PROJECT MANUAL

Construction Documents for

Fellsmere Elementary School
Single Point Entrance Addition

50 N Cypress St.
Fellsmere, FL 32948

S+A Project #18031

School District of Indian River County

School Board of Indian River County, Florida

Facilities Planning & Construction
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Vero Beach, Florida 32967

ARCHITECT
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STRUCTURAL
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Ft. Pierce, FL 34950

100% Documents **1/10/2019**

SECTION 02 41 16 - STRUCTURE DEMOLITION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

1. Section Includes:
   a. Demolition and removal of buildings and site improvements.
   b. Abandoning in-place and/or removing below-grade construction.
   c. Disconnecting, capping or sealing, and abandoning in-place or removing site utilities.
   d. Salvaging items for reuse by Owner.

2. Related Sections:
   a. Section 011000 "Summary" for use of the premises and phasing requirements.
   b. Section 013200 "Construction Progress Documentation" for preconstruction photographs taken before building demolition.
   c. Section 024119 "Selective Demolition" for partial demolition of buildings, structures, and site improvements.

1.3 DEFINITIONS

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

2. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse. Include fasteners or brackets needed for reattachment elsewhere.

3. National Emissions Standards for Hazardous Air Pollutants (NESHAP) Demolition: The wrecking or taking out of any load supporting structural member of a facility.

4. Hazardous Materials and Hazardous Building Components: A poison, corrosive agent, flammable substance, explosive, radioactive chemical, or any other material which can endanger the environment or human health if handled improperly.

1.4 MATERIALS OWNERSHIP

1. Unless otherwise indicated, demolition waste becomes property of Contractor unless as specifically included in salvage schedule on demolition plans.

2. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner, unless as specifically included in salvage schedule on demo plans that may be uncovered during demolition remain the property of Owner.

   a. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 INFORMATIONAL SUBMITTALS

1. Qualification Data: For qualified refrigerant recovery technician.

2. Proposed Protection Measures: Submit informational report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
   a. Adjacent Buildings: Detail special measures proposed to protect adjacent buildings to remain including means of egress from those buildings.

3. Schedule of Building Demolition Activities: Indicate the following:
   a. Detailed sequence of demolition work, with starting and ending dates for each activity.
   b. Temporary interruption of utility services.
   c. Shutoff and capping or re-routing of utility services.

4. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.

5. Predemolition Photographs, and/or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces that might be misconstrued as damage caused by demolition operations. Comply with Section 013233 "Photographic Documentation." Submit before the Work begins.

6. Landfill Records: Indicate receipt and acceptance of permitted asbestos containing materials landfill facility licensed to accept asbestos containing materials.

7. Retain paragraph below for refrigerant recovery or if refrigerant recovery is not specified in Section 017419 "Construction Waste Management and Disposal."

8. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present is identified in pounds, the total amount of refrigerant which is recovered is identified in pounds, and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

9. Removal of all Regulated Asbestos Containing Materials (RACM) from a facility being demolished must be documented before any disruptive activity begins.

10. Asbestos containing material (ACM) identified by the Licensed Asbestos Consultant in the National Emission Standards Hazardous Air Pollutants (NESHAP) pre-demolition survey, which are determined to remain in place during demolition by the Owner must comply with applicable Federal, State, and Local regulations regarding waste disposal and wet demolition. Pre-renovation and/or pre-demolition asbestos surveys shall be included in the bid documents for the demolition or renovation of the facility.

11. At least one trained supervisor employed by the owner and/or operator is required to be present at any facility which is being demolished or renovated and is regulated by NESHAP. Evidence of the training must be posted and made available for inspection at the demolition or renovation site.

1.6 QUALITY ASSURANCE

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

2. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition, including but not limited to, the ten day notification. Comply with hauling and disposal regulations authorities having jurisdiction.

3. Standards: Comply with ANSI/ASSE and NFPA.

4. Predemolition Conference: Conduct conference at Project site.
   a. Inspect and discuss condition of construction to be demolished.
   b. Review structural load limitations of existing structures.
   c. Review and finalize building demolition schedule and verify availability of demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   d. Review and finalize protection requirements.
   e. Review procedures for noise control and dust control.
   f. Review procedures for protection of adjacent buildings.
   g. Review items to be salvaged and returned to Owner.
   h. Review asbestos NESHAP survey for potential asbestos containing materials remaining in building.

1.7 PROJECT CONDITIONS

1. Buildings to be demolished will be vacated and their use discontinued before start of the Work.

2. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
   a. Provide not less than (72) hours' notice of activities that will affect operations of adjacent occupied buildings.
   b. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
      1) Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

3. Owner assumes no responsibility for buildings and structures to be demolished.
   a. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
   b. Before building demolition, Owner will remove the items as outlined in the salvage schedule of the demolition plans.

4. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

   a. Hazardous materials will be removed by Owner before start of the Work.
   b. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

5. Regulated Asbestos Containing Materials: It is not expected that regulated asbestos containing materials will be encountered in the Work.
   a. Regulated asbestos containing materials will be removed by Owner before start of the Work.
   b. If RACM is encountered, do not disturb; immediately notify Architect and Owner. RACM will be removed by Owner under a separate contract.

c. ACM identified by the Licensed Asbestos Consultant in the NESHAP pre-demolition survey, which is determined to remain in place by the Owner during demolition must comply with applicable Federal, State, and Local regulations regarding waste disposal and wet demolition.

6. Hazardous Materials, Hazardous Building Components, and Regulated Asbestos Containing Materials: The aforementioned materials are present in buildings and structures to be demolished. A report on the presence of these materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
   a. Hazardous material remediation and asbestos abatement are specified elsewhere in the Contract Documents.
   b. Do not disturb hazardous materials, asbestos containing materials, or items suspected of containing these materials except under procedures specified elsewhere in the Contract Documents.
   c. Owner will provide material safety data sheets for materials that are known to be present in buildings and structures to be demolished because of building operations or processes performed there.

7. On-site storage or sale of removed items or materials is not permitted.

1.8 COORDINATION

1. Arrange demolition schedule so as not to interfere with Owner's on-site operations or operations of adjacent occupied buildings.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

1. Satisfactory Soils: Comply with requirements in Section 312000 "Earth Moving."

PART 3 EXECUTION

3.1 EXAMINATION

1. Verify that utilities have been disconnected and capped before starting demolition operations.

2. Review Project Record Documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

3. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations. Comply with Section 013233 "Photographic Documentation."

4. Perform; engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during building demolition operations.
   a. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.

5. Verify that hazardous materials and hazardous building components have been removed before proceeding with building demolition operations.

6. Verify that regulated asbestos containing materials have been abated before proceeding with building demolition operations.

7. Perform wet demolition during building demolition operations where known asbestos containing materials are allowable per the asbestos NESHAP pre-demolition survey. Comply with all applicable waste disposal and wet demolition regulations.

3.2 PREPARATION

1. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.

2. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
   a. Owner will arrange to shut off indicated utilities when requested by Contractor.
   b. Arrange to shut off indicated utilities with utility companies.
   c. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
   d. Cut off pipe or conduit a minimum of 24 inches below grade. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.

3. Existing Utilities: See plumbing and electrical Sections for shutting off, disconnecting, removing, and sealing or capping utilities. Do not start demolition work until utility disconnecting and sealing have been completed and verified in writing.

4. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.
   a. Strengthen or add new supports when required during progress of demolition.

3.3 PROTECTION

1. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

2. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations.
   a. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.
   b. Provide temporary services during interruptions to existing utilities, as acceptable to Owner and authorities having jurisdiction.
      1) Provide at least (72) hours' notice to occupants of affected buildings if shutdown of service is required during changeover.

3. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 015000 "Temporary Facilities and Controls."
   a. Protect adjacent buildings and facilities from damage due to demolition activities.
   b. Protect existing site improvements, appurtenances, and landscaping to remain.
   c. Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of trees to remain.
   d. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   e. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
   f. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.

g. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

4. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION, GENERAL

1. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations and as follows:
   a. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
   b. Maintain fire watch during and for at least (Insert number) hours after flame cutting operations.
   c. Maintain adequate ventilation when using cutting torches.
   d. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.

2. Engineering Surveys: During demolition, perform surveys to detect hazards that may result from building demolition activities.

3. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   a. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.
   b. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations. Do not use water when it may damage adjacent construction or create hazardous or objectionable conditions, such as ice, flooding, and pollution.

4. Explosives: Use of explosives is not permitted.

3.5 DEMOLITION BY MECHANICAL MEANS

1. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

2. Remove debris from elevated portions of the building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
   a. Remove structural framing members and lower to ground by method suitable to minimize ground impact and dust generation.

3. Salvage: Items to be removed and salvaged are indicated on Drawings.

4. Below-Grade Construction: Abandon foundation walls and other below-grade construction. Cut below-grade construction flush with grade.

5. Below-Grade Construction: Demolish foundation walls and other below-grade construction that are within footprint of new construction and extending (5 feet) outside footprint indicated for new construction. Abandon below-grade construction outside this area.
   a. Remove below-grade construction, including basements, foundation walls, and footings, to depths indicated.

6. Below-Grade Construction: Demolish foundation walls and other below-grade construction.

a. Remove below-grade construction, including basements, foundation walls, and footings, to depths indicated.

7. Existing Utilities:

a. Abandon existing utilities and below-grade utility structures. Cut utilities flush with grade.
b. Demolish existing utilities and below-grade utility structures that are within (5 feet) outside footprint indicated for new construction. Abandon utilities outside this area.
   1) Fill abandoned utility structures with approved material according to backfill requirements in Section 312000 "Earth Moving."
   2) Piping: Disconnect piping at unions, flanges, valves, or fittings.
   3) Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.
c. Demolish and remove existing utilities and below-grade utility structures.
   1) Piping: Disconnect piping at unions, flanges, valves, or fittings.
   2) Wiring Ducts: Disassemble into unit lengths and remove plug-in and disconnecting devices.

3.6 SITE RESTORATION

1. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

3.7 REPAIRS

1. Promptly repair damage to adjacent buildings caused by demolition operations.

3.8 DISPOSAL OF DEMOLISHED MATERIALS

1. Remove demolition waste materials from Project site [and legally dispose of them in an EPA-approved landfill acceptable to authorities having jurisdiction. See Section 017419 “Construction Waste Management and Disposal" for recycling and disposal of demolition waste.
   a. Do not allow demolished materials to accumulate on-site.
   b. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
2. Do not burn demolished materials.

3.9 CLEANING

1. Clean adjacent structures and improvements of dust, dirt, and debris caused by building demolition operations. Return adjacent areas to condition existing before building demolition operations began.
   a. Clean roadways of debris caused by debris transport.

END OF 02 41 16

EXTERIOR CONCRETE FLATWORK CHECKLIST

SECTION 03 00 00

PART 1 – PRE-INSTALLATION DO'S AND DON'TS

1.1 DO'S

- ☐ Do compact the subgrade in full conformance with the geotechnical report.
- ☐ Do provide a smooth subgrade surface that is free of ruts so that the slab is not restrained from freely shrinking.
- ☐ Do ensure that the subgrade is moist, but with no standing water, while the concrete is being placed.
- ☐ Do verify correct concrete mix (must include 1" aggregate to reduce drying shrinkage) is being used and that the slump and time limits are acceptable.
- ☐ Do place, consolidate and finish the concrete in a timely manner.
- ☐ Do be prepared to protect newly placed concrete from rain.
- ☐ Do provide a uniform application of curing compound immediately after finishing and in full conformance with the manufacturer's recommendations.
- ☐ Do joint the slab in a timely manner. If slab is to be sawcut, make the cut ¼ the slab depth with an early-entry 1/8" wide diamond blade as soon as possible and within 12 hours of finishing. This **will be strictly enforced.**

1.2 DON'TS

- ☐ Don't add water to the concrete in the field UNLESS the supplier has purposely withheld water at the plant and has specifically indicated on the batch ticket the maximum amount that can be added in the field. Never exceed the supplier's maximum field added water limit. This will be strictly enforced.
- ☐ Don't create vertical faces beneath the slab where the slab changes thickness. Doing so will bind the slab and prevent free horizontal movement that is necessary for good crack control. Instead, gradually slope the bottom of the slab.
- ☐ Don't place a vapor barrier/retarder beneath the slab.
- ☐ Don't dust the surface of rain damaged area(s) with pure portland cement.
- ☐ Don't delay the application of the curing compound.
- ☐ Don't wait more than 12 hours to sawcut the slab.
- ☐ Don't allow automobile traffic on the slab for a minimum of 7 days. Other heavier traffic should not be allowed on 4" thick slabs at all.

