qualifications: Company specializing in erecting the work of this Section with three years of documented experience; qualified and acceptable to the PCM.

D. Plywood Chase Mockup:

1. The PCM shall provide at the job site, from accepted precast cell geometry Shop Drawings, a plywood typical cell chase mock-up, representing one story. The plywood mockup is for coordination between subcontractors only and is not for use for changing the geometry of the chase.
2. The PCM shall provide all required plumbing fixtures, valves, HVAC grilles, and all other items as specified in this section required for coordination between trades utilizing the chase mockup.
3. Mechanical, electrical, security, and fire protection subcontractors shall promptly provide all utilities within in the chase to provide a complete chase mockup.
4. Once accepted, the plywood chase mockup will serve as the standard for the project. This mockup must be accepted before the precast cell mockup production, in order to identify any adjustments to the arrangement of utility rough-ins and connection locations for the convenience of installation and maintenance of the utilities by others.

E. Precast Cell Mockup:

1. After approval of the precast cell Shop Drawings and identified adjustments required by mechanical and electrical subcontractors, the PCM will fabricate, outfit and finish a one-story, two cell module (of typical cells) at the fabricating plant prior to the fabrication of remaining cell units.
2. The purpose of the cell mockup will be to identify quality assurance expectations of the final product with regards to finishes on furniture, walls, and floors, and not the placement of equipment.
3. The review and acceptance of the concrete mockup shall take place at the fabricator's plant. Overall cell geometry and location of cast in items are not subject to adjustment during this review except by processed change order.
4. After written acceptance, of the cell mockup, the remaining units may be fabricated. Architect or Owner shall be permitted to inspect the fabricated units at any time at the production facility.
5. The accepted typical cell mockup shall be delivered to the job site and erected and will be used as a quality reference standard for the job. The accepted standard cell mockup will be incorporated into the project as one of the last units to be erected.

1.6 TESTING DURING FABRICATION

- A. Testing: All testing of precast concrete elements shall be performed by an ACI Level 1 certified technician employed by the precast manufacturing plant. Sampling and testing for quality control during placement of concrete is to include the following:
1. Sampling Newly Placed Concrete: ASTM C172, except as modified to account for self-consolidating concrete (SCC).
 2. Slump Flow: ASTM C1611 for Self Consolidating Concrete: The slump cone can be upright or inverted, but consistency with either method is required. The slump cone shall be placed on a base plate of non-absorbing material and shall be filled in one lift without rodding or strike off. The cone shall then be lifted at a certain speed until contact with the concrete ceases. The resulting concrete sample patty is then measured in two perpendicular directions. The two measured diameters are averaged and the slump flow is reported in inches. One test for each days pour of each different mix design used. Additional tests when concrete consistency is an issue.

3. Air Content: ASTM C173, modified for SCC, volumetric method for lightweight and normal concrete; ASTM C231, modified for SCC, pressure method for normal weight concrete; one for each day's pour of each mix design used. Also test each time a set of compressive strength specimens are molded.
 4. Concrete Temperature: test hourly when air temperature is 40°F and below, and when 80°F (27°C) and above, and each time a set of compressive strength specimens are made.
 5. Compression Test Specimen: ASTM C31, except as modified for SCC, one set of seven cylinders for each compressive strength test, unless otherwise directed by Architect designer. Mold and store cylinders for laboratory cured test specimens (except when field cure test specimens are required).
 6. Compressive Strength Tests: ASTM C39, one set for each day's pour, plus additional sets for each 50 cubic yards over and above the first 25 cubic yards of each concrete class placed in any one day; two specimens tested at seven days, three specimens tested at 28 days. The remaining two specimens are for checking strip strength. One of the 28 day cylinders may be held if necessary.
- B. Coordination for Cast-in Anchorage (Embedments): Coordinate installation of anchorages for prefinished precast concrete modular cells. Furnish sleeves, concrete inserts, anchor bolts, and items with integral anchors that are to be embedded in concrete bases. Include setting drawings, templates, and directions for installing anchorages. Deliver such items to Project site in time for installation under the work of Section 03 30 00.
- C. Preinstallation Conference: Conduct conference at Project site.
1. Inspect and discuss power and control system roughing-in and other preparatory work performed by other trades.
 2. Review and finalize a construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 3. Review sequence of installation.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle precast elements in position consistent with their design. Lift and support only from the manufacturer's designated support points. Lifting or handling devices shall be capable of supporting member in positions anticipated during manufacture, storage, transportation, and erection.
- B. Protect units to prevent staining, chipping, or spalling of concrete. Store off the ground. Protect finishes from weather and dirt. Do not deface date of production and piece type for each unit.

1.8 SITE CONDITIONS

- A. Field Measurements: Verify precast cell unit anchorages and supports by field measurements before fabrication and indicate measurements on Shop Drawings.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating precast cell units without field measurements. Coordinate construction to ensure that actual opening dimensions correspond to established dimensions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Oldcastle Precast Modular Group, 200 Keystone Drive, Telford, PA 18969; phone: (215) 257-2255.
2. Bethlehem.
3. Rotondo Weirich Enterprise.
4. Fibrebond.
5. Tindall.

B. Substitutions: Under provisions of Division 01.

C. Other manufacturers proposed for use shall submit qualification package per Quality Assurance article Paragraph 1.5 B above for review prior to bid date.

2.2 PERFORMANCE REQUIREMENTS

A. Provide modular precast cells consisting of a monolithically cast five-sided module including ceilings and walls. Coordinate installation of windows, doors and frames, furnishings, electrical and plumbing fixtures and other items as specified in this section. Six-sided modules, tapered walls, or panelized construction will not be allowed. Cell walls shall be of uniform thickness from top to bottom of walls. Balcony may be cast as an integral or separate component and erected in the field as applicable to project requirements.

B. Engineer and size components to withstand code required physical and seismic loads, and the following:

1. Superimposed loads of dayroom roof onto front walls of cells, and superimposed loads of attic roof and walls onto cell walls, and superimposed loads of utility, shower and janitor closet rooms onto sides of adjacent cells.
2. Railing and guardrail loads.

C. Prefinished precast concrete modular cells shall conform to dimensions and configuration indicated on the drawings and the following:

1. Maximum allowable deflection per ACI 318, L/360 unless indicated otherwise.
2. Threaded inserts for support and attachment of cell furnishings, fixtures and cell light fixtures.
3. Embeds/inserts for the support of balcony stairs and balcony guardrail.
4. Required fire ratings: As indicated on the Drawings.

2.3 CONCRETE MATERIALS

A. Portland Cement: Conform to ASTM C150.

B. Fly Ash: Conform to ASTM C618, except the loss on ignition shall not exceed 3.0-percent by weight.

C. Ground Granulated Blast Furnace Slag: Conform to ASTM C989.

D. Aggregates: Conform to ASTM C33.

- E. Admixtures: Conform to ASTM C494. Self-consolidating concrete may be proportioned with a viscosity-modifying admixture to improve stability. Acceptable admixture: Sika Visocrete or accepted equal.
- F. Water: Potable
- G. Batching: Concrete must be batched at PCM manufacturing facility, no ready mix concrete will be allowed for use with the precast cells and components.

2.4 PROPORTIONING AND DESIGNING CONCRETE MIXES

- A. Concrete 28-Day Specified Compressive Strength: 5,000 psi minimum.
- B. Water to Cementitious Materials Ratio: 0.45 maximum with an allowable variation during production of +/- 0.02.
- C. Slump/Slump Flow Limits, Self-Consolidating Concrete: Minimum 23 inch slump flow, maximum 28 inch slump flow.
- D. Cementitious Materials: 650 pounds per cubic yard, minimum.
- E. Curing: Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or accelerated methods. No steam curing or accelerated curing methods will be allowed.

2.5 REINFORCEMENT

- A. Reinforcing Steel: ASTM A615-Grade 60 deformed steel bars.
- B. Welded Wire Reinforcement: ASTM A1064 for plain and deformed wire.

2.6 CONCRETE ACCESSORIES

- A. Connecting and Supporting Devices: ASTM A36 carbon steel plates, angles, items cast into concrete, items connected to steel framing members, inserts, conforming to PCI MNL-123, prime painted, all items at the exposed to weather in the finished structure to be galvanized.
- B. Grout: Non-shrink, non-metallic, minimum strength of 6000 psi (41.4 MPa) at 28 days.
- C. Shim Packs and Bearing Pads: As recommended by PCM.
- D. Bolts, Nuts and Washers: High strength steel, quenched and tempered alloy steel, or corrosion resistant chromium-nickel type as required by design, ASTM A307 or ASTM A325
- E. Prime Paint: Zinc rich alkyd, except for weld plates and surfaces in contact with concrete.
- F. Embeds/Carriers: As required for installation of modular precast cell balcony railings, windows, door frames, and embed plates; threaded insert for mounting of light fixtures and detention finishes.
- G. Forms: Reusable externally reinforced steel forms of the Precast Cell Manufacturer's design meeting the shapes and dimensions indicated on the shop drawings, accepted cell geometry drawings and the tolerance requirements indicated herein.

- H. Sealer: Cell floor sealer for use on cell floors integrated with the precast cell unit. Sealer shall be Ashford Formula manufactured by Curecrete Chemical Company, Inc. Springville, UT or accepted equal.

2.7 CELL COMPONENTS

- A. Thermally Enhanced Stainless Steel Detention Windows. Window shall be 14 gauge stainless steel frame welded and sealed in corners. Window manufactured by CM Security Group Inc. Montreal, QC or Hopes Windows, Jamestown, NY.

1. The windows shall be fabricated providing no less than three square feet of clear viewing area.
2. Quality Control Tests:
 - a. Air infiltration test: ASTM E283, Maximum Air infiltration 0.15 CFM/Sq. Ft. of area with pressure differential across the window unit of 1.56 PSF.
 - b. Water Penetration Test: ASTM E331, No water penetration for 15 minutes when the window is subjected to a rate of flow of 5 gal/hr./sq.ft.
 - c. ASTM F1592 Standard Test method for detention hollow metal vision systems.
 - d. Materials: Perimeter framing formed from 14 gauge 304 stainless steel. Glazing beads shall be 14 gauge "Z" profile thermally enhanced. All screws shall be tamper-resistant truss head stainless steel screws.
 - 1) Finish Powder Coated Thermally Enhanced Glass Stops on Exterior: Color as selected by Architect, 2B finish on interior.
 - e. Fabrication: Fabricate windows in accordance with approved shop drawings. Color to be selected at time of shop drawing review.
 - 1) Frame members shall be coped and welded at corners for maximum strength and silicone sealed for weather-tightness.
 - 2) All windows shall be designed for outside glazing using screw applied glazing beads.

- B. Security Hollow Metal Door and Frames: Manufactured by Habersham Metal Products Co., Cornelia, GA, (706) 778-2212 or accepted equal.

1. Hollow Metal Doors:
 - a. Materials: Doors shall be constructed of material conforming to ASTM A653/A653M (A60). Door face sheets shall be 14 gauge sheets. Doors shall be 2 inches in thickness and constructed using vertical steel stiffeners of 16 gauge minimum welded a maximum of 3 inches on center. All mortised hardware reinforcing shall be made of 7 gauge steel. All surface mounted hardware shall be of gauges to meet recommended thread engagement of hardware manufacturer. Doors and frames shall be prepped per hardware schedule; universal lock pockets are not acceptable. Basis of design, to receive Southern Steel 10120AM or Folger Adam 120M Lock and Southern Steel 220L-4 or Folger Adam 524 Door Position Switch. PCM shall provide door hinges only, and temporary lock for construction purposes.
 - b. Food Pass Openings: The food pass opening shall be a flush opening fabricated using interior channels, securely welded to the inside of both face sheets. The food pass shutter shall be constructed using two 10 gauge steel plates spot welded together to produce and inset fit to prevent tampering.

- c. Door Construction: Edges continuously welded and ground smooth. Glazing shall be applied with 1/4 - 20 torx security head screws at 8 inches on center minimum. Door shall be constructed in accordance with NAAMM 863-90 and shall meet performance specified in ASTM F1450.
 - d. Finishing: Door shall be prime painted under this specification section and both sides of door, door edges, and frame shall be finish painted by the on site painting contractor.
- 2. Hollow Metal Door Frames:
 - a. Materials: Frames shall be constructed of materials conforming to ASTM A653/A653M (A60). Frames shall be constructed of 12-gauge minimum thickness sheet steel. Anchors of 12-gauge minimum or 5/8-nelson stud shall be required at four locations per jamb, 2 locations per head. Stainless steel hinge reinforcing of minimum 7 gauge with angle backup full width of hinge shall be required. Lock enclosing reinforcement shall be constructed of a unitized box of no less than 10 gauge. Frame to be prepped for Southern Folger lock. Universal lock pockets are not allowed.
 - b. Construction: Frames shall be continuously welded the full width and depth of frame corner joint with face welded and ground smooth. Frame shall have a bolt-on spreader bar at bottom of frame to prevent warping. Minimum height of doorstop shall be 5/8 inch. Conduit used shall be 3/4 inch in diameter. All hardware reinforcing shall be protected with steel mortar guards that protect from leakage that would interfere with installation or operation of hardware. Frames shall be constructed in accordance with NAAMM 863-90 and shall meet performance specified in ASTM F1450.
 - c. Finishing: PCM shall prime paint both sides of cell doors and frames. Finish painting by on site painting contractor.
- C. Glazing for Security Cell Window: 9/16 inch ArmorProtect Plus made up of 1/8 inch heat strengthened glass, 0.050 inch urethane interlayer, 1/8 inch polycarbonate, 0.050 inch urethane interlayer, 1/8 inch heat strengthened glass. Glass shall pass HP White Level A ballistics and Level 1 forced entry tests. Glass manufactured by Oldcastle Building Envelope (866) 653-2278 or accepted equal.
- D. Glazing for Security Cell Door: 3/8 inch tempered glass, manufactured by Oldcastle Building Envelope or accepted equal. Provide two percent attic stock and store where directed on site.
- E. Glazing Tape and Blocks:
 - 1. Glazing Tape: Butyl rubber extruded preformed architectural glazing tape.
 - 2. Setting Blocks: Thermoplastic setting blocks - 90 durometer shore hardness thermoplastic rubber.
 - 3. Window Sealant: Type 3 sealant.
- F. Joint Sealants: Shop applied.
 - 1. Backer Rod: Compressible rod stock of expanded, extruded polyethylene.
 - 2. Type 1 Sealant: Flexible security sealant. Two part, non-sag, cold applied, chemically-curing elastomeric polyurethane. Pecora Dynaflex shall be installed around all furniture, light fixtures, and plumbing fixtures.

3. Type 2 Sealant: Non secure sealant. Neutral, one-part silicone sealant. Dow Corning 795 Silicone Building Sealant shall be installed on window frame to glazing joints. (Cap Bead).
 4. Type 3 Sealant: Non secure sealant, one part, non-sag polyurethane sealant. Pecora Dynotrol shall be installed on exterior windows and joints.
- G. Fixed Wall Mounted Bunk: Provide prefinished wall-mounted bunks security bolted to wall. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent salt solution test. Bunk shall be 29 inches wide by 80-3/8 inches long by 11 inches high, 10 gauge hot rolled P&O steel. Manufactured Chief Industries Inc. Grand Island NE (308) 389-7390 or accepted equal.
- H. Fixed Bunk Mounted Ladder: Provide prefinished bunk mounted ladder security bolted to bunks as specified above. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent salt solution test. Manufactured by Chief Industries Inc. Grand Island NE (308) 389-7390 or accepted equal.
- I. Fixed Wall Mounted Desk: Provide prefinished wall-mounted desks security bolted to wall. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent Salt Solution test. Desk shall be 12 inches wide by 18 inches deep by 6 inches high, 10 gauge hot rolled P&O steel. Manufactured by Chief Industries Inc. Grand Island NE (308) 389-7390 or accepted equal.
- J. Fixed Wall Mounted Seat: Provide prefinished wall-mounted seat security bolted to wall. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent salt solution test. Manufactured by Chief Industries Inc. Grand Island NE (308) 389-7390 or accepted equal.
- K. Fixed Wall Mounted Shelf w/ Safety Hooks: Provide prefinished wall-mounted shelf security bolted to wall. Paint finish must meet ASTM B117, 95 Degrees F, 5 percent Salt Solution test. Manufactured by Chief Industries Inc. Grand Island, NE (308) 389-7390 or accepted equal.
- L. Snap-Off Security Bolts: Security Bolts shall be made from mild steel and zinc plated. Manufactured by Tanner Nut and Bolt Corp. or accepted equal.
- M. Threaded Inserts: Threaded inserts shall be made from die cast zinc alloy material. Manufactured by Tanner Nut and Bolt Corp. or accepted equal.
- N. Cell Wall and Ceiling Surfacers and Paint:
1. Filler/surfacer shall be applied to substrate to fill bug holes and honeycombs. Filler/surfacer material shall be one component, polymer modified Portland cement. ProSpec RubCrete as manufactured by Bonsal American, Charlotte, NC, (800) 738-1621, shall be the standard of quality. The filler/surfacer shall meet the following test requirements.
 - a. TTM-58 freeze thaw adhesion, Method C. Result-10 cycles wet 4B.
 - b. ASTM D1735 Humidity 1000 hours Result-4C.
 - c. ASTM D4541 Pull off adhesion 3 trials Result-283 psi.
 2. Cell wall and ceiling shall receive a two-component high performance epoxy coating system. Total dry film thickness not less than 8 mils applied in two coats. The coating shall be Amerlock 400 VOC as manufactured by PPG. The coating shall meet the following product description and test requirements.
 3. Generic Description: High-solids epoxy coating.
 4. Finish: High gloss.