END OF SECTION 03 00 00

SECTION 03 11 00 – CONCRETE FORMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The extent of formwork is indicated by the cast-in-place concrete structures shown on the Drawings.

B. The Work includes providing formwork, and shoring, for cast-in-place concrete and installation into formwork of items furnished by others, such as anchor bolts, setting plates, bearing plates, anchorages, inserts, frames, nosings, and other items to be embedded in concrete (but not including reinforcing steel).

1.3 SUBMITTALS

A. Product Data; Concrete Formwork: Submit 2 copies of manufacturer's data and installation instructions for proprietary materials including form coatings manufactured form systems, form liners, ties, accessories, and other items specified herein.

B. Concrete Shoring Formwork: Provide shop drawings, catalog cuts, and calculations signed and sealed by a Professional engineer registered in the State of Florida.

1.4 QUALITY ASSURANCE

A. Examine the substrate and the conditions under which concrete formwork is to be performed and notify the Architect in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected. Contractors shall be licensed and exhibit 5 years experience in similar projects.

B. Codes and Standards: Unless otherwise shown or specified, design, construct, erect, maintain, and remove forms and related structures for cast-in-place concrete Work in compliance with the current accepted American Concrete Institute Standard ACI 347, "Guide to Formwork for Concrete."

C. Allowable Tolerances

1. Construct formwork to provide completed cast-in-place concrete surfaces complying with the tolerances specified in ACI 347 and as follows:

a. Variation from plumb in lines and surfaces of columns, piers, walls, and arises; 1/4 inch per 10 feet, but not more than one inch. For exposed corner columns, control joint grooves, and other conspicuous lines, 1/4 inch in a bay or 20 feet maximum; 1/2" maximum in 40 ft. or more.
b. Variation in sizes and locations of sleeves, floor openings, and wall openings, 1/4

inch.

c. Variations in footings plan dimensions, minus 1/2 inch and plus 2 inches; misplacement or eccentricity, 2 percent of the footing width in direction of misplacement but not more than 2 inches; thickness reduction, minus 5 percent.

2. Before concrete placement, check the lines and levels of erected formwork. Make corrections and adjustments to ensure proper size and locations of concrete members and stability of forming systems.
3. During concrete placement, check formwork and related supports to ensure that forms are not displaced and that completed Work will be within specified tolerances.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Forms for Exposed Finish Concrete

1. Unless otherwise shown or specified, construct formwork for exposed concrete surfaces with plywood, metal, metal-framed, plywood-faced, or other panel type materials acceptable to Architect, to provide continuous, straight, smooth as-cast surfaces. Plywood grain indentations are not acceptable. Furnish in largest practicable sizes to minimize number of joints to conform to joint system shown on Drawings. Provide form material with sufficient thickness to withstand pressure of newly placed concrete without bow or deflection.

a. Plywood: APA grade-trademarked "B-B Plyform Exterior," mill oiled.

2. Provide form coatings on forms for all exposed finished concrete. Plywood grain indentations or patterns left in the concrete as a result of the forms are not acceptable.

B. Forms for Unexposed Finish Concrete: Form concrete surfaces which will be unexposed in the finished structure with plywood, lumber, metal, or other acceptable material. Provide lumber that is dressed on at least 2 edges and one side for tight fit.

C. Form Units

1. Provide factory-fabricated, adjustable-length, removable, or snap-off metal form ties; design to prevent form deflection and to prevent spalling concrete surfaces upon removal.
2. Unless otherwise shown, provide ties so that portion remaining within concrete after removal of exterior parts is at least one inch from outer concrete surface. Unless otherwise indicated, provide form ties which will leave a hole not larger than one-inch diameter in concrete surfaces.
3. Form ties fabricated on the project site and wire ties are not acceptable.

D. Form Coatings: Commercial formulation form-coating compounds that will not bond with, stain, nor adversely affect concrete surfaces and will not impair subsequent treatment of concrete surfaces bond or adhesion, nor impede the wetting of surfaces to be cured with water or curing compounds.

E. Inserts

1. Provide metal inserts for anchorage of materials or equipment to concrete construction not supplied by other trades and as required for the Work.
2. Provide Fry original reglet as manufactured by Fry Reglet Corporation, Alhambra,

California. Reglet shall be made of .050 polyvinylchloride, meeting ASTM Spec. D-1874. Provide steel spacer channel for positive alignment and barrier to grout.

3. Vinyl Chamfer Strips: Shall be Vinylex CSN-1/2 as manufactured by Vinylex Corporation, Knoxville, Tennessee 37921.

F. Form liners by Fitzgerald Form Liners of Santa Ana, CA. for tilt-up concrete panel construction:

1. See architectural drawings for pattern types.

a. Provide expanded polystyrene back-up strips, shaped in wedge form for use with the Shiplap pattern.

2.2 DESIGN OF FORMWORK

A. Design, erect, support, brace, and maintain formwork so that it will safely support vertical and lateral loads that might be applied, until such loads can be supported by the concrete structure. Carry vertical and lateral loads to ground by formwork system and in-place construction that has attained adequate strength for that purpose. Construct formwork so that concrete members and structures are of correct size, shape, alignment, elevation, and position. Maintain formwork construction tolerances and surface irregularities complying with the following ACI 347 limits:

1. Provide Class A tolerances for concrete surfaces exposed to view.
2. Provide Class C tolerances for other concrete surfaces.

B. Design forms and falsework to include assumed values of live load, dead load, weight of moving equipment operated on formwork, concrete mix, height of concrete drop, vibrator frequency, ambient temperature, foundation pressures, stresses, lateral stability, and other factors pertinent to safety of structure during construction.

C. Construct forms to sizes, shapes, lines, and dimensions shown and to obtain accurate alignment, location, grades, level, and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required in the Work. Use selected materials to obtain required finishes. Solidly butt joints and provide backup at joints to prevent cement paste from leaking.

D. Design formwork to be readily removable without impact, shock, or damage to cast-in-place concrete surfaces and adjacent materials. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like for easy removal.

E. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joint and provide backup material at joints as required to prevent leakage and fins.

F. Provide temporary openings for cleanouts and inspections where interior area of formwork is inaccessible before and during concrete placement. Securely brace temporary openings and set tightly to forms to prevent losing concrete mortar. Locate temporary openings in forms at inconspicuous locations.

G. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before placing concrete. Re-tighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper

alignment.

H. Provisions for other Trades: Coordinate openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses, and chases from trades providing such items. Accurately place and securely support items built into forms.

I. All required shoring and lifting for concrete formwork shall be signed and sealed by a registered engineer in the State of Florida. Indicate all details and seal on shop drawings.

PART 3 - EXECUTION

3.1 FORM CONSTRUCTION

A. Construct forms complying with ACI 347 to the exact sizes, shapes, lines, and plumb work in finish structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes.

B. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where the slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and assure ease of removal.

C. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Brace temporary closures and set tightly to forms to prevent loss of concrete mortar. Locate temporary openings on forms in as inconspicuous location as possible, consistent with project requirements.

1. Form intersecting planes to provide true, clean-cut corners, with edge grain of plywood not exposed as form for concrete.

D. Provide formwork sufficiently tight to prevent leakage of cement paste during concrete placement. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

E. Falsework

1. Erect falsework and support, brace and maintain it to safely support vertical, lateral, and asymmetrical loads applied until such loads can be supported by in-place concrete structures. Construct falsework so that adjustments can be made for take-up and settlement.
2. Provide wedges, jacks, or camber strips to facilitate vertical adjustments. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to produce Work or required dimensions.
3. Support form facing materials by members spaced sufficiently close to prevent deflection. Fit forms placed in successive units for continuous surfaces to accurate alignment, free from irregularities and within allowable tolerances.
4. Provide camber in formwork as required for anticipated deflections due to weight and pressures of fresh concrete and construction loads for longspan members without intermediate supports.
5. Carefully inspect falsework and formwork during and after concrete placement operations to determine abnormal deflection or signs of failure; make necessary adjustments to

produce Work of required dimension.

F. Forms for Exposed Concrete

1. Drill forms to suit ties used and to prevent leakage of concrete mortar around tie holes. Do not splinter forms by driving ties through improperly prepared holes.
2. Do not use metal cover plates for patching holes or defects in forms.
3. Provide sharp, clean corners at intersecting planes without visible edges or offsets. Back joints with extra studs or girts to maintain true, square intersections.
4. Use extra studs, whalers, and bracing to prevent bowing of forms between studs and to avoid bowed appearance in concrete. Do not use narrow strips of form material which will produce bow.
5. Assemble forms so they may be readily removed without damage to exposed concrete surfaces.
6. Form molding shapes, recesses, and projections with smooth-finish materials and install in forms with sealed joints to prevent displacement.
7. Back-up strips shall be used as continuous support for the unsupported portions of the shiplap form liner. Span the entire length of the form liner.

G. Corner Treatment

1. Form chamfers with ½" round strips, unless otherwise shown, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer strips at changes in direction.
2. Unexposed corners may be formed either square or chamfered.

H. Provision for Other Trades: Provide openings in concrete formwork to accommodate Work of other trades including those under separate prime contracts. Size and location of openings, recesses, and chases are the responsibility of the trade requiring such items. Accurately place and securely support items to be built into form.

I. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, or other debris just before concrete is to be placed. Retighten forms immediately after concrete placement as required to eliminate mortar leaks.

J. Construction Joints: Where footings and walls are divided by construction joints, joints shall have keyways formed. Keyways shall be 1/3 of the dimension of the element in both directions and shall be at least 2 inches thick, unless otherwise noted.

3.2 FORM COATINGS

A. Coat form contact surfaces with form-coating compound before reinforcement is placed. Do not allow excess form coating material to accumulate in the forms or to come in contact with surfaces which will be bonded to fresh concrete. Apply in compliance with Manufacturer's instructions.

B. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

3.3 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into the Work anchorage devices and other embedded items required for other Work that is attached to, or supported by, cast-in-place concrete. Use setting Drawings, diagrams, instructions, and directions provided by suppliers of the items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge form or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in the finished slab surface. Provide and secure units to support types of screeds required.

1. Forms for concrete curbs and bases shall be rigidly held straight and tight so that finished concrete will be level and even.

3.4 REMOVAL OF FORMS

A. General: Formwork not supporting concrete, such as sides of beams, walls, columns, and similar parts of the Work, may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form removal operation and provided that curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements may not be removed in less than 14 days, and not until concrete has attained design minimum 28 day compressive strength.

C. Form facing material may be removed 24 hours after placement, only if shores and other vertical supports have been arranged to permit removal of form facing material without loosening or disturbing shores and supports.

3.5 REUSE OF FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets. Do not use "patched" forms for exposed concrete surfaces, except as acceptable to the Architect.

END OF SECTION 03 11 00

SECTION 03 20 00 – CONCRETE REINFORCING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. The extent of concrete reinforcement is shown on the Drawings and in schedules.

B. The Work includes fabrication and placement of reinforcement for cast-in-place concrete including bars, ties, and supports.

1.3 SUBMITTALS

A. Product Data: Submit 2 copies of manufacturer's specifications and installation instructions for proprietary materials and reinforcement accessories.

B. Shop Drawings: For fabrication, bending, and placement of concrete reinforcement. Comply with the current accepted ACI 315 "Details and Detailing of Concrete Reinforcement." Show bar schedules, stirrup spacing, diagrams of bent bars, arrangements, and assemblies as required for the fabrication and placement of concrete reinforcement. Show building plans with bar sizes, spacing, and quantities for all bent and straight reinforcing bars.