5. Volume Solids: 83 percent +/- 3 percent.
6. Volatile Organic Compounds: Comply with VOC requirements of SCAQMD Rule 1113.
 - a. Abrasion: ASTM D 4060: Result, no more than 102 mg loss after 1000 cycles.
 - b. Adhesion: ASTM D 4541: Result, no less than 350 psi pull.
 - c. Hardness: ASTM D 3363 (Pencil): Result, must pass 6H (gouge).
 - d. Stain Resistance (ketchup, grape juice, blood and coffee): Result, complete removal and no staining upon solvent wash.
 - e. Urine Resistance (exposed to urine 7 days): Result, less than 1 percent gloss loss and no more than 2.5 DE color change.
- O. Cell Mirror: Mirror shall be Type 430 bright-annealed stainless steel. Mirror shall be wall mounted with pin-torx security screws. Manufactured by Willoughby Industries, Inc. Indianapolis, IN (800) 428-4065, Model number MR-2 (SM-1216-FA) or Acorn Engineering Co., City of Industry, CA, (800) 488-8999, Model number 1817.
- P. Combination Lavatory/Water Closet Unit: Manufactured by Willoughby Industries, Inc. Indianapolis, IN (800) 428-4065, Model number 1546 or 1545 (ADA Compliant) or Acorn Engineering Co., City of Industry, CA, (800) 488-8999, Model number 1415 or 1432 (ADA Compliant) combination stainless steel security type lavatory/water closet with the following features:
 1. Fabricate from 14 gauge, type 304 stainless steel, seamless weld with exposed surfaces satin finished.
 2. Water consumption: 1.6 gallons of water per flush.
 3. Blowout type, concealed wall supply, off floor mounting, wall outlet.
 4. Trap: Minimum 3-1/2 inch seal, capable of passing a 2 1/8 inch ball.
 5. Flush valve: (see Flush Valves).
 6. Toilet flushing extension.
 7. Multi sided lavatory bowl (12-3/4 inches by 8-1/4 inches by 5 inches deep).
 8. Integral fast drain with elbow waste.
 9. Chase mounted brass p-trap with cleanout.
 10. Penal type filler/bubbler.
 11. Pneumatic lavatory valve: See Lavatory Controls.
 12. Toilet waste extension with 3 inches no-hub cleanout tee with PVC pinned plug, 3 inches no-hub coupling.
 13. Recess tissue holder.
 14. Cabinet interior with fire resistant, sound deadening material.
 15. Wall sleeve: Minimum 20 gauge galvanized steel, with 1/2 inch diameter steel bars, extending into frame, and welded in place.
 16. Toilet bowl protector.
- Q. Flush Valves shall be Regal Hydraulic flush valve model number 9603 manufactured by Sloan or accepted equal.
 1. Control Mechanism: Diaphragm.

2. Flush valve assemblies: Flush valve, stop check, tailpiece and vacuum breaker.
 3. Valve Materials:
 - a. Valve body: Brass or bronze.
 - b. Valve Internal Parts: Corrosion resistant materials that will not be affected by the action of or contact with water.
 4. Operating Features:
 - a. Valve operators shall employ the non-hold open feature.
 5. Push Button Valve Operators: Hydraulic type.
- R. Lavatory Controls - Provide the following for each lavatory:
1. Metering valves: Construction type.
 2. Body with integral check stops, and strainer: Brass or bronze.
 3. Push buttons and strainer screen: Stainless Steel.
 4. Pneumatic Housings: Thermoplastic.
 5. Air and Water Feed Lines: FDA approved polyethylene tubing.
 6. Valve cover for mounting valve on chase wall.
 7. Operation: Pneumatic valve, hot and cold mixing, hand push button operation requiring less than five pounds of force to actuate. Valve shall be capable of remote mounting up to 10 feet from actuation push button.
 - a. Timing Cycle: Adjustable from two seconds to over one minute delivering full flow during the entire cycle. Maximum flow: 0.5 gallons per minute.
 - b. All adjustments shall be concealed.
- S. HVAC Grilles:
1. Face Plate: 11 gauge stainless steel - Mill finish, perforated with 5/16 inch holes on 7/16 inch staggered centers continuously welded to sleeve.
 2. Sleeve: 10 gauge cold rolled steel formed with welded seams, length consistent with wall thickness. Nelson studs welded to sleeve on each of four sides of sleeve, 3 inches long by 3/8 inch diameter.
 3. Auxiliary Sleeve: 14 gauge cold roll steel formed with welded or lapped seams. Auxiliary sleeves shall extend 1 inch beyond the back of the wall and inserted into primary sleeve, attached with bolts.
 4. Damper: Opposed blade, constructed of steel, adjustable through face with removable key.
 5. Finish: All steel surfaces primed with a coat of rust inhibiting prime coat. HVAC grills manufactured by Anemostat Products, Carson, CA, or accepted equal.
- T. Cell Light Fixtures:
1. Surface mounted maximum security LED fixture with LED night light.
 2. 14-1/2 inches wide by 49 inches long x 3 inches deep, 14 gauge cold rolled steel housing.
 3. Inner lens to be 0.125 inch prismatic acrylic, outer lens (inmate side) to be 0.250 inch clear polycarbonate.

4. Torx security screws to be used at all locations accessible to inmate.
 5. Fixture to have integral LED night light. Light fixture manufactured by Kenall, Gurnee, IL or equal.
- U. Security Cover Plates: Cover plate shall be made from 14 gauge cold rolled steel for maximum protection of devices. Devices when installed are recessed below surface of cover plate. Back plate shall be made from galvanized 11 gauge steel with 1/4-20 threaded inserts installed. Fasteners shall be standard stainless steel center-pin reject torx screws. Cover plates shall be powder coated with a baked white polyester powder coating. Models WSP/WPP as manufactured by Kenall, Gurnee, IL or accepted equal.
- V. Electrical Conduit and Connectors:
1. Conduit shall be rigid schedule 40 PVC non-metallic conduit, 3/4 inch inside diameter, 1.050 inch outside diameter. Part number 49007-010 as manufactured by Carlon or accepted equal.
 2. Couplings, adapters, fittings and preformed radius elbows shall be schedule 40 rigid PVC, as manufactured by Carlon or accepted equal.
 3. Washers shall be attached to each connector to prevent leakage of concrete. Washers shall be flat non-metallic 3/4 inch washers. Part number E943EW as manufactured by Carlon or accepted equal.
- W. Electrical Boxes - Electrical boxes shall be stamped steel masonry boxes.
1. Single gang box shall be a 2-1/2 inches deep by 3-3/4 inches high by 1-13/16 inch wide with concentric conduit knockouts.
 2. Double gang box shall be 2-1/2 inches deep by 3-3/4 inches high by 3-5/8 inches wide with concentric conduit knockouts.
 3. Intercom box shall be coordinated with security electronic contractor.
 4. All electrical boxes to receive #12 stranded grounding pigtail wire.
 5. All boxes to be sealed with caulk and tape to prevent leakage.
- X. Wire and Cable - Cell wiring shall be No 12 stranded THHN copper wire with insulation.

2.8 FABRICATION

- A. Fabrication shall conform with PCI MNL-116. Maintain plant records and quality control program during production of precast members. Make records available upon request.
- B. Ensure that all accessories, fixtures, and appurtenances shown to be cast-in are as specified and available prior to placing concrete.
- C. Forms shall be of a permanent type, such as steel, that provide a smooth finished product utilizing permanent steel forms with non-tapering walls.
- D. Surface Preparation: Forms shall be cleaned before each use.
- E. Manufacturing Tolerances: Precast concrete modular units shall conform to the following:
1. Length, single cell or double cell +/- 3/8 inch.
 2. Width, single cell +/- 1/4 inch.
 3. Width, double cell +/- 1/2 inch.

4. Height and depth, +/- 1/4 inch.
 5. Balcony width, single or double cell +/- 1/2 inch.
 6. Wall thickness, + 1/4 inch, - 0 inch.
 7. Plate recess, +1/4 inch, -1/8 inch.
 8. Tipping of plates, +/- 1/8 inch.
 9. Location of embedments +/- 1/2 inch.
 10. Position of electrical boxes +/- 1 inch.
 11. Out of square of electrical boxes: Comply with PCI MNL 116.
 12. Floor thickness, +/- 1/4 inch.
 13. Local smoothness, 1/4 inch per 10 feet, any surface.
 14. Concrete cover on reinforcing, +/- 1/4 inch.
- F. Walls of precast concrete modular cell units will be vertical walls void of any tapering. Both faces of all walls to be straight and parallel with one another.

2.9 FINISHING

- A. General: Component surfaces shall be formed as shown on the approved shop drawings. Bearing surfaces of all components shall be square, true and free from honeycomb.
- B. Smooth Concrete Finish: Provide smooth surface finish free of form marks, pockets, sand streaks, and honeycomb, with uniform color and texture.
1. Interior face of units shall have a steel form finish as obtained with a well-designed mix and proper vibration. Small air pockets (1/4 inch) and pits will be acceptable. Chips and spalls which occur during transportation and erection shall be patched satisfactorily as far as conformity to original shape, texture, and structural adequacy.
 2. Exterior face of modular units will be allowed to have small air pockets and pits. Chips and spalls, which occur during transportation and erection, shall be patched satisfactorily as far as conformity to original shape, texture and structural adequacy. The exterior finish shall be a form liner finish as specified by the Architect. Conform to PCI MNL 116 Appendix C.
- C. Unacceptable Finish Conditions: The acceptability of the appearance shall be made in comparison with the accepted mockup in good daylight conditions. The module and accepted mockup shall be viewed with the unaided eye at a distance of 20 feet or greater. Except as specifically accepted, or inherent in the design of the units, the following is a partial list of finish defects that will be properly repaired when visible at a 20 foot distance:
1. Ragged or irregular edges.
 2. Excessive air pits and voids evident on exposed surface.
 3. Adjacent flat and return surfaces with more than slight difference in exposure.
 4. Casting lines evident from different placements.
 5. Visible form joints or irregular surfaces greater than 1/16 inch.
 6. Rust staining on surfaces.
 7. Foreign material embedded in the face of the module unit.

PART 3 EXECUTION

3.1 PREPARATION

- A. The PCM shall provide a full-time job-site coordinator during all periods of precast erection. Coordinator shall attend a pre-construction conference with the major subcontractors, Construction Manager and Architect prior to start of erection.
- B. Assure that all ancillary work required under other contracts are complete, and that required access to installation locations is assured for the full term of the work, prior to effecting delivery. Finished units may be stored on the project site.
- C. Ensure that all lifting devices, used for placement of cell modules and precast wall panels, are as supplied by the manufacturer.

3.2 ERECTION

- A. Comply with manufacturer's lifting diagrams. Erect members without damage to structural capacity, shape, or finish. Repair damaged members. Align and maintain uniform horizontal and vertical joints, as erection progresses.
- B. Provide for full uniform transfer of loads in walls between cells and to foundation, using grout bed, properly designed pads, or other method as required by the design.
- C. Secure units in place as required by the design, to resist vertical and lateral loads. Perform welding, in accordance with AWS D1.1. Protect finished surfaces from weld spatter.
- D. Allow access for mechanical, plumbing and electrical subcontractors for utility connections and utility system testing.

3.3 FIELD QUALITY ASSURANCE

- A. Erection Tolerances: Erect members level, plumb, and true within the following allowable tolerances:
 - 1. Plan Location from Building Grid Datum: +/- 1/4 inch.
 - 2. Support Elevation from Nominal Elevation:
 - a. Maximum Low: 1/2 inch.
 - b. Maximum High: 1/4 inch.
 - 3. Plumb in any 10 Feet of Element Height: 1/4 inch.
 - 4. Maximum Jog in Alignment of Matching Edges: 1/4 inch.
 - 5. Joint Width (governs over joint taper): +/- 1/4 inch.
 - 6. Joint Taper: Maximum 3/8 inch.
 - 7. Joint Taper Over 10 Foot Length: 1/4 inch.

3.4 CLEANING

- A. After completing installation, repair any damage and clean units as recommended by manufacturer.

END OF SECTION

DIVISION 14
CONVEYING EQUIPMENT

SECTION 14 24 00
HYDRAULIC PASSENGER ELEVATORS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Hydraulic elevators.

1.2 PRODUCTS SUPPLIED BUT NOT INSTALLED UNDER THIS SECTION

- A. Hoist Beam.
- B. Lifeline Beam.
- C. Pit Ladder.

1.3 WORK SUPPLIED UNDER OTHER SECTIONS

- A. Temporary lighting, including temporary lighting in hoistway for machine space with switch located in hoistway on the strike jamb side of top landing door.
- B. Hoistway ventilation shall be in accordance with local and national building code requirements.
- C. Guide Rail Support shall be structurally adequate to extend from pit floor to top of hoistway, with spans in accordance with requirements of authority having jurisdiction and final layouts.
- D. Removable barricades at all hoistway openings, in compliance with OSHA 29 CFR 1926.502 in addition to any local code requirements.
- E. Lifeline attachments capable of withstanding 5000 pound load in accordance with OSHA 29 CFR 1926.502. Provide a minimum of two at the top and front of each hoistway.
- F. Pit lighting: Fixture with switch and guards. Provide illumination level equal to or greater than that required by ASME A17.1/CSA B44 2000, or applicable version.
- G. Control space lighting with switch. Coordinate switch with lighting for machine space as allowable by code.
- H. Access Doors: As required for access to governor. Access door shall be self-closing, self-locking if necessary and operable from the inside without a key.

1.4 RELATED SECTIONS

- A. Division 01 – Temporary Facilities and Controls: protection of floor openings and personnel barriers; temporary power and lighting.
- B. Section 03 30 00 – Cast-In-Place Concrete: Elevator motor and pump foundation, and grouting thresholds.
- C. Section 04 22 00 – Concrete Unit Masonry: Elevator pit, hoistway enclosure, building-in and grouting hoistway door frames, grouting thresholds.
- D. Section 05 12 00 – Structural Steel Framing: Hoistway framing.

- E. Section 05 50 00 – Metal Fabrications: Pit ladder, divider beams, support for entrances and rails, hoisting beam at top of hoistway.
- F. Section 07 13 26 – Self-Adhering Sheet Waterproofing: Waterproofing of elevator pit.
- G. Section 08 34 76 – Elevator Door Smoke Containment System.
- H. Section 09 65 00 – Resilient Flooring: Cab flooring.
- I. Division 23 – Heating, Ventilating, and Air Conditioning: Ventilation and temperature control of elevator equipment room.
- J. Division 26 – Electrical: Electrical service to main disconnect in elevator machine room; electrical power for elevator installation and testing; electrical-disconnecting device to elevator equipment prior to activation of sprinkler system; electrical service for machine room; machine room and pit receptacles with ground-fault current protection; lighting in machine room and pit; wiring for telephone service to machine room.
- K. Division 26 – Standby Power Supply Systems: Emergency generator for elevator operation.
- L. Division 27 – Telephone Systems: ADAAG-required emergency communications equipment.
- M. Division 28 – Fire Alarm Systems: Fire and smoke detectors and interconnecting devices; fire alarm signal lines to contacts in the machine room.
- N. Section 31 00 00 – Earthwork: Excavation for elevator pit and cylinder well casing.