1.4 QUALITY ASSURANCE

A. The Installer must examine the substrate and the conditions under which concrete reinforcement is to be placed and notify the Contractor in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

B. Codes and Standards: Comply with requirements of the latest edition of the following codes and standards, except as herein modified:

1. American Welding Society, AWS D1.4/D1.4M:2005 - "Structural Welding Code - Reinforcing Steel."
2. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
3. American Concrete Institute, ACI 318 "Building Code Requirements for Structural Concrete and Commentary."

1.5 DELIVERY, HANDLING, AND STORAGE

A. Deliver reinforcement to the project site bundled, tagged, and marked. Use metal tags indicating bar size, lengths, and other information corresponding to markings shown on placement diagrams.

B. Store concrete reinforcement materials at the site to prevent damage and accumulation of dirt or excessive rust.

PART 2 – PRODUCTS

2.1 MATERIAL

A. Reinforcing Bars (ReBar): ASTM A615, and as follows.

1. Provide Grade 60 for bars No. 3 to 11.

B. Steel Wire: ASTM A1064.

C. Welded Wire Fabric (WWF): ASTM A1064.

D. Supports for Reinforcement: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement in place.

1. Use wire bar type supports complying with CRSI recommendations, unless otherwise indicated. Do not use wood, brick, and other unacceptable materials.
2. For slabs on grade, use supports with sand plates or horizontal runners where base material will not support chair legs.
3. Over waterproof membranes, use precast concrete chairs to prevent penetration of the membrane
4. For footings, trench footings, and grade beams use precast concrete bricks (f'c = 3000 psi min. at 28 days). (Concrete masonry bricks not acceptable).
5. For concrete masonry bond beams use #2 bar laterally, tied to each longitudinal reinforcing bar below to hold bars apart and up from bottom. Space #2 bars at 48 inches o.c.

E. Grouted Anchor Bolts: Refer to Structural drawings.

F. Rebar Ties: Nylon or annealed tie wire as recommended by the ACI.

2.2 FABRICATION

A. Fabricate reinforcing bars to conform to required shapes and dimensions, with fabrication tolerances complying with CRSI "Manual of Standard Practice." In case of fabricating errors, do not re-bend or straighten reinforcement in a manner that will injure or weaken the material.

B. Unacceptable Materials: Reinforcement with any of the following defects will not be permitted in the work.

1. Bar lengths, depths, and bends exceeding specified fabrication tolerances.
2. Bends or kinks not indicated on Drawings or final shop drawings.
3. Bars with reduced cross-section due to excessive rusting or other cause.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the conditions under which concrete reinforcement is to be placed. Do not proceed with the Work until unsatisfactory conditions have been corrected.

B. Notify Architect when steel placement for a concrete pour is nearing a completion so that the Work may be observed.

3.2 INSTALLATION

A. Comply with the specified codes and standards and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars," for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean reinforcement to remove loose rust and mill scale, earth, ice, and other materials which reduce or destroy bond with concrete. Reinforcing steel should be free of kinks and non-shop bends. Field bends should only be as directed by the architect.

C. Position, support, and secure reinforcement against displacement by formwork construction, or concrete placement operations. Locate and support reinforcing by precast concrete brick, metal chairs, runners, bolsters, spacers, and hangers as required.

D. Place reinforcement to obtain the minimum coverages for concrete protection. Arrange, space, and securely tie bars and bar supports together with 16 gauge wire to hold reinforcement accurately in position during concrete placement operations. Set wire ties so that twisted ends are directed away from exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lab adjoining pieces at least one full mesh and lace splices with 16 gauge wire. Do not make end laps midway between supporting beams or directly over beams of continuous structures. Offset end laps in adjacent widths to prevent continuous laps.

F. Provide sufficient numbers of supports and of strengths to carry reinforcement. Do not place reinforcing bars more than 2 inches beyond the last leg of continuous bar support. Do not use supports as bases for runaways for concrete conveying equipment and similar construction loads.

G. Provide standard reinforcing splices by lapping ends, placing bars in contact, and tightly tying wire. Comply with requirements of ACI 318 for minimum lap of spliced bars.

H. Reinforcing steel installed in continuous footings shall run continuous. This shall include specially shaped components with proper lap where corner reinforcing and step footings occur.

I. Provide additional reinforcing around required openings in footings, and slabs having at least a one foot dimension.

J. Flame cutting of reinforcing steel is prohibited.

END OF SECTION 03 20 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section specifies interior and exterior cast-in-place concrete, mix design, placement procedures, and finishes. Work includes, but is not necessarily limited to:

1. Interior and Exterior Concrete:

a. Floor slabs; on grade, elevated, subgrade.
b. Bases, curbs, risers, and steps, elevated, on grade
c. Foundations, pads, piers, columns, beams.
d. Recesses for floor finishes.
e. Normal weight aggregates.
f. Reglets.
g. Form liners.

2. Other Materials

a. Concrete admixtures
b. Waterstops
c. Expansion joint fillers
d. Concrete floor sealer

B. Provide other cast-in-place concrete and related work as shown on the Drawings and specified herein for complete and finished work, except concrete work specifically designed to be provided under the Work of other Sections of these Specifications.

C. The following is by other Sections, meeting the requirements of this Section (unless indicated otherwise).

1. Bases for exterior equipment.
2. Encasement of underground utilities or connections.
3. Specifically excluded items.

1.3 SUBMITTALS

A. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, patching compounds, waterstops, joint systems, curing compounds, dry-shake finish materials, hardeners, sealers, and other specified items.

B. Samples of materials as requested by Architect, including names, sources, and descriptions, as follows:

1. Normal weight aggregates.
2. Reglets.
3. Waterstops.
4. Form liners.

C. Laboratory test reports for concrete materials and mix design tests.

D. Material certificates in lieu of material laboratory test reports when permitted by Architect. Material certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with or exceeds specified requirements. Provide certification from admixture manufacturers that chloride content complies with specification requirements.

E. Construction Joints: Submit drawing of proposed construction joints in concrete for slabs on grade.

F. Minutes of pre-construction meeting.

G. Submit proposed mix designs.

H. Submit statement from ready-mixed plant verifying conformance to specifications and proposed mix designs.

I. Submit concrete curing materials product data and specification sheets.

J. Submit written approval/ certification of concrete curing materials as specified herein.

K. Submit ISO 9001/ 9002 Registration Certificate for companies that are ISO registered.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with the current accepted provisions of the following codes, specifications, and standards, except as otherwise shown or specified.

1. ACI 117 "Specifications for Tolerances for Concrete Construction and Materials."
2. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete."
3. ACI 301 "Specifications for Structural Concrete."
4. ACI 302.1R "Guide for Concrete Floor and Slab Construction."
5. ACI 304R "Guide for Measuring, Mixing, Transporting, and Placing Concrete."
6. ACI 311.4R "Guide for Concrete Inspection."
7. ACI 318, 318R "Building Code Requirements for Reinforced Concrete and Commentary."
8. Concrete Reinforcing Steel Institute, "Manual of Standard Practice."
9. Comply with building code requirements which are more stringent than the above.
10. ACI 305 - “Hot Weather Concreting.”
11. ACI 306 - “Cold Weather Concreting.”

B. Document Conflict and Precedence: In case of conflict among Contract Documents, including architectural and structural drawings and specifications, notify the Architect prior to submitting proposal. In case of conflict between and/or among the structural drawings and specifications, the strictest interpretation shall govern, unless specified otherwise in writing by the Architect.

C. Inspection and Testing of the Work: Materials and installed work may require testing and retesting, as directed by the Architect, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at the Owner’s expense, including retesting of rejected materials and installed work, shall be done at the

Contractor's expense. Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents.

D. Mockup: Cast mockup of size indicated or as required by the Owner and the Architect to demonstrate typical joints, form tie spacing, and proposed surface finish, texture, and color. Maintain sample panel exposed to view for duration of Project, after Architect's acceptance of visual qualities.

1. Demolish mockup and remove from site when directed by Architect.

1.5 CONCRETE TESTING

A. The Contractor for the work of 03 30 00, Cast-In-Place Concrete, shall cooperate and coordinate with the testing laboratory to perform field quality control testing during concrete work under Division 03.

B. Quality Control Testing During Construction: Perform sampling and testing for field quality control during the placement of concrete, as follows: (Field Testing of concrete shall be provided by the Owner from an independent testing agency. The Contractor shall be responsible for notifying the testing company 24 hours in advance of an expected pour.)

1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
2. Slump: ASTM C 143; one test at point of placement (end of hose if pumped) for each day's pour of each type of concrete; additional tests when concrete consistency seems to have changed.
3. Air Content: ASTM C 173, volumetric method for lightweight or normal weight concrete; ASTM C 231, pressure method for normal weight concrete; one for each day's pour of each type of air-entrained concrete.
4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below, when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
5. Compression Test Specimen: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless otherwise directed. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
6. Compressive-Strength Tests: ASTM C 39; one set for each day's pour exceeding 5 cu. yd. (4 cu. m) plus additional sets for each 50 cu. yd. (38 cu. m) more than the first 25 cu. yd. (19 cu. m) of each concrete class placed in any one day; one specimen tested at 7 days, two specimens tested at 28 days, and one specimen retained in reserve for later testing if required.

    a. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.
    b. When total quantity of a given class of concrete is less than 50 cu. yd. (38 cu. m), Architect may waive strength testing if adequate evidence of satisfactory strength is provided.
    c. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, evaluate current operations and provide corrective procedures for protecting and curing the in-place concrete.

d. Strength level of concrete will be considered satisfactory if averages of sets of three consecutive strength test results equal or exceed specified compressive strength and no individual strength test result falls below specified compressive strength by more than 500 psi (3.4 MPa).

C. Report test results in writing to the Architect, Engineer, Contractor, and ready-mix supplier on the same day that test are made. Reports of compressive strength tests shall contain the project identification name and number, date of concrete placement, name of Contractor, name of concrete supplier and truck number, name of concrete testing service, concrete type and class, location of concrete batch in the structure, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength and type and amount of fibrous reinforcement, compressive breaking strength, and type of break for both 7 day tests and 28 day tests.

D. Additional Tests: The testing service will make additional tests of in-place concrete when test results indicate the specified concrete strengths and other characteristics have not been attained in the structure, as directed by the Architect. The testing service shall conduct tests to determine the strength and other characteristics of the in-place concrete by compression tests on cored cylinders complying with ASTM C42 or by load testing specified in ACI 318 or other acceptable nondestructive testing methods, as directed. The Contractor shall pay for such tests conducted and other additional testing as may be required, when unacceptable concrete is verified.

E. Evaluation of Quality Control Tests: Do not use concrete delivered to the final point of placement which has slump or total air content outside the specified values.

1. Compressive strength tests for laboratory-cured cylinders will be considered satisfactory if the averages of all sets of 3 consecutive compressive strength tests results equal or exceed the 28 day design compressive strength of the type or class of concrete; and no individual strength test falls below the required compressive strength by more than 500 psi.
2. Strength tests of specimens cured under field conditions may be required by the Architect to check the adequacy of curing and protecting of the concrete placed. Specimens shall be molded by the field quality control laboratory at the same time and from the same samples as the laboratory cured specimens.

    a. Provide improved means and procedures for protecting concrete when the 28 day compressive strength of field cured cylinders is less than 85 percent of companion laboratory cured cylinders.
    b. When laboratory cured cylinder strengths are appreciably higher than the minimum required compressive strength, field cured cylinder strengths need not exceed the minimum required compressive strength by more than 500 psi even though the 85 percent criterion is not met.
    c. If individual tests of laboratory cured specimen produce strengths more than 500 psi below the required minimum compressive strength or if tests of field cured cylinders indicates deficiencies in protection and curing, provide additional measures to assure that the load-bearing capacity of the structure is not jeopardized. If the likelihood of low-strength concrete is confirmed and computations indicate the load-bearing capacity may have been significantly reduced, tests of cores drilled from the area in question may be required.

3. If the compressive strength tests fail to meet the minimum requirements specified, the concrete represented by such tests will be considered deficient in strength.

F. Deficient concrete shall be removed as directed by the Architect and replaced by the Contractor without additional cost to the Owner.

1.6 FIELD QUALITY CONTROL

A. Floor Tolerance Measurements: Floor flatness and levelness tests on floor slabs shall be conducted in accordance with the provisions set forth in ASTM E1155-87, with the exception of Subparagraphs 7.2.3 and 7.3.2 which may be waived at the Owner's option, also Zi calculation to be used shall be N min. = A/10. Floor tolerance measurements shall be made by the independent testing laboratory within 24 hours after completion of the final troweling operation, and before forms and shores have been removed, measurement shall be taken using a Dipstick Auto-Read Floor Profiler as manufactured by The Edward W. Face Company, Inc. of Norfolk, VA. Results of floor tolerance tests, including a formal notice of acceptance or rejection of the work, shall be provided to the Contractor within 24 hours after data collection.

B. Remedy for Out-of-Tolerance Work: Slab sections measuring at or above both of the specified minimum local F-numbers shall be accepted for tolerance compliance as constructed. Floor slab sections measuring below either (or both) of the specified minimum local F-numbers shall be removed and replaced (in the case of slabs-on-grade), or ground or re-topped (in the case of elevated slabs). No remedies for sub-minimum local F-number sections other than replacement of slabs-on-grade, and grinding or re-topping of elevated slabs will be permitted. For the purposes of this paragraph, a floor section shall be a rectangular area bound by column or half-column lines (i.e. minimum sections area - approximately 100 sq. ft.).

C. Special Conditions (Exceptions): Where room sizes (areas receiving concrete flooring) are restricted to smaller areas due to bearing walls or existing construction making finishing difficult, the Architect's Field Representative will determine acceptable deviations/exceptions in testing requirements.

1. Architect's Field Representative may at his discretion:

a. Waive entirely testing of small rooms, storage areas, and similar spaces.
b. Reduce the number and select the location of tests.
c. Waive penalties between specified and minimum locals.
d. Require that tolerances exceed minimum locals only.
e. Waive the requirement for removal of concrete not meeting minimum locals if, in his opinion, repairs can bring floors into acceptable/serviceable tolerances.

1.7 CONCRETE MATERIALS AND MIX DESIGN

A. Concrete Materials and Mix Design:

1. Ready-mixed concrete shall be mixed and delivered in accordance with ASTM C94.
2. Product Data: Submit 2 copies of manufacturer's specifications with application an installation instructions for proprietary materials and items, including admixtures, bonding agents, waterstops, joint systems, chemical floor hardeners, and dry shake finish materials.
3. Laboratory Test Reports: Submit 2 copies of laboratory test reports for concrete materials and mix design tests. The Architect's review will be for general information only. Production of concrete to comply with specified requirements is the Contractor's responsibility.

B. Tests for Concrete Materials

1. For normal weight concrete test aggregates by the methods of sampling and testing of ASTM C33.
2. For light weight concrete, test aggregates by the methods of sampling and testing of ASTM C330.
3. For portland cement, sample the cement and determine the properties by the methods of test ASTM C33.
4. Submit written reports for each material sampled and tested, prior to the start of Work. Provide the project identification name and number, date of report, name of Contractor, name of concrete testing service, source of concrete aggregates material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

C. Submit signed statement form ready-mix plant that concrete furnished for the Project will exactly conform to the approved design mixes.

1.8 PROJECT CONDITIONS

A. Trades requiring inserts and sleeves for their work shall furnish same for installation as Work under this Section. Delivery of inserts and sleeves for installation as Work under this Section shall be timed so as note to cause delay in the progress of this Work.

B. Installation requirements within this Specification Section are not intended to be restrictive and the Contractor is allowed when reviewed with the Architect's field representative to adjust the means and methods used to meet required tolerances.

1.9 PREINSTALLATION CONFERENCE

A. At least 35 days to the start of the concrete construction schedule, the Contractor shall conduct a pre-installation conference at project site to review the proposed mix designs and to discuss the required the methods and procedures to achieve the required concrete construction.

B. The Contractor shall require representatives of every party who is concerned with the concrete work to attend the conference, including, but not limited to, the following:

1. Contractor’s Superintendent.
2. Testing Laboratory.
3. Concrete Subcontractor.
4. Ready-mix concrete producer.

5. Admixture manufacturer (s).
6. Owner.
7. Architect.
8. Structural Engineer.

C. Minutes of the meeting shall be recorded, typed and printed and distributed by the Contractor within three (5) days of the meeting. One copy of the minutes shall be transmitted to the following for information purposes.

1. Owner's representative.
2. Architect and Engineer.

D. The Contractor shall notify the Architect and the Engineer at least seven (70 days prior to the scheduled date of the conference.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type II. Use one brand of cement throughout Project.

B. Normal-Weight Aggregates: ASTM C33 and as specified. Provide aggregates from a single source for exposed concrete.

1. For exposed exterior surfaces, do not use fine or coarse aggregates that contain substances that cause spalling.
2. Local aggregates not complying with ASTM C33 that have been shown to produce concrete of adequate strength and durability by special tests or actual service may be used when acceptable to Architect.
3. Fine Aggregate: Clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.
4. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter, as follows:

    a. Crushed stone, processed from natural rock or stone.
    b. Washed gravel, either natural or crushed. Use of pit or bankrun gravels not permitted.
    c. Maximum Aggregate Size: Not larger than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourths of minimum clear spacing between individual reinforcing bars or bundles of bars.

5. Aggregate Supply: Provide aggregates from one source of supply to ensure uniformity in color, size, and shape.

C. Lightweight Aggregates: ASTM C330.

D. Water: Potable.

2.2 CONCRETE ADMIXTURES

A. Provide admixtures produced by established reputable manufacturers and use in compliance with manufacturer's printed directions. Do not use admixtures which have not been incorporated and

tested in accepted mixes, unless otherwise authorized specifically in writing by Architect.

1. Air-Entraining Admixture: ANSI/ASTM C260
2. Water-Reducing Admixture: ANSI/ASTM C494, Type A.
3. Set-Control Admixture: ANSI/ASTM C494
4. Super Plasticizer: ANSI/ASTM C494, Type F.

B. Air-Entraining Admixture: ASTM C260, certified by manufacturer to be compatible with other required admixtures.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Air-Mix or Perma-Air, Euclid Chemical Co.
b. Darex AEA or Daravair, W.R. Grace & Co.
c. MB-VR or Micro-Air, Master Builders, Inc.
d. Sealtight AEA, W.R. Meadows, Inc.
e. Sika AER, Sika Corp.

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

1. Products: Subject to compliance with requirements, provide one of the following:

a. Chemtard, ChemMasters Corp.
b. Eucon WR-75, Euclid Chemical Co.
c. WRDA, W.R. Grace & Co.
d. Pozzolith Normal or Polyheed, Master Builders, Inc.
e. Plastocrete 161, Sika Corp.

D. High-Range Water-Reducing Admixture: ASTM C494, Type F or Type G.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Eucon 37, Euclid Chemical Co.
b. WRDA 19 or Daracem, W.R. Grace & Co.
c. Rheobuild or Polyheed, Master Builders, Inc.
d. Sikament 300, Sika Corp.

E. Water-Reducing, Accelerating Admixture: ASTM C494, Type E.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Accelguard 80, Euclid Chemical Co.
b. Daraset, W.R. Grace & Co.
c. Pozzutec 20, Master Builders, Inc.

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

1. Products: Subject to compliance with requirements, provide one of the following:

a. Eucon Retarder 75, Euclid Chemical Co.
b. Daratard-17, W.R. Grace & Co.
c. Pozzolith R, Master Builders, Inc.
d. Plastiment, Sika Corporation.

G. Shrinkage Compensating Cement: ASTM C845, Type K, M, or S. Contractor may substitute

shrinkage compensating cement concrete for slabs, on grade or elevated, and eliminate all control joints. Design mixes shall be submitted for approval.

H. Pozzolan Admixtures

1. Fly ash or other pozzolans used as admixtures may be used provided they conform to ASTM C618 Class C or F. Fly ash replacement of cement shall not exceed 20% (one part fly ash max. to four parts cement) by weight.
2. Submit manufacturer's certification that product conforms to the requirements specified and is compatible with all other admixtures.

2.3 PROPORTIONING AND DESIGN MIXES

A. Proportion mixes by either laboratory trial batch or field experience methods as specified in ACI 301, using materials to be employed on the project for each class of concrete required.

B. Submit written reports to Architect of each proposed mix for each type of concrete at least 15 days prior to start of Work. Indicate with each mix design the items or structures for which it is to be used. Do not begin concrete production until mixes have been reviewed by Architect. Submit the following information:

1. Complete identification of aggregate source of supply.
2. Tests of aggregate for compliance with specified requirements.
3. Scale weight of each aggregate.
4. Absorbed water in each aggregate.
5. Brand, type, and composition of cement.
6. Brand, type, and amount of each mixture.
7. Amounts of water used in trial mixes.
8. Proportions of each material per cu.yd. including fibrous secondary reinforcement.
9. Gross weight and yield per cu.yd. of trial mixtures.
10. Measured slump.
11. Measured air content.
12. Compressive strength developed at 7 days and 28 days, from not less than 4 test cylinders cast for each 7 and 28 day test, and for each design mix. These test reports may be from previous projects within the past 6 months.
13. Identification number or name of mix to verify agreement with compression test reports.
14. ACI 318 Proportioning method used.
15. Water cement ratio.
16. Fly ash or pozzolan type and brand.
17. Method by which concrete is intended to be placed.
18. Structural component for which concrete mix is designed.

C. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix designs and strength results must be submitted to and accepted by Architect before using in work.

D. Concrete Suppliers Record of Quality Control: The concrete supplier's past record of quality control shall be used in the design of the concrete mixes to determine the amount by which the average concrete strength fcr should exceed the specified strength f'c as outlined in ACI 318. If a suitable record of test results is not available, the average strength must exceed the design strength by the amount as specified in ACI 318. After sufficient data becomes available from the job, the statistical methods of ACI 214 may be used to reduce the amount by which the average strength must exceed f'c as outlined in ACI 318.

E. Admixtures:

1. Admixtures to be used in concrete shall be subject to the approval of the Architect, Engineer, and Owner's Testing Laboratory.
2. Quantities of admixtures to be used shall be in strict accordance with the manufacturer's instructions.
3. Admixtures containing chloride ions shall not be used in prestressed concrete, in concrete containing galvanized or aluminum embedments, or in metal deck floors or roofs.
4. Air entraining admixtures shall conform to "Specification for Air Entraining Admixtures for Concrete" ASTM C260. Do not use more than 3% air entrainment in concrete scheduled to receive hardeners.
5. Water reducing admixtures, retarding admixtures, accelerating admixtures, water reducing and retarding admixtures, and water reducing and accelerating admixtures shall conform to "Specification for Chemical Admixtures for Concrete" ASTM C494.
6. Fly ash or other pozzolans, used as admixtures, shall conform to "Specification for Fly Ash and Raw of Calcined Natural Pozzolans for use in Portland Cement Concrete" ASTM C618. Obtain mill test reports for approval.
7. Use amounts of admixtures as recommended by the manufacturer for climatic conditions prevailing at the time of placing. Adjust quantities of admixtures as required to maintain quality control.

F. Slump Limits: When increased workability, pumpability, low water cement ratio, shrinkage reduction, or permeability reduction is required, then a superplasticizer admixture shall be considered for use. The maximum slump with the use of superplasticizers shall be 8 inches unless approved otherwise by the Architect, Engineer, and Owner's Testing Laboratory. Any deviation from these values (such as concrete design to be pumped), shall be submitted to the Architect, Engineer, and Owner's Testing Laboratory for approval.

G. Adjustments of Concrete Mixes: Mix design adjustments may be requested by the Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant. Such mix design adjustments shall be provided at no additional cost to the Owner. Any adjustments in approved mix designs including changes in admixtures shall be submitted in writing on the specified Concrete Mix Design Submittal Form to the Architect/Engineer, and Owner's Testing Laboratory for approval prior to field use.