1.5 REFERENCES

- A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.
- B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.
- C. Referenced Standards:
 - 1. ADA – Americans with Disabilities Act - 2010 Standards for Accessible Design.
 - 2. AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
 - 3. ANSI/NFPA 70, National Electrical Code.
 - 4. ANSI/NFPA 80, Fire Doors and Windows.
 - 5. ASME/ANSI A17.1, Safety Code for Elevators and Escalators.
 - 6. ASME A17.2 – Inspector's Manual for Elevators and Escalators.
 - 7. ANSI A117.1 – Accessible and Usable Buildings and Facilities.
 - 8. APA Engineered Wood Construction Guide.
 - 9. ASME A90.1 – Safety Standard for Belt Manlifts.

10. ASME B20.1 – Safety Standards for Conveyors and Related Equipment.
11. ASTM A36/A36M – Standard Specification for Carbon Structural Steel.
12. ASTM A167 – Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
13. ASTM A653/A653M – Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
14. ASTM B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
15. AWS D1.1 – Structural Welding Code - Steel.
16. CBC, Part 2, Section 11B-206.6, Section 11B-407.1, and Chapter 30.
17. California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6 – Elevator Safety Orders.
18. NEMA LD3 – High Pressure Decorative Laminates.
19. SFM Standard 12-7-4, Fire Door Assembly Tests.
20. UL 10B – Fire Door Assembly Tests.

1.6 SUBMITTALS

- A. Product Data: Submit manufacturer's product data for each system proposed for use. Include the following:
 1. Signal and operating fixtures, operating panels and indicators.
 2. Cab design, dimensions and layout.
 3. Controls, signals and operating system.
 4. Layout, finishes, accessories and available options.
 5. Hoistway door and frame details.
 6. Electrical characteristics and connection requirements.
 7. Expected heat dissipation of elevator equipment in machine room (BTU).
- B. Shop Drawings: Submit layout drawings. Drawings shall include, but not be limited to, the following:
 1. Car, guide rails, buffers and other components in hoistway.
 2. Maximum rail bracket spacing.
 3. Maximum loads imposed on guide rails requiring load transfer to building structure.
 4. Loads on hoisting beams.
 5. Clearances and travel of car.
 6. Clear inside hoistway and pit dimensions.
 7. Location and sizes of access doors, hoistway entrances and frames.
- C. Operations and Maintenance Manuals: Provide manufacturer's standard operations and maintenance manual.

1.7 SYSTEM DESCRIPTION: ELEVATOR ARRANGEMENT

A. Performance Requirements for Elevators:

1. Quantity and Elevator Numbers: Two elevators with designations of E1 and E2.
2. Type: Twin direct acting hydraulic cylinder without well holes.
3. Number of Stops: Four.
4. Number of Openings: Two front and two rear.
5. Rise: 29 feet - 4 inches.
6. Pit: 4 feet - 0 inches deep.
7. Rated Capacity and Speed: 4500 pounds; 150 feet per minute.
8. Cab Height: 10 feet - 0 inches.
9. Entrance Size and Type: 4 feet - 0 inches x 8 feet - 0 inches; two-speed doors.
10. Main Power Supply: 480 Volts + or – 5 percent of normal, 3 Phase, with a separate equipment grounding conductor.
11. Lighting Power Supply: 120 Volts, 1 Phase, 15 Amp, 60 Hz.
12. Stopping Accuracy: $\pm 1/4$ inch under any loading condition or direction of travel.
13. Door Opening Time: 4.5 seconds.

B. Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.

C. Car Operating Features

1. Full Collective Operation.
2. Single Speed Fan.
3. Solid State Starting
4. Remote elevator monitoring required.
5. Car-Stall Protection.
6. Firefighters' Service Phase I and Phase II.
7. Top of Car Inspection.
8. Rear Door Operation.
9. Access at Bottom Landing.
10. Solid State Starting.
11. Intercom provisions (Installed by Others).
12. Automatic Standby Power Operation with Manual Override.
 - a. This operation shall return each car automatically to a designated landing when the system is initially switched to standby power. One or more cars are returned at a time. Preference is given to loaded cars over empty cars in order to reduce passenger waiting times. A car must respond by beginning to move toward the designated landing within a pre-determined time. If a car does not respond, it is automatically placed in a "Not Available" mode while other cars are moved. If a car was not returned to the designated landing on the first try, a second attempt is made. If the second attempt is not successful, the car will remain in a "Not Available" mode

and can only be moved by manual means. Once each car has returned to the designated landing, the doors will remain open for a predetermined amount of time.

- b. When all cars have successfully returned to the designated landing or have attempted to move twice, automatic selection of the car(s) to run on normal operation will occur.
- c. If for any reason a car selected for normal operation under stand by power is delayed for 60 seconds, the car will be placed in a "Not Available" mode and another car will be selected for normal operation based on the priorities listed above.
- d. Manual Override of Standby Power Operation is achieved by a manual input for each car via a strip switch. A manually selected car may be run either in a return operation to a designated landing or in normal operation under standby power. If a manually selected car has not yet returned to the designated landing, it will perform this operation first then immediately go into normal operation.
- e. If a manually selected car is delayed, no other car can be selected in the group unless it is manually selected.
- f. If car selection is changed by Manual Override while a car is running in return or normal operation under standby power, the newly selected car will not be permitted to run until the car that is running has stopped, opened its doors, and gone into the Standby Power Wait state.

D. Door Control Features:

1. Closed Loop Door Operator is a closed loop, microprocessor based door operator system. The door operator will facilitate smooth operation under varying environmental influences such as, temperature, wind, friction, and component variation. The processor will monitor the door's actual position and velocity compared to its desired position and velocity. If variations are detected in the profile the command will be automatically corrected. The Closed Loop Door Operator control system shall not require machine room door control equipment.
2. Door noise not to exceed 58dBA.
3. Door control to open doors automatically when car arrives at a landing in response to a normal hall or car call.
 - a. Elevator doors shall be provided with a reopening device that will stop and reopen the car door(s) and hoistway door(s) automatically should the door(s) become obstructed by an object or person.
 - b. Primary door protection shall consist of a two dimensional, multi-beam array projecting across the car door opening. Under normal operation and for any door position, the system shall detect as a blockage an opaque object that is equal to or greater than 1.3 inches in diameter when inserted between the car doors at vertical positions from within 1 inch above the sill to 71 inches above the sill. Under degraded conditions (one or more blocked or failed beams), the primary protection shall detect opaque objects that are equal to or greater than 4 inches in diameter for the same vertical coverage. If the system performance is degraded to the point that the 4 inch object cannot be detected, the system shall maintain the doors open or permit closing only under nudging force conditions.
 - c. The door reopening device shall also include a secondary, three dimensional, triangular infrared multi-beam array projecting across the door opening and extending into the hoistway door zone. The door opening device will cause the doors

to reopen when it detects a person(s) or object(s) entering or exiting the car in the area between the hoistway doors or the entryway area adjacent to the hoistway doors.