H. Shrinkage: All concrete shall be proportioned for a maximum allowable unit shrinkage of 0.03% measured at 28 days after curing in lime water as determined by ASTM C157 (using air storage).

2.4 RELATED MATERIALS

A. Waterstops: Provide flat, dumbbell-type or centerbulb-type waterstops at construction joints and other joints as indicated. Size to suit joints.

B. Rubber Waterstops: Corps of Engineers CRD-C 513.

1. Manufacturers: Subject to compliance with requirements, provide products of one of the following:

a. The Burke Co.
b. Progress Unlimited.
c. Williams Products, Inc.

C. Preformed Expansion Joint Fillers: Provide closed cell polyethylene expansion joints equal to "Sonoflex F" as manufactured by Sonneborn Building Products or Deck-O-Form as manufactured

by W.R. Meadows, Inc., and ASTM D545.

D. Non-Shrink Grout

1. Type: Grout for base plates and bearing plates shall be a non-metallic, shrinkage resistant, premixed, non-corrosive, non-staining product containing Portland cement, silica sand, shrinkage compensating agents and fluidity improving compounds.
2. Specifications: Non-shrink grout shall conform to Corps of Engineers Specification for Non-Shrink Grout, CE-CRD-C621.
3. Compressive Strength: 28 day compressive strength as determined by grout cube tests, shall be as follows:

    a. 6,000 psi for supporting concrete 3,000 psi and less.
    b. 8,000 psi for supporting concrete greater than 3,000 psi and less than or equal to 4,000 psi.
    c. 10,000 psi for supporting concrete greater than 4,000 psi.

4. Products: Acceptable manufacturers as follows:

    a. “Supreme”; Cormix, Inc.
    b. “Crystex”; L & M Construction Chemicals, Inc.
    c. “Masterflow 713”; Master Builders.
    d. “Five Star Grout”; U.S. Grout Corp.
    e. “Sonogrout”; Sonneborn Construction Chemicals.
    f. “Euco-NS”; Euclid Chemical Company
    g. “Sure-Grip Grout”; Dayton Superior Corp.

5. Manufacturers: At the start of grouting operations, the Contractor shall have a manufacturer’s representative observe the grouting operation to insure conformance to requirements.

6. Reglets: Refer to Section 07 60 00, 2.1E for reglet description.

2.5 CONCRETE CURING MATERIALS

A. Moisture-Retaining Cover: One of the following, complying with ASTM C171, for concrete floors that are to be exposed or to receive floor sealer.

1. Waterproof paper.
2. Polyethylene film.
3. Polyethylene-coated burlap.

B. Water Based Acrylic Liquid Membrane-Forming Curing Compound: Liquid-type membrane-forming curing compound complying with ASTM C309, Type I, Class B, with 18 to 20 percent minimum solids.

1. Products: Subject to compliance with requirements, provide one of the following:

    a. Safe Cure and Seal, Dayton Superior Corp.
    b. Aqua-Cure, Euclid Chemical Co.
    c. Masterseal-W100, Master Builders, Inc.
    d. Vocomp 20, W.R. Meadows, Inc.
    e. Kure-N-Seal, WB, Sonneborn-Chemrex.

C. Evaporation Control: Monomolecular film-forming compound applied to exposed concrete slab surfaces for temporary protection from rapid moisture loss.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Eucobar, Euclid Chemical Co.
b. E-Con, L&M Construction Chemicals, Inc.
c. Confilm, Master Builders, Inc.

D. Coordinate curing methods and requirements with the manufacturer of the floor finish materials and adhesives used to install the floor finish materials. Do not use any curing methods which will inhibit the adhesion and proper installation of the specified floor finish materials.

2.6 BONDING AGENT

A. Chemical Bonding Agent: Film-forming, freeze-thaw resistant compound suitable for brush or spray application complying with MIL-B-19235. Subject to compliance with requirements, provide one of the following:

1. Adbond (J40); Dayton Superior Corp.
2. Eucoweld; Euclid Chemical
3. Everbond; L & M Construction Chemicals
4. Sonocrete PB; Sonneborn Building Products
5. Intralok; W.R. Meadows, Inc.

2.7 CONCRETE FLOOR SEALER - INTERIOR

A. Refer to Section 03 35 00, Concrete Floor Sealers

2.8 CONCRETE FLOOR SEALER - EXTERIOR

A. One of the following for exterior second floor walkways and stairs:

1. "Kure-N-Seal 30": Sonneborn Building Products
2. Equal product by L & M Construction Chemicals, Inc.
3. Equal product by Dayton Superior Corp.
4. Color: clear.

B. All concrete floors scheduled to receive polyurethane floor sealers shall be mechanically profiled sanded or sandblasted prior to application of primer, in strict accordance with the manufacturer's written recommendations.

2.9 PROPORTIONING AND DESIGNING MIXES

A. Prepare design mixes for each type and strength of concrete by either laboratory trial batch or field experience methods as specified in ACI 301. For the trial batch method, use an independent testing agency acceptable to Architect for preparing and reporting proposed mix designs. Water to cement ratio shall be in the range in a range of 0.4 to 0.5.

1. Do not use the same testing agency for field quality control testing.

B. Submit written reports to Architect of each proposed mix for each class of concrete at least 15

days prior to start of Work. Do not begin concrete production until proposed mix designs have been reviewed by Architect.

C. Design mixes to provide normal weight concrete with properties as indicated on plans.

D. Adjustment to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in Work.

2.10 ADMIXTURES

A. Use air-entraining admixture in exterior concrete, unless otherwise indicated. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content within the following limits:

1. Concrete structures and slabs exposed to freezing and thawing or subjected to hydraulic pressure:

a. 3 to 15 percent for maximum 2 inches aggregate.
b. 4-1/2 percent to 6-1/2 percent for maximum 1 inch aggregate.
c. 5 to 7 percent for maximum 3/4 inch aggregate.
d. 6 to 8 percent for maximum 1/2 inch aggregate.

2. Other Exterior Concrete: 2 to 4 percent

B. Use of admixtures for water-reducing and set-control shall be permitted only with prior approval of the Architect for each condition and shall be in strict compliance with the manufacturer's directions.

1. Design mix submittals shall include these admixtures and shall indicate for which types of concrete structures they are to be used.

C. Use amount of admixtures recommended by manufacturer for climatic conditions prevailing at time of placing. Adjust quantities and types of admixtures as required to maintain quality control.

D. Use of calcium chloride will not be permitted.

2.11 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements of ASTM C 94, and as specified.

1. When air temperature is between 85 deg F (30 deg C) and 95 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes, and when air temperature is above 95 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.
2. Delete the references for allowing additional water to be added to the batch for material with sufficient slump. Addition of water to the batch will not be permitted.
3. During hot weather or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C94 may be required.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate the installation of joint materials, construction joints, vapor retarder/barrier, and other related materials with placement of forms and reinforcing steel.

3.2 PREPARATION

A. Pre-placement Inspection: Before placing concrete, inspect and complete the formwork installation, reinforcing steel, and items to be embedded or cast-in. Notify other crafts to permit the installation of their work; cooperate with other trades in setting such work, as required.

1. Inspect soil at bottom of foundation systems which will be subject to testing for soil bearing value by the testing laboratory, as directed by the Architect. Place concrete immediately after approval of foundation excavations.
2. Inspect underslab areas that were subject to testing for soil bearing value by the testing laboratory as required by Architect. Place concrete immediately after approval of underslab compaction tests.

B. Material placement for interior slabs on grade and exterior concrete stoops.

1. Under remaining building slabs, place vapor barrier, lapping joints and 6 inches minimum and seal with tape or mastic, lap and fold joints and turn membrane up on walls to top of floor on existing subgrade. Do not puncture membrane.
2. Install and properly anchor the slab reinforcing mesh.
3. Position waterstops and expansion joint fillers where indicated on the Drawings and as recommended by manufacturer. Special precautions shall be taken to avoid collapse during installation.

3.3 JOINTS

A. Construction Joints: Locate and install construction joints so they do not impair strength or appearance of the structure, as acceptable to Architect. Construction joints should be formed per ACI 318, cleaned, laitance removed, wetted, standing water removed.

B. Provide keyways at least 1-1/2 inches deep in construction joints in walls and slabs and between walls and footings. Bulkheads designed and accepted for this purpose may be used for slabs.

C. Place construction joints perpendicular to main reinforcement. Continue reinforcement across construction joints except as indicated otherwise. Do not continue reinforcement through sides of strip placements.

D. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.

E. Waterstops: Provide waterstops in construction joints as indicated. Install waterstops to form continuous diaphragm in each joint. Support and protect exposed waterstops during progress of Work. Field-fabricate joints in waterstops according to manufacturer's printed instructions.

F. Isolation Joints in Slabs-on-Grade: Construct isolation joints in slabs-on-grade at points of contact between slabs-on-grade and vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Joint fillers and sealants are specified in Section 07 92 00 as another part of the Work.

G. Contraction (Control) Joints in Slabs-on-Grade: Construct contraction joints in slabs-on-grade to

form panels of patterns as shown. Use saw cuts 1/8 inch wide by one-fourth of slab depth or inserts 1/4 inch wide by one-fourth of slab depth, unless otherwise indicated.

1. Form contraction joints by inserting pre-molded plastic, hardboard, or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris.
2. Contraction joints in unexposed floor slabs may be formed by saw cuts as soon as possible after slab finishing as may be safely done without dislodging aggregate.
3. If joint pattern is not shown, provide joints not exceeding 15 feet in either direction and located to conform to bay spacing wherever possible (at column centerlines, half bays, third bays).
4. Joint fillers and sealants are specified in Section 07 92 00 as another part of the Work.

H. Expansion Joints

1. Provide pre-molded joint filler for expansion joints abutting concrete curbs (except in integral walk and curb), catch basins, manholes, inlets, structures, masonry walls, and other fixed objects.
2. Set and secure continuous expansion joint strips where edge of slab abuts vertical surfaces.
3. Locate expansion joints at 20 feet o.c. for walks and curbs, unless otherwise shown.
4. Extend joint fillers full-width and depth of joint, flush with finished surface. Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Form top edge of filler to conform to top profile of concrete.

3.4 INSTALLING EMBEDDED ITEMS

A. General: Set and build into formwork anchorage devices and other embedded items required for other work that is attached to or supported by cast-in-place concrete. Use setting drawings, diagrams, instructions, and directions provided by suppliers of items to be attached.

B. Install dovetail anchor slots in concrete structures.

C. Forms for Slabs: Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and contours in finished surfaces. Provide and secure units to support screed strips using strike-off templates or compacting-type screeds.

3.5 PREPARING FORM SURFACES

A. General: Coat contact surfaces of forms with an approved, non-residual, low-VOC, form-coating compound before placing reinforcement.

B. Do not allow excess form-coating material to accumulate in forms or come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply according to manufacturer's instructions.

1. Coat steel forms with a non-staining, rust-preventative material. Rust-stained steel formwork is not acceptable.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. General: Comply with ACI 304, "Guide for Measuring, Mixing, Transporting, and Placing Concrete," and as specified.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened sufficiently to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation at its final location. Concreting should be placed at such a rate that the concrete is at all times plastic.

D. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

1. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures for consolidation of concrete complying with ACI 309.
2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the machine. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix to segregate.

E. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until completing placement of a panel or section.

1. Consolidate concrete during placement operations so that concrete is thoroughly worked around reinforcement, other embedded items and into corners.
2. Bring slab surfaces to correct level with a straightedge and strike off. Use bull floats or darbies to smooth surface free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.
3. Maintain reinforcing in proper position on chairs during concrete placement.

F. Hot-Weather Placement: When hot weather conditions exist that would impair quality and strength of concrete, place concrete complying with ACI 305 and as specified.

1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 95 deg F. (35 deg C). Mixing water may be chilled or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without puddles or dry areas.
4. Use water-reducing retarding admixture when required by high temperatures, low humidity, or other adverse placing conditions, as acceptable to Architect.