- d. The size of the secondary protection zone shall vary as the door positions vary during opening and closing. The width of the zone shall be approximately one-third the size of the separation between the doors (or door and strike plate for single-slide doors) and shall be approximately centered in the door separation. In order to minimize detection of hallway passers-by who are not entering the elevator, the maximum zone penetration into the entryway shall not exceed 20 inches for any door separation. Normal penetration depth into the entryway from the car doors shall be approximately 14 inches for a door separation of 42 inches. The penetration shall reduce proportionally as the doors close. At door separations of 18 inches or less the secondary protection system may cease its normal operation since the depth of the zone recedes to where it is inside the hoistway doors. The vertical coverage of the secondary protection shall be approximately 19 inches above the sill to approximately 55 inches above the sill (mid-thigh to shoulder of a typical adult).
 - e. The secondary protection shall have an anti-nuisance feature which will ignore detection in the secondary zone after continual detection occurs for a significant time period in the secondary zone without corresponding detection in the primary protection zone; i.e. a person/object is in the entryway but does not enter. Normal secondary protection shall be re-enabled whenever a detection occurs in the primary zone.
 - f. The reaction time of the door detector sub-system shall not exceed 60 milliseconds when both primary and secondary protection capabilities are active; nor 40 milliseconds when the secondary protection is disabled.
4. Door nudging operation to occur if doors are prevented from closing for an adjustable period of time.

E. Provide equipment according to structural design criteria on Structural Drawings.

1.8 QUALITY ASSURANCE

- A. Manufacturer: Provide elevators manufactured by a firm with a minimum of ten years experience in fabrication of elevators equivalent to those specified. Elevator manufacturer shall be ISO 9002 certified.
- B. Installer: Elevators shall be installed by the manufacturer.
 - 1. Regulatory Requirements: Elevator system design and installation shall comply with the latest versions of ASME A17.1 and the following:
 - 2. Conform to applicable code for manufacture and installation of elevator systems.
 - 3. Conform to California Code of Regulations, Title 8, Division 1, Chapter 4, Subchapter 6 – Elevator Safety Orders.
 - 4. Conform to ANSI A117.1 and Americans with Disabilities Act Accessibility Guidelines (ADAAG) for provisions for the physically disabled.
 - 5. Conform to the accessibility requirements of CCR, T-24.
 - 6. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc., and suitable for the purpose specified and indicated.

- C. Permits and Inspections: Provide licenses and permits and perform required inspections and tests.
- D. Coordination and Pre-Installation Meetings:
 - 1. Conduct pre-installation meeting in accordance with provisions of Division 01.
 - 2. Convene pre-installation meeting at least two weeks prior to commencing work of this Section.
 - 3. Take minutes of meeting. Distribute to all attendees and concerned parties within five days of meeting.
 - 4. Coordinate work in this Section with work in related Sections.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Should the building or the site not be prepared to receive the elevator equipment at the agreed upon date, the General Contractor will be responsible to provide a proper and suitable storage area on or off the premises.
- B. Should the storage area be off-site and the equipment not yet delivered, then the elevator contractor, upon notification from the General Contractor, will divert the elevator equipment to the storage area. If the equipment has already been delivered to the site, then the General Contractor shall transport the elevator equipment to the storage area. The cost of elevator equipment taken to storage by either party, storage, and redeliver to the job site shall not be at the expense of the elevator contractor.

1.10 WARRANTY

- A. The elevator contractor's acceptance is conditional on the understanding that their warranty covers defective material and workmanship. The guarantee period shall not extend longer than one year from the date of completion or acceptance thereof by beneficial use, whichever is earlier, of each elevator. The guarantee excludes ordinary wear and tear or improper use, vandalism, abuse, misuse, or neglect or any other causes beyond the control of the elevator contractor and this express warranty is in lieu of all other warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose.

1.11 MAINTENANCE SERVICE

- A. Maintenance service consisting of regular examinations, adjustments and lubrication of the elevator equipment shall be provided by the elevator contractor for a period of twelve months after the elevator has been turned over for the customer's use. This service shall not be subcontracted but shall be performed by the elevator contractor. All work shall be performed by competent employees during regular working hours of regular working days and shall include emergency 24-hour callback service. This service shall not cover adjustments, repairs or replacement of parts due to negligence, misuse, abuse or accidents caused by persons other than the elevator contractor. Only genuine parts and supplies as used in the manufacture and installation of the original equipment shall be provided.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A. Basis-of-Design: Schindler 330A Holeless Hydraulic Elevator.
- B. Otis Elevator Company.
- C. ThyssenKrupp.
- D. Substitutions:
 - 1. Under provisions of Division 01.
 - 2. Basis-of-Design Product Specification: Where a specific manufacturer's product is named and accompanied by the words "basis of design", including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other manufacturers, whether listed or not. Submit a substitution request for any product, by any manufacturer, listed or not listed, other than the product(s) listed as "basis-of-design".

2.2 EQUIPMENT: MACHINE ROOM COMPONENTS

- A. The hydraulic system shall be of compact design suitable for operation under the required pressure. The power component shall be mounted in the hydraulic-fluid storage tank. The control valve shall control flow for up and down directions hydraulically and shall include an integral check valve. A control section including control solenoids shall direct the main valve and control: up and down starting, acceleration, transition from full speed to leveling speed, up and down stops, pressure relief and manual lowering. All of these functions shall be fully adjustable for maximum smoothness and to meet contract conditions. System to be provided with a muffler, low-pressure switch and a shut-off valve.
- B. A microprocessor-based controller shall be provided, including necessary starting switches together with all relays, switches, solid-state components and hardware required for operation, including door operation, as described herein. A three phase overload device shall be provided to protect the motor against overloading.
- C. A manual lowering feature shall permit lowering the elevator at slow speed in the event of power failure or for adjusting purposes.
- D. Tank heater.
- E. Low-oil control
- F. Pressure switch.

2.3 EQUIPMENT: HOISTWAY COMPONENTS

- A. Plunger(s) and Cylinder(s): Each cylinder shall be constructed of steel pipe of sufficient thickness and suitable for the operating pressure. The top of each cylinder shall be equipped with a cylinder head with a drip ring to collect any oil seepage as well as an internal guide ring and self-adjusting packing. Each plunger shall be constructed of selected steel tubing or pipe of proper diameter machined true and smooth with a fine polished finish. Each plunger shall be provided with a stop ring electrically welded to it to prevent the plunger from leaving the cylinder. Each plunger and cylinder shall be installed plumb and shall operate freely with minimum friction.
- B. Hydraulic fluid shall be non-combustible type.

- C. Car Guide Rails: Tee-section steel rails with brackets and fasteners.
- D. Spring Buffer: Helical coil spring type.
- E. Wiring: Wiring for hoistway electrical devices included in scope of the elevator system, hall panels, pit emergency stop switch, and the traveling cable for the elevator car.
- F. Hoistway Entrances:
 - 1. Frames: Entrance frames shall be of bolted construction for complete one-piece unit assembly. All frames shall be securely fastened to fixing angles mounted in the hoistway and shall be of 14-gauge sheet steel. Provide additional sill angle support for 4 foot-0 inch wide two speed opening door arrangement. Sills shall be extruded aluminum.
 - 2. Doors: Entrance doors shall be of hollow metal construction with vertical internal channel reinforcements.
 - 3. Fire Rating: Entrance and doors shall be UL fire rated for 1-1/2 hour.
 - 4. Entrance Finish: Stainless steel with satin finish.
 - 5. Entrance Markings: Entrance jambs shall be marked with 4 inch x 4 inch plates having raised floor markings with contracted Grade 2 Braille adjacent. Markings shall be provided on both sides of the entrance.
 - 6. Sight Guards: Black sight guards will be furnished with any metal finish door. Powder paint matching sight guards will be furnished with powder paint doors.

2.4 EQUIPMENT: CAR COMPONENTS

- A. Platform, Heavy Loading Type: The car platform shall be arranged to accommodate one-piece loads weighing up to 25 percent of the rated capacity. The platform shall be recessed 5/16 inch for flooring by others.
- B. Cab: Cab walls and ceiling shall be 14-gauge sheet stainless steel with brushed finish.
- C. Car Front Finish: Stainless steel with brushed finish.
- D. Car Door Finish: Stainless steel with brushed finish.
- E. Car top to be of wood material clad on both sides with a natural finish aluminum panel.
- F. Ceiling Type: Suspended security metal ceiling with 1 x 4 recessed LED light configuration, detention rated and tamper resistant.
- G. Emergency Car Lighting: An emergency power unit employing a six volt, sealed rechargeable battery and totally static circuits shall be provided to illuminate the elevator car and provide current to the emergency siren in the event of building power failure.
- H. Emergency Pulsating Siren: Siren mounted on top of the car that is activated when the Alarm button in the car operating panel is engaged. Siren shall have a rated sound pressure level of 80 dba at a distance of three meters from the device. Siren shall respond with a delay of not more than 1 second after the switch or push button has been pressed
- I. Exhaust Fan: An exhaust fan shall be mounted on the car top.
- J. Utility Outlet: A 125V, 15 amperes utility outlet with ground-fault circuit-interrupter protection shall be furnished on top of the cab.

- K. Threshold: Stainless steel.
- L. An electrical contact shall be provided on the car-top exit with door position connected to central security control monitoring.
- M. Kickplate for car doors: Satin stainless steel.
- N. Applied Base Finish: Satin stainless steel.
- O. Applied Reveal Finish: Satin stainless steel.

2.5 EQUIPMENT: SIGNAL DEVICES AND FIXTURES

- A. Car-Operating Panel: Panel shall provide space for intercom call station provided under Specification Section 28 15 00 and fire control key switch.
- B. Car Fixture Finish: Stainless steel with satin finish.
 - 1. Applied car operating panel shall be furnished. It shall contain a bank of square fixed buttons marked to correspond to the landings served and that illuminate upon arrival, and key switches for lights, inspection, and the exhaust fan.
- C. Car Position Indicator: A 16-segment, digital, vacuum fluorescent car position indicator shall be integral to the car operating panel.
- D. Security Monitoring: Elevators shall have full time visual and audio monitoring connected to central security control monitoring.
- E. Communications equipment and connections to the building service system shall be furnished and installed as work of electrical subcontractor. The telephone instrument shall be furnished by the electrical subcontractor.
- F. Car Lantern and Chime: A directional lantern visible from the corridor shall be provided in the car entrance. When the car stops and the doors are opening, the lantern shall indicate the direction in which the car is to travel and a chime will sound.
- G. Hall Fixtures: Hall fixtures shall be provided with necessary call buttons and key switches for elevator operation. Raised markings shall be provided for each push-button.
- H. An illuminated signal marked "ELEVATOR EMERGENCY POWER" shall be provided in the elevator lobby at the designated level to indicate that the normal power supply has failed and the emergency or standby power is in effect.
- I. Fixture Finish: Stainless steel with satin finish.
- J. Landing Passing Signal: A chime bell shall sound in the car to tell a passenger that the car is either stopping at or passing a floor served by the elevator.
- K. Provide hall position indicator at each landing.
- L. Combination Hall Position Indicator and Hall Lanterns at landings.

2.6 PROVISIONS FOR THE PHYSICALLY DISABLED

- A. Comply with CBC Chapter 11B and ANSI A117.1, to the degree described in the Contract Documents.

- B. Provide indicators in conformance with ANSI A117.1.
- C. Locate the center of the intercom call station no more than 48 inches above floor level.
- D. Sound audible tone signal in car when car is stopping at a floor.
- E. Include audible tone signals with illuminated landing indicators: once for UP stops and twice for DOWN stops.
- F. At each floor landing, provide vandal-proof floor designations in both raised characters and Braille on both jambs of elevator hoistway entrances. Comply with CBC Sections 11B-407.2.3.1 and 11B-703.
- G. At main entry level, provide raised characters, Braille, and five pointed raised star placed to the left of the floor designation on both jambs of elevator hoistway entrance per 11B-407.2.3.1.
- H. The clearance between the car platform sill and the edge of the hoistway landing shall be no greater than 1-1/4 inches per CBC Section 11B-407.4.3.
- I. Elevator car shall be equipped with a self-leveling feature that will automatically bring and maintain the car at floor landings within a tolerance of 1/2 inch under rated loading to zero loading conditions per CBC 11B-407.4.4.
- J. Provide minimum acceptable time from notification that a car is answering a call (lantern and audible signal) until the doors of the car start to close using the formula stated in CBC Section 11B-407.3.4.
- K. Elevator doors shall remain fully open in response to a car call for five seconds minimum per CBC Section 11B-407.3.5.
- L. The level of illumination at the car controls, platform, car threshold, and car landing sill when the car and landing doors are open shall be not less than five foot-candles (54 lux) per CBC Section 11B-407.4.5.

PART 3 EXECUTION

3.1 PREPARATION

- A. Take field dimensions and examine conditions of substrates, supports, and other conditions under which this work is to be performed. Do not proceed with work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Installation of all elevator components except as specifically provided for elsewhere by others.

3.3 INSTALLATION

- A. Install elevators per manufacturer's written instructions and accepted shop drawings.
- B. Install all elevator components except as specifically provided for elsewhere by others.

- C. Install in accordance with ANSI/ASME A17.1.
- D. Install system components. Connect equipment to building utilities. Install piping between hoistway plunger and pump unit.
- E. Provide conduit, boxes, wiring and accessories.
- F. Mount motor and pump unit on vibration and acoustic isolators, on a bed plate and concrete pad. Place unit on structural supports and bearing plates. Securely fasten to building supports. Prevent lateral displacement.
- G. Accommodate equipment in space indicated.
- H. Install guiderails using threaded bolts with metal shims and lock washers under nuts. Compensate for expansion and contraction movement of guiderails.
- I. Accurately machine and align guiderails. Form smooth joints with machined splice plates.
- J. Bolt or weld brackets directly to structural steel hoistway framing.
- K. Field Welds: Chip and clean away oxidation and residue, then wire brush; spot prime with two coats of primer.
- L. Coordinate installation of hoistway wall construction.
- M. Install hoistway door sills, frames and headers in hoistway walls. Grout sills in place. Set entrances in vertical alignment with car openings and aligned with plumb hoistway lines.

3.4 TOLERANCES

- A. Guiderail Alignment: Plumb and parallel to each other within 1/8 inch in accordance with ANSI/ASME A17.1 and ANSI/ASME A17.2.
- B. Cab Movement on Aligned Guiderails: Smooth movement with no objectionable lateral or oscillating movement or vibration.

3.5 FIELD QUALITY CONTROL

- A. Field inspection and testing will be performed under provisions of Division 01.
- B. Perform tests required by regulatory agencies.
- C. Provide two weeks' written notice of date and time of tests.
- D. Supply instruments and execute specific tests.
- E. Perform the following tests in the presence of the Owner and Architect:
 - 1. Test elevator system by transporting at least-rated capacity up from main floor during a five minute period.
 - 2. At an agreed time during the contract warranty period and with the building normally occupied using normal building traffic, conduct tests to verify performance. Furnish event recording of all hall call registrations, time initiated and response time throughout entire normal working day.

3.6 TESTS BY REGULATORY AGENCIES

- A. Testing by regulatory agencies will be performed at their discretion and documented by the Contractor under provisions of Division 01.
- B. Obtain required permits to perform tests. Perform tests required by regulatory agencies.
- C. Schedule tests with agencies with Architect, Owner, Construction Manager, and Contractor present.
- D. Furnish test and approval certificates issued by jurisdictional authorities.

3.7 ADJUSTING

- A. Adjust work under provisions of Division 01.
- B. Adjust for smooth acceleration and deceleration of car so as to not cause passenger discomfort.
- C. Adjust automatic floor leveling feature at each floor to achieve 1/4 inch from flush.
- D. Adjust equipment for smooth and quiet operation.

3.8 CLEANING

- A. Clean work under provisions of Division 01.
- B. Remove protective coverings from finished surfaces.
- C. Clean surfaces and components ready for inspection.

3.9 PROTECTION OF FINISHED WORK

- A. Protect finished work under provisions of Division 01.
- B. Do not permit construction traffic within cab after cleaning.

3.10 DEMONSTRATION

- A. The elevator contractor shall make a final check of each elevator operation with the Owner or Owner's representative present prior to turning each elevator over for use. The elevator contractor shall determine that control systems and operating devices are functioning properly and shall demonstrate and instruct the control operations to the Owner's personnel. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

END OF SECTION

SECTION 14 42 16
VERTICAL WHEELCHAIR LIFTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Vertical platform wheelchair lift installed within enclosure.

1.2 RELATED SECTIONS

- A. Section 03 30 00 – Cast-In-Place Concrete.
- B. Section 08 71 00 – Door Hardware.
- C. Section 09 22 16 – Non-Structural Metal Framing.
- D. Section 09 29 00 – Gypsum Board: Gypsum board shaftway.
- E. Division 26 – Electrical: Dedicated telephone service and wiring connections.
- F. Division 26 – Electrical: Lighting and wiring connections at top of shaft.
- G. Division 26 – Electrical: Electrical power service and wiring connections.