G. The following concrete shall be prohibited:

1. Partially hardened concrete. 2. Contaminated concrete.
3. Re-tempered concrete.
4. Concrete that has been re-mixed after it has taken its initial set.

3.7 FINISHING FORMED SURFACES

A. Rough-Formed Finish: Provide a rough-formed finish on formed concrete surfaces not exposed to view in the finished Work or concealed by other construction. This is the concrete surface having texture imparted by form-facing material used, with tie holes and defective areas repaired and patched, and fins and other projections exceeding 1/4 inch in height rubbed down or chipped off.

B. Smooth-Formed Finish: Provide a smooth-formed finish on formed concrete surfaces exposed to view or to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or another similar system. This is an as-cast concrete surface obtained with selected form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch defective areas with fins and other projections completely removed and smoothed.

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

D. All exposed formed concrete surfaces shall have a “smooth-formed finish”. All fins shall be removed and shall have a “rubbed” finish. Surface shall be “rubbed” within 48 hours of removing forms, no exceptions.

3.8 MONOLITHIC SLAB FINISHES

A. General Information (Slabs on Grade): The requirements indicated are based upon the latest FF/FL method. Bids for this work shall reflect these requirements and enforcement thereof can be expected.

B. Float Finish - Not Critical Floor Tolerance: Apply float finish to monolithic slab surfaces that are to receive trowel finish and other thick finishes as hereinafter specified, and slab surfaces which are to be covered with waterproofing membrane or sand-bed terrazzo, and as otherwise shown on Drawings or in Schedules.

C. Trowel Finish 1 - Typical Classroom, Corridors, Other Rooms:

1. Specified Overall Value: FF30/FL23
2. Minimum Local Value: FF25/ FL 20
3. Apply trowel finish to slab surfaces that are to be covered with resilient flooring, paint or other thin film finish coating system.

D. Trowel Finish 3 – Gym, Cafeteria and Stage Floors:

1. Specified Overall Value: FF 50/ FL 30
2. Miniumum Local Value: FF40/FL 25
3. Apply trowel finish to slab surfaces that are to be covered with wood flooring, paint, or other thin finish coating system.

E. Non-slip Broom Finish: Apply non-slip broom finish to exterior concrete with fiber bristle broom, perpendicular to main traffic route. Coordinate required final finish with the Architect before application.

F. Modification of Existing Surface:

1. If, in the opinion of the Architect, or Engineer, or Owner, all or any portion of the substandard work can be repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately undertake the approved repair method.
2. The Contractor shall submit for review and approval a detailed work plan of the proposed repair showing areas to be repaired, method of repair, and time to affect the repair.
3. Repair methods, at the sole discretion of the Architect or Engineer, may include grinding (floor stoning), planning, re-topping with self-leveling grout or polymer concrete, or any combination of the above.
4. The Architect, or Engineer, or Owner’s Representative maintain the right to require a test repair for review and approval to demonstrate a satisfactory end product. If, in the opinion of the Architect, Engineer, or Owner’s Representative the repair is not satisfactory an alternate method of repair shall be submitted or the defective area shall be replaced.
5. The judgment of the Architect, or Engineer on the appropriateness of a repair method and its ability to achieve the desired end product shall be final.
6. All repair work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

G. Removal and Replacement:

1. If, in the opinion of the Architect, or Engineer, all or any portion of the substandard work cannot be satisfactorily repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately commence to remove and replace the defective work.

2. Replacement section boundaries shall be made to coincide with the test section boundaries as previously defined.
3. Sections requiring replacement shall be removed by saw cutting along the section boundary lines to provide a neat clean joint between new replacement floor and existing floor.
4. The new section shall be reinforced the same as the removed section and doweled into the existing floor as required by the Architect or Engineer. No existing removed reinforcing steel may be used. All reinforcing steel shall be new steel.
5. Replacement sections may be retested for compliance at the direction of the Architect or Engineer. Decision shall be final.
6. All replacement work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place, and cure concrete as specified to blend with in-place construction. Provide other miscellaneous concrete filling shown or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations. Set anchor bolts for machines and equipment to template at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.

D. Grout base plates as indicated, using specified non-metallic, non-shrink grout.

3.10 CONCRETE CURING AND PROTECTION

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before power floating and trawling.

B. Start initial curing as soon as free water has disappeared from concrete surface after placing and finishing. Weather permitting; keep continuously moist for not less than 72 hours.

C. Curing Methods: Cure concrete by curing compound, by moist curing, by moisture-retaining cover curing, or by combining these methods, as specified. Wet cure 7 days minimum at 50 degrees minimum temperature.

D. Provide moisture curing by the following methods:

1. Keep concrete surface continuously wet by covering with water.
2. Use continuous water-fog spray.
3. Cover concrete surface with specified absorptive cover, thoroughly saturate cover with water, and keep continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with a 4-inch lap over adjacent absorptive covers.

E. Provide moisture-retaining cover curing as follows: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and

ends lapped at least 3 inches and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

F. Apply curing compound on exposed interior slabs and on exterior slabs, walks, and curbs as follows:

1. Apply curing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours and after surface water sheen has disappeared). Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
2. Use membrane curing compounds that will not affect surfaces to be covered with finish materials applied directly to concrete.

G. Curing Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces, by moist curing with forms in place for the full curing period or until forms are removed. If forms are removed, continue curing by methods specified above, as applicable.

H. Curing Unformed Surfaces: Cure unformed surfaces, including slabs, floor topping, and other flat surfaces, by applying the appropriate curing method.

1. Final cure concrete surfaces to receive finish flooring with a moisture-retaining cover, unless otherwise directed.

3.11 SHORES AND SUPPORTS

A. General: Comply with ACI 347 for shoring and re-shoring in multistory construction, and as specified.

B. Remove shores and re-shore in a planned sequence to avoid damage to partially cured concrete. Locate and provide adequate re-shoring to support work without excessive stress or deflection.

3.12 REMOVING FORMS

A. General: Formwork not supporting weight of concrete, such as sides of beams, walls, columns, and similar parts of the work, may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, provided concrete is sufficiently hard to not be damaged by form-removal operations, and provided curing and protection operations are maintained.

B. Formwork supporting weight of concrete, such as beam soffits, joists, slabs, and other structural elements, may not be removed in less than 14 days or until concrete has attained at least 75 percent of design minimum compressive strength at 28 days. Determine potential compressive strength of in-place concrete by testing field-cured specimens representative of concrete location or members.

C. Form-facing material may be removed 24 hours after placement only if shores and other vertical supports have been arranged to permit removal of form-facing material without loosening or disturbing shores and supports.

3.13 REUSING FORMS

A. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or

otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-coating compound as specified for new formwork.

B. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close joints. Align and secure joint to avoid offsets. Do not use patched forms for exposed concrete surfaces except as acceptable to Architect.

3.14 CONCRETE SURFACE REPAIRS

A. Patching Defective Areas: Repair and patch defective areas with cement mortar immediately after removing forms, when acceptable to Architect.

B. Mix dry-pack mortar, consisting of one part portland cement to 2-1/2 parts fine aggregate passing a No. 16 mesh sieve, using only enough water as required for handling and placing.

1. Cut out honeycombs, rock pockets, voids over 1/4 inch in any dimension, and holes left by tie rods and bolts down to solid concrete but in no case to a depth less than 1 inch. Make edges of cuts perpendicular to the concrete surface. Thoroughly clean, dampen with water, and brush-coat the area to be patched with bonding agent. Place patching mortar before bonding agent has dried.
2. For surfaces exposed to view, blend white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Provide test areas at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike-off slightly higher than surrounding surface.

C. Repairing Formed Surfaces: Remove and replace concrete having defective surfaces if defects cannot be repaired to satisfaction of Architect. Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycomb, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning. Flush out form tie holes and fill with dry-pack mortar or precast cement cone plugs secured in place with bonding agent.

1. Repair concealed formed surfaces, where possible, containing defects that affect the concrete's durability. If defects cannot be repaired, remove and replace the concrete.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as monolithic slabs, for smoothness and verify surface tolerances specified for each surface and finish. Correct low and high areas as specified. Test unformed surfaces sloped to drain for trueness of slope and smoothness by using a template having the required slope.

1. Repair finished unformed surfaces containing defects that affect the concrete's durability. Surface defects include crazing and cracks in excess of 0.01 inch wide or that penetrate to the reinforcement or completely through non-reinforced sections regardless of width, spalling, popouts, honeycombs, rock pockets, and other objectionable conditions.
2. Correct high areas in unformed surfaces by grinding after concrete has cured at least 14 days.
3. Correct low areas in unformed surfaces during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete. Proprietary underlayment compounds may be used when acceptable to Architect.
4. Repair defective areas, except random cracks and single holes not exceeding 1 inch in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose reinforcing steel with at least 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials to provide concrete of same type or

class as original concrete. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

E. Repair isolated random cracks and single holes 1 inch or less in diameter by dry-pack method. Groove top of cracks and cut out holes to sound concrete and clean of dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding compound. Place dry-pack before bonding agent has dried. Compact dry-pack mixture in place and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

F. Perform structural repairs with prior approval of Architect for method and procedure, using specified epoxy adhesive and mortar.

G. Repair methods not specified above may be used, subject to acceptance of Architect.

END OF SECTION 03 30 00

SECTION 03 52 16 - LIGHTWEIGHT INSULATING CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Insulating concrete fill on corrugated metal deck.

B. Insulation board for embedment in lightweight insulating concrete.

1.2 RELATED SECTIONS

A. Section 015240-Construction Waste Management.

B. Section 053100-Steel Decking.

C. Section 072300-Roof Insulation.

D. Section 075400-Thermosplastic Membrane Roofing.

E. Section 076200-Flashing and Sheet Metal for blocking and grounds.

1.3 REFERENCES

A. ASCE-7 American Society of Civil Engineering.

B. American Society for Testing and Materials (ASTM).
1. C150-Portland Cement
2. C177-Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus.
3. C332-Lightweight Aggregates for Insulating Concrete.
4. C495-Compressive Strength of Lightweight Insulating Concrete.
5. C578-Rigid, Cellular Polystyrene Thermal Insulation.
6. C796-Foaming Agents for Use in Producing Cellular Concrete Using Preformed Foam.
7. C869-Foaming Agents Used in Making Preformed Foam for Cellular Concrete.

C. Florida Building Code (FBC).

D. Florida Building Code Test Protocol for High Velocity Hurricane Zones, Test Application Standard (TAS) No. 105-Test Procedure for Field Withdrawal Resistance Testing.

1.4 SUBMITTALS

A. Mix Designs: Submit mix designs to Engineer for review a minimum of 20 days before first placement. Do not proceed without Engineer's written approval.

B. Submit certified test reports stating that concrete physical properties meet specification requirements.

C. Submit Roof Plan showing pitch/taper, sumps, details cut locations. Submit details.

D. Complete current Florida Building Code (FBC) High Velocity Hurricane Zones (HVHZ) Protocols and required product Notice of Acceptance (NOA).

1.5 QUALITY ASSURANCE

A. Applicator: Company specializing in placing lightweight concrete fill material and approved by manufacturer.

B. Complete insulating concrete roof deck system: Certified in writing, jointly, by the manufacturer and the licensed applicator, verifying that work conforms to requirements of the contract documents and manufacturer's requirements for honoring the manufacturer's warranty as specified in the appropriate Roofing Section.

C. Tests:
1. Compressive test for insulating concrete: ASTM C495.
2. Thermal transmission: ASTM C177.

D. Code Compliance.
1. Building Code: The complete roofing system shall comply with all applicable requirements of the Florida Building Code.
2. Product Approvals: Roofing system shall have current FBC HVHZ Protocols and required product Notice of Acceptance (NOA) for each roofing system applied to each type of substrate.
3. Wind Resistance: Execute the installation of the LWIC system to comply with wind resistance requirements of applicable building codes for specific negative wind pressures at various building elevations (heights) as indicated on the Drawings.
   (a) Calculations: Wind load calculations shall be prepared by a licensed structural engineer registered in the State of Florida in accordance with ASCE 7.

1.6 PRE-INSTALLATION MEETING

A. Shall not occur without Shop Drawings approved by the Contractor and accepted by the A/E. Shall convene a minimum of two weeks before starting work of this section.

B. Required Attendees:
1. Owner’s Project Manager.
2. Building Department Representative.
3. Owner’s Maintenance Foreman.
4. Architect.
5. Contractor.
6. LWIC manufacturer.
7. LWIC installer.
8. Roofing subcontractor.
9. Roof System Manufacturer.
10. Installers of deck or substrate construction to receive LWIC work.
11. Installers of roof-top units and other work in and around roofing that must precede or follow LWIC work (including mechanical work if any).
12. Any other subcontractors associated with roof assembly work.

C. The Contractor shall make arrangements for the meeting and notify the parties required to attend.

D. Agenda shall include:
1. Review preparation and installation procedures and coordinating and scheduling required with related work.
2. Review LWIC system requirements (drawings, specifications, and other contract documents).
3. Review Shop Drawings and associated submittals.

4. Review manufacturer's technical materials.
5. Review and finalize construction schedule related to roofing work and verify availability of materials, personnel, equipment and facilities needed to make progress and avoid delays.
6. Review required inspection, testing, certifying and material usage accounting procedures.
7. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including temporary roofing.
8. Tour representative areas of LWIC substrates (decks), inspect and discuss condition of the substrate, roofing system, roof drains, curbs, penetrations and other preparatory work performed by other trades.

1.7 PROJECT CONDITIONS

A. Environmental Requirements: When air temperature of 40 degrees F. or above are predicted for the first 72 hours after placement, normal placement procedures may be used.

B. Inspection: The applicator shall be responsible for inspection and approval of the substrate as being suitable for the roof insulation system.

1.8 SPECIAL WARRANTIES

A. By Membrane Producer: Provide a 20 year Special Warranty from the roof membrane producer covering correction of defects in the roof insulation component of the Roof Assembly.

B. By Lightweight Insulation Concrete (LWIC) Producer and Installer: Provide a 10 year Special Warranty in which the lightweight concrete roof insulation producer/installer agrees to correct defective roof insulation work.
1. At time of project closeout, submit this signed Special Warranty to the roof membrane producer, for transmittal to Contractor, A/E and board.

PART 2 PRODUCTS

2.1 ACCEPTABLE PRODUCTS

A. Subject to compliance with the specified requirements, provide products for roofing and re-roofing as appropriate, by one the following:
1. Celcore Inc.
2. Concrecel USA.
3. Elastizell Corporation of America.

2.2 MATERIALS

A. All lightweight concrete materials are to contain recycled content such as reclaimed Portland cement. All expanded polystyrene board to contain recycled content.

B. Cellular Insulating Concrete: Slurry of cellular Portland cement, water, and manufacturer’s product. No admixtures shall be used without approval by LWIC manufacturer.
1. Portland Cement: ASTM C150, Type I, II, or III.
2. Cellular Foaming Agent: ASTM C869 and C796.
   (a) All cellular foaming agents to be manufactured from 100 per cent bio-based materials.
3. Water: Potable, clean and free of deleterious amounts of acid, alkali and organic materials.

4. Vented Insulation Board: Comply with ASTM C578, expanded polystyrene as approved by LWIC manufacturer.
   (a) Board thickness: Per shop drawings.
5. Curing Compound: For use when allowed by the LWIC manufacturer and when used in accordance with LWIC manufacturer's written recommendations.

C. Aggregate Insulating Concrete: Slurry of cellular Portland cement, water, and manufacturer's product. No admixtures shall be used without approval by LWIC manufacturer.
1. Portland Cement: ASTM C150, Type I, II, or III.
2. Aggregate: ASTM C332, Expanded vermiculite.
   (a) ASBESTOS: Must be asbestos free, no asbestos shall be allowed, not even trace levels shall accepted. If vermiculite aggregate is used, LWIC manufacturer must supply the Owner a notarized statement by an officer of the LWIC manufacturer that mined aggregates are asbestos free.
3. Water: Potable, clean and free of deleterious amounts of acid, alkali and organic materials.
4. Vented Insulation Board: ASTM C578, Expanded polystyrene as approved by LWIC manufacturer.
   (a) Board thickness: Per shop drawings.
5. Curing Compound: For use when allowed by the LWIC manufacturer and when used in accordance with LWIC manufacturer's written recommendations.

D. When required, mesh reinforcement shall be equal to keydeck type 21602-1619.

E. Venting Accessories:
1. Stack Vents and Perimeter Vents: Provide in compliance with manufacturer's requirements and Florida Building Code (FBC) High Velocity Hazard Zone (HVHZ) Protocols and required product Notice of Acceptance (NOA).

2.3 PHYSICAL PROPERTIES OF MIX

A. Cellular:
1. Density at time of placement: 38-48 pcf min.
2. Oven dry density: 30 pcf min.
3. Minimum compressive strength: 200 psi min. (ASTM C495).

B. Aggregate:
1. Density at time of placement: 60-68 pcf min.
2. Oven dry density: 35 pcf min.
3. Minimum compressive strength: 300 psi min. (ASTM C495).

PART 3 EXECUTION

3.1 PREPARATION

A. Cover drains. Set screeds to assure correct thickness of insulating concrete.

B. Install all roof penetration assemblies (such as scuttles, curbs, joint assemblies, vents, piping, and electrical risers and conduit, etc.).

C. Close or seal all joints and openings in metal deck prior to concrete placement.

3.2 INSTALLATION

A. Mix and pump into place under provisions of manufacturer's instructions using equipment designed specifically for this type of work.

B. Insulation Installation:
1. Fill steel form corrugations with slurry coat of insulating concrete to a minimum of 1/8 inch over the top of form.
2. Place insulation board on concrete within 30 minutes of placing of concrete slurry.
3. Lay insulation board per Florida Building Code (FBC) High Velocity Hurricane Zones (HVHZ) Protocols and required product Notice of Acceptance (NOA).
4. Boards and slurry shall be left undisturbed a minimum of 24 hours before application of top coat.
5. Install layer of insulating concrete within 24 hours of installing the initial leveling coat. All areas of 1/8-inch thick leveling layer of insulating concrete and insulation board not covered by the lightweight concrete within four hours shall be removed from the deck.
6. Install insulating concrete and develop the new sloping sections to drains on roof after as shown on roof plan.
7. The average 'R' value shall be 20 min. as tested in accordance with ASTM C177 which includes the outside air film roofing materials, insulating concrete, insulating board, and inside air.

C. Concrete Placing:
1. Pump concrete into place. Do not vibrate or tamp.
2. Screed to an even surface, and to drain. Broom finish.
3. Thickness of concrete over top of insulation: Per Florida Building Code (FBC) High Velocity Hurricane Zones (HVHZ) Protocols and required product Notice of Acceptance (NOA).

3.3 FIELD QUALITY CONTROL

A. Conduct wet density test daily. At least 4 test specimens shall be sampled at the point of placement for each day's pour or each 8 cubic yards of material placed. Test in accordance with ASTM C495.

B. Prior to commencement of roofing, insulating concrete applicator shall flood test the deck to insure positive slope and drainage. If there is any ponding water, it shall be corrected before placement of the roofing materials.

C. Furnish Certificate of Compliance to the Owner upon completion of job.

END OF SECTION

SECTION 04 05 13 - MASONRY MORTARING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section specifies the mortar for unit masonry materials specified in the following Sections:

1. Concrete masonry units, Section 04 20 00.

1.2 SUBMITTALS

A. All required submittals shall be approved prior to the start of masonry construction.

B. Product Data: Proposed prepared masonry cement.

C. Proposed mortar mix design(s) including identities and proportions of ingredients as well as adherences to standards where specified.

D. Test results from mortar cube breaks reporting compressive strength of mortar.

E. Provide certification, in writing, that materials meet requirements of ASTM C1142.

F. Submit a copy of certification that the integral water repellent admixture for the mortar was added in amounts according to the manufacturers written installation instructions.

1.3 QUALITY ASSURANCE

A. Codes and Specifications: Comply with the provisions of the following codes specifications, and standards, except as otherwise shown or specified.

1. ACI 530/ASCE 5/TMS 402-11 Building Code Requirements for Masonry Structures
2. ACI 530.1/ASCE 6/TMS 602-11 Specifications for Masonry Structures
3. NCMA-TEK 20B Mortars for Concrete Masonry
4. ASTM C144, Aggregate for Masonry Mortar
5. ASTM C150, Portland Cement
6. ASTM C207, Hydrated Lime for Masonry Purposes
7. ASTM C270, Mortar for Unit Masonry
8. ASTM C979, Pigments for integrally Colored Concrete

B. Field Quality Control.

1. Materials may require testing and re-testing, as directed by the Architect, during the progress of the Work. Allow free access to material stockpiles and facilities. Tests shall be performed at the Contractor's expense.
2. Do not change source or brands of masonry mortar material during the course of the Work. If changes become necessary, resubmit data for material being changed and for tests of materials in which the changed material is and

ingredient.

1.4 TESTS FOR MORTAR

A. Test for compressive strength by the methods of sampling and testing of ASTM C109 and ASTM C780.

1. Provide a minimum of one set of cubes for testing per 5,000 sq. ft. of masonry wall construction and as directed by Architect.

B. Submit written reports for each material sampled and tested. Provide Project name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

C. If the compressive strength tests fail to meet the minimum requirements specified, the mortar represented by such tests will be considered deficient in strength.

1. Removed and replaced deficient mortar.

1.5 MATERIAL STORAGE, DELIVERY, AND HANDLING

A. Store mortar materials off the ground, under cover, using tarpaulins, felt paper, or polyethylene sheets in a dry location.

B. Deliver and store manufactured products in original unopened containers.

C. Store cementitious ingredients in weather-tight enclosures and protect against contamination.

D. Stock piles and handle aggregates to prevent contamination form foreign materials.

1.6 ENVIRONMENTAL REQUIREMENTS

A. To assure mortar temperatures between 40 degrees F and 120 degrees F until used heat mixing water or aggregates when air temperature is between 32 degrees F and 40 degrees F. When the air temperature is between 25 degrees F and 32 degrees F, heat both water and aggregate.

B. Produce subsequent mortar batches within plus or minus 10 degrees of first batch.

C. Do not heat water or sand above 160 degrees F.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, non-staining, without air entertainment and of natural color or white, to produce the required color of mortar or grout.

B. Masonry Cement: Current ASTM C91, non-staining, with 12 to 22 percent air content by volume.

C. Hydrated Lime: ASTM C207, Type S

D. Aggregates: ASTM C144, except for joint less than 1/4 inch, use aggregate graded with 100 percent passing the No. 16 sieve.

E. Water: Clean, free of deleterious materials which would impair strength or bond.

F. Ready Mixed Mortar: ASTM C270 Standard Specification for ready mixed mortar for unit masonry.

G. Integral Water Repellent Admixture: "Dry-Block Water Repellent Mortar Admixture" as manufactured by Grace Construction Products, Cambridge, MA.

2.2 MORTAR MIXES

A. Do not lower the freezing point of mortar by use of admixture or anti-freeze agents.

1. Do not use calcium chloride in mortar.

B. Mortar for Unit Masonry: Comply with ASTM C270, Property Specification, Proportion Specifications, or ASTM C1142.

1. Type M: 2500 psi average compressive strength at 28 days for masonry in contact with the earth.
2. Type S: 1800 psi average compressive strength at 28 days for other masonry conditions.

C. Use gray (non-colored) mortar for interior and non-exposed concrete block masonry.

PART 3 – EXECUTION

3.1 INSTALLATION

A. Refer to Section 04 20 00, Unit Masonry.

END OF SECTION

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SECTION 04 05 16 – MASONRY GROUTING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies the masonry grout for unit masonry materials specified in the following Sections:

1. Concrete masonry units, Section 04 20 00

B. The types of masonry grout required include the following:

1. Fine grout
2. Coarse grout
3. Grout for use in hollow metal frames

1.2 SUBMITTALS

A. Product Data: Proposed portland cement

B. Proposed grout mix designs for both fine and coarse grouts including complete identities and proportions of ingredients as well as adherences to standards where specified. All grout shall be plant-mix.