1.3 REFERENCES

- A. ASME A17.1 – Safety Code for Elevators and Escalators.
- B. ASME A17.5 – Elevator and Escalator Electrical Equipment.
- C. ASME A18.1 – Safety Standard for Platform Lifts and Stairway Chairlifts.
- D. ICC/ANSI A117.1 – Accessible and Usable Buildings and Facilities.
- E. NFPA 70 – National Electric Code.

1.4 SUBMITTALS

- A. Submit under provisions of Division 01.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Submit manufacturer's installation instructions, including preparation, storage and handling requirements.
 - 2. Include complete description of performance and operating characteristics.
 - 3. Show maximum and average power demands.
- C. Shop Drawings:
 - 1. Show typical details of assembly, erection and anchorage.
 - 2. Include wiring diagrams for power, control, and signal systems.
 - 3. Show complete layout and location of equipment, including required clearances and coordination with shaftway.

- D. Selection Samples: For each finished product specified, provide two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- E. Verification Samples: For each finished product specified, two samples, minimum size 6 inches square, representing actual product, color, and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Firm with minimum ten years experience in manufacturing of vertical platform lifts, with evidence of experience with similar installations of type specified.
- B. Installer Qualifications: Licensed to install equipment of this scope, with evidence of experience with specified equipment. Installer shall maintain an adequate stock of replacement parts, have qualified people available to ensure fulfillment of maintenance and callback service without unreasonable loss of time in reaching project site.

1.6 REGULATORY REQUIREMENTS

- A. Provide platform lifts in compliance with:
 - 1. ASME A17.1 – Safety Code for Elevators and Escalators.
 - 2. ASME A17.5 – Elevator and Escalator Electrical Equipment.
 - 3. ASME A18.1 – Safety Standard for Platform Lifts and Stairway Chairlifts.
 - 4. NFPA 70 – National Electric Code.
- B. Seismic Design: In accordance with 2013 CBC and Structural Design Criteria indicated on Structural Drawings.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store components off the ground in a dry covered area, protected from adverse weather conditions.

1.8 PROJECT CONDITIONS

- A. Do not use wheelchair lift for hoisting materials or personnel during construction period.

1.9 WARRANTY

- A. Warranty: Manufacturer shall warrant the wheelchair lift materials and workmanship for two years following completion of installation.
- B. Extended Warranty: Provide an extended manufacturer's warranty for the entire warranty period covering the wheelchair lift materials and workmanship for five additional years beyond the initial two year warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Garaventa Lift, Blaine, WA; 800-663-6556, www.garaventallift.com. Product: Genesis Vertical Lift, Enclosure Model GVL-EN-120.
2. Savaria Corporation.
3. The National Wheel-O-Vator Co., Inc.

B. Substitutions: Under provisions of Division 01.

2.2 VERTICAL WHEELCHAIR LIFT

A. Capacity: 750 pounds rated capacity with a safety factor of 5.

B. Vertical Rise: 9 feet - 4 inches.

C. Platform Dimensions: 37-1/4 inches wide x 54 inches long.

D. Platform Configuration: Straight Through Entry/Exit: Front and rear openings.

E. Landing Openings:

1. Lower Landing: Door.
2. Upper Landing: Gate.

F. Doors and Gates: Doors and gates shall be self-closing type.

1. Door Height: Flush mount, 80 inches.
2. Gate Height: Flush mount, 42-1/8 inches.
3. Door Construction: Aluminum frame with panels of 3/16 inch thick clear Plexiglas with 16 gauge galvanized steel kick plate.
4. D-Handle Pull: 12 inch offset D-Handle.

G. Power Door/Gate Operator: Automatically opens the door/gate when platform arrives at a landing. Door/gate shall also open at landing by pressing call button.

1. ADA compliant and obstruction sensitive.
2. Low voltage, 24 VDC with all wiring concealed.
3. Provide power operators at the following locations:
 - a. Lower Landing: Door.
 - b. Upper Landing: Gate.

H. Lift Components:

1. Machine Tower: Custom aluminum extrusion.
2. Base Frame: Structural steel.
3. Platform Side Wall Panels: 42-1/8 inches high, 16 gauge galvanized steel sheet. Custom aluminum extrusion tubing frame.
4. Enclosure Panels: 3/16 inch clear Plexiglas.

- I. Enclosure Height Above Upper Landing: Enclosure shall extend 42-1/8 inches above the upper landing level.
- J. Infill Panel Kit: Provide 16 gauge galvanized panels and mounting hardware to cover void between side of enclosure, drive mast, and adjacent wall at the following locations:
 - 1. Lower landing.
 - 2. Upper landing.
- K. Base Mounting and Access to Lift at Lower Landing:
 - 1. Pit Mount: Lift shall be mounted in pit with dimensions to meet manufacturer's requirements for the platform size specified. Pit construction shall be in accordance with provisions of Section 03 30 00.
- L. Leadscrew Drive:
 - 1. Drive Type: Self-lubricating acme screw drive.
 - 2. Emergency Operation: Manual handwheel device to raise or lower platform.
 - 3. Battery Powered Emergency Lowering: Battery powered platform lowering device that automatically activates in the event of power failure and allows passenger to drive platform downward to lower landing. Will not operate lift in up direction.
 - 4. Safety Device: Integral safety nut assembly with safety switch.
 - 5. Travel Speed: 10 feet per minute.
 - 6. Motor: 2.0 horsepower.
 - 7. Power Supply: 120 VAC single phase; 60 Hz on a dedicated 20 amp circuit.
- M. Platform Controls: 24 VDC control circuit with the following features:
 - 1. Direction Control: Direction Control: Illuminated tactile and constant pressure push buttons with dual platform courtesy lights and safety light.
 - 2. Illuminated and audible emergency stop switch shuts off power to lift and activates audio alarm equipped with battery backup.
 - 3. Keyless operation.
 - 4. Emergency Telephone: Platform shall be equipped with ADA compliant autodialer telephone with a stainless steel faceplate. Telephone shall operate in the event of power failure. A telephone line shall be supplied to the lift site as specified under Division 26.
 - 5. Arrival gong and digital floor display.
- N. Call Station Controls: 24 VDC control circuit with the following features:
 - 1. Direction Control: Illuminated tactile and constant pressure buttons with illuminated "in-use" indicator.
 - 2. Keyless operation.
 - 3. Call Station Mounting:
 - a. Lower: Frame mounted.
 - b. Upper: Frame mounted.

O. Safety Devices and Features:

1. Grounded electrical system with upper, lower, and final limit switches.
2. Tamper resistant interlock to electrically monitor that the door/gate is in the closed position and the lock is engaged before lift can move from landing.
3. Pit stop switch mounted on mast wall.
4. Electrical disconnect shall shut off power to the lift.

P. Finishes:

1. Aluminum Extrusions: Champagne anodized finish.
2. Ferrous Components: Electrostatically applied baked powder finish, fine textured.
 - a. Color: Satin Grey, RAL 7030.
3. Lift Finish: Baked powder coat finish as selected by the Architect from manufacturer's optional RAL color chart.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. Verify shaft and machine space are of correct size and within tolerances.
- C. Verify required landings and openings are of correct size and within tolerances.
- D. Verify electrical rough-in is at correct location.
- E. If substrate preparation is the responsibility of another installer, notify Architect of any unsatisfactory preparation before proceeding.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

- A. Install platform lifts in accordance with applicable regulatory requirements including ASME A17.1, ASME A18.1, and the manufacturer's instructions.
- B. Install system components and connect to building utilities.
- C. Accommodate equipment in space indicated.
- D. Startup equipment in accordance with manufacturer's instructions.
- E. Adjust for smooth operation.

3.4 FIELD QUALITY CONTROL

- A. Perform tests in compliance with ASME A17.1 or A18.1 and as required by authorities having jurisdiction.
- B. Schedule tests with agencies and Architect, Owner, and Contractor present.

3.5 PROTECTION

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

END OF SECTION

DIVISIONS 15 – 20
NOT USED