C. Compression test results from an independent certified testing laboratory from grout samples made from the proposed grout mix design. Test reports may be from previous Projects within the previous 6 months.

1.3 QUALITY ASSURANCE

A. Standards: Comply with the provisions of the following in accordance with the Florida Building Code 5th Edition (2014), except as otherwise shown or specified.

1. ACI 530/ASCE 5 Building Code Requirements for Masonry Structures.
2. ACI 530.1/ASCE 6 Specifications for Masonry Structures.
3. NCMA-TEK 23-A Grouting for Concrete Masonry Walls.

A. Field Quality Control

1. Materials may require testing and re-testing, as directed by the Architect, during the progress of the Work. Allow free access to material stockpiles and facilities. Tests will be performed at the Contractor's expense.
2. Do not change source or brand of masonry grout materials during the course of the Work. If changes become necessary, resubmit data for material being changed and for tests of materials in which the changed material is an ingredient.

1.4 MATERIAL STORAGE

A. Store grout materials off the ground, under cover, using tarpaulin, felt paper, or polyethylene sheets and in a dry location.

1.5 TESTS FOR GROUT

A. Provide a minimum of one set of 3 test specimens for testing per 5000 square feet of masonry wall construction and as directed by the Architect.

B. Submit written reports for each material sampled and tested. Provide Project name and number, date of report, name of contractor, name of testing service, source of aggregates, material manufacturer and brand name for manufactured materials, values specified in the referenced specification for each material, and test results. Indicate whether or not material is acceptable for intended use.

C. If the compressive strength tests fail to meet the minimum requirements specified, the grout represented by such tests shall be considered deficient in strength.

1. Removed and replaced deficient mortar.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portland Cement: ASTM C150, Type I, unless otherwise acceptable to Architect.

B. Flyash: ASTM C618-97, Type F may be substituted for up to 20 percent of the portland cement in the grout mix.

C. Fine Aggregates: Clean, sharp, natural sand free from loam, clay lumps, or other deleterious substances.

D. Coarse Aggregates: Clean, uncoated, pea gravel containing no clay, mud, loam, or foreign matter. Maximum aggregate size 3/4-inch.

E. Water: Clean, free of deleterious materials which may impair strength or bond.

F. Portland Cement: ASTM C 150, Type I. Provide natural color or white cement as required to produce required mortar color.

G. Masonry Cement: ASTM C 91.

H. Hydrated Lime: ASTM C 207, Type S.

I. Aggregate for Mortar: ASTM C 144, except for joints less than 1/4 inch use aggregate graded with 100 percent passing the No. 16 sieve.

1. White Mortar Aggregates: Natural white sand or ground white stone

J. Water: Clean and potable.

2.2 GROUT MIXES

A. Do not use calcium chloride in grout

B. Grout, comply with ASTM C476.

1. Fine Grout: 2500 psi average compressive strength at 28 days.
2. Coarse Grout: 2500 psi average compressive strength at 28 days.

3. Use fine grout in all hollow metal frames.

C. Grout Proportions (by volume): Comply with Table 1, ASTM C476.

1. Fine Grout: 1 part portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-1/4 to 3 parts fine aggregate.
2. Coarse Grout: 1 part portland cement, 0 to 1/10 part hydrated lime or lime putty, 2-/1/4 parts fine aggregate, 1 to 2 parts coarse aggregate.

D. Grout Slump: 9 to 11 inches.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Section 04 20 00, Unit Masonry.

B. Grout all steel frames installed in concrete and CMU walls. Do not install until asphaltic emulsion back coating has dried. Refer to Section 08 11 01- Steel Doors and Frames.

3.2 SAMPLING AND TESTING

A. Sampling and Testing of Grout: NCMA-TEK 107.

1. Place a piece of wood 1-5/8 inch thick and 3 inches by 3 inches on a level surface. Four masonry units with permeable paper, such as absorptive paper toweling, taped to one face shell are placed around the wood block to form the mold. The resulting mold is approximately 3 inches square by 6 inches high. Pour grout into the mold in two layers. Rod each layer 25 times with a 1 x 2 wood puddling stick to eliminate air bubbles. Puddle the bottom layer throughout its depth. Distribute the strokes uniformly over the cross-section of the mold. For the upper layer, allow the stick to penetrate about 1/2 inch into the underlying layer. After the second lift has been puddled, level the top of the prism with a trowel and immediately cover the prism with wet burlap or similar material to keep it damp. Protect the prisms against extreme changes in temperature, and after 48 hours, remove the masonry units and carefully pack the samples for transport to the laboratory where they will be stored in a moist room until tested.
2. Cap the specimens in accordance with the applicable provisions of "Method of Capping Cylindrical Concrete Specimens," ASTM C617. The sample should be tested in a damp condition in accordance with the applicable provisions of ASTM C39 "Methods of Test Compressive Strength of Molded Concrete Cylinders."
3. Three test samples shall be made and tested for each type of grout to be used in the work.

END OF SECTION 04 05 16

SECTION 04 05 23 – MASONRY ACCESSORIES

PART 1- GENERAL

1.1 SUMMARY

A. Section includes masonry accessories for unit masonry materials specified in:

1. Concrete masonry units, Section 04 20 00

B. The types of masonry accessories required include the following:

1. Continuous horizontal wire reinforcing and ties
2. Individual metal ties
3. Anchoring devices
4. Neoprene expansion joint filler
5. Rubber control joints
6. Concealed and through-wall flashings built into masonry work
7. Reinforcing bars in masonry lintel block and hollow metal door frame heads
8. Vertical bars for concrete masonry
9. Caging devices and centering clips for alignment of vertical reinforcing bars
10. Grouted anchor bolts
11. Preformed expansion joint material
12. Column isolation
13. Vents in head joints of face brick at top and bottom of cavity walls
14. Mortar dropping control devices

1.2 SUBMITTALS

A. All submittals shall be approved prior to the start of masonry construction.

B. Product Data, with particular items to be provided, clearly marked, for:

1. Masonry joint reinforcement
2. Masonry in-wall flashing
3. Neoprene expansion joint filler
4. Rubber control joint
5. Vents in head joints of face brick
6. Mortar dropping control devices
7. Provide documentation showing recycled content of steel reinforcing and accessories

C. Samples at project site for review:

1. Masonry ties and anchoring devices.
2. Vents in head joints of face brick.
3. Mortar dropping control devices.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer: Provide masonry reinforcing as manufactured by one of the following;

1. Heckmann Building Products, Inc., Chicago, Illinois; http://www.heckmannbuildingprods.com
2. Dur-O-Wal, Inc., Aurora, Illinois; http://www.dur-o-wal.com
3. Masonry Reinforcing Corp. of America, Charlotte, North Carolina; http://www.wirebond.com
4. Hohmann & Barnard, Inc., Hauppauge, New York; http://www.h-b.com

2.2 MATERIALS

A. Continuous Wire Reinforcing and Ties for Masonry

1. Provide welded wire units prefabricated in straight lengths of not less than 10 foot, with matching pre-fabricated corner ("L") and intersection ("T") units.
2. Fabricate from cold-drawn steel wire complying with ASTM A1064, with deformed or embossed continuous side rods and plain cross-rods, with unit width of 1-1/2 to 2 inches less than thickness of wall partition.
3. Wire shall be galvanized in accordance with the following:

    a. Joint reinforcement, interior walls: Mill galvanized wire ASTM A641 Class 1 (0.40 oz. per sq. ft.)
    b. Wire ties or anchors in exterior walls completely embedded in mortar or grouts: Mill galvanized ASTM A641 Class 3 (0.80 oz. per sq. ft.)
    c. Wire ties or anchors in exterior walls not completely embedded in mortar or grout (includes cavity walls): Hot dip galvanized ASTM A153 Class B2 (1.50 oz. per sq. ft.)
    d. Joint reinforcement in exterior walls or interior walls exposed to moist environments such as showers, food service areas, and toilet rooms: Hot dip galvanized ASTM A153-B2 (1.50 oz. per sq. ft.)
    e. Sheet metal ties or anchors exposed to weather metal: Hot dip galvanized ASTM A153 B2 (0.60 oz. per sq. ft.)
    f. Sheet metal ties or anchors completely embedded in mortar or grout: ASTM A653 (0.60 oz. per sq. ft.)

4. For single wythe interior CMU walls, provide truss ladder type joint reinforcing fabricated with two 9 gage steel side rods and 9 gage cross rods. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c.
5. For composite interior walls consisting of CMU backup and face brick or 2 wythes of brick, provide ladder type joint reinforcing fabricated with two 9 gage steel side rods and 9 gage cross rods. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c.
6. Multi-wythe exterior walls consisting of CMU backup, insulated cavity, and exterior face brick. Contractor's option:

    a. When both wythes are to be constructed simultaneously, Provide ladder type joint reinforcing fabricated with three 9 gage steel rods and 9 gage cross rods. Joint reinforcing shall be placed in every other CMU joint or

not more than 16 inches o.c

b. When each wythe is to be constructed separately:

(1) Provide adjustable ladder type joint reinforcing fabricated with two 9 gage steel side rods, 9 gage cross rods, 9 gage eyes and 9 gage double legged pintles. Longitudinal rods shall be spaced for each face shell of CMU; eye sections shall extend into wall's cavity, and pintles shall rest upon bed joints of face brick. Joint reinforcing shall be placed every other CMU joint or not more than 16 inches o.c.

(2) Brick wythe shall have ladder type joint reinforcing fabricated with two 9 gage steel side rods and 9 gage cross rods. Joint reinforcing shall be placed in every other CMU joint or not more than 16 inches o.c. Joint reinforcing in brick need not be n the same joint as pintle.

7. For composite foundation walls consisting of two or more wythes of CMU, provide ladder type joint reinforcing fabricated with four 9 gage cross rods. Joint reinforcing shall be placed in every CMU joint or no more than 8 inches o.c.
8. For single wythe foundation walls, provide truss ladder type joint reinforcing fabricated with two 9 gage steel rods and 9 gage cross rods. Joint reinforcing shall be placed in every CMU joint or no more than 8 inches o.c.
9. For multi-wythe walls in which the coursing in the face wythe does not align vertically with the coursing in the backup wythe use:

a. Stone Tab 3700 with 1100 triangular ties; Masonry Reinforcing Corporation of America.
b. Stone Lok AA690 with Flex-o-lok AA400 w/t Type A triangular web ties; AA Wire Products.

B. Adjustable Masonry Wall Ties: Shall be fabricated from 3/16 inch cold-drawn galvanized steel wire, complying with ASTM A1064, of the length required for proper embedment in wythes of masonry shown, or crimped if used in cavity wall construction. Provide either "rectangular" or "Z" ties for proper anchorage in mortar joint.

C. Anchoring Devices for Masonry

1. Rigid Anchors: Where masonry is to be rigidly anchored to structural steel beams, such as lintel beams, provide galvanized steel straps, bars, or rods welded to the steel beam and extending into the mortar joint. Straps shall be not less than 14 gage in thickness. Bars and rods shall be not less than 1/4 inch in diameter.
2. Flexible Anchors: Where masonry is to be laterally supported from structural steel, while permitting only vertical movement or both vertical and horizontal movement, provide flexible anchors consisting of 2 different components as follows:

a. Web Ties or Beam Ties: Shall be 3/16 inch galvanized steel wire, ASTM A1064, 12 inches long with width being approximately 2 inches less than nominal wall thickness. Provide ties with blunt end when used with strap anchors, and provide ties with tapered end when used with rod anchors. This type tie shall permit only vertical movement and shall be installed parallel to masonry walls that abut steel columns.
b. Triangular Ties: Shall be 3/16 inch galvanized steel wire, ASTM A1064, lengths as required to extend to within 5/8 inch of opposite face of

masonry. Closed end shall be 1 inch wide, and split-end opening shall be 1/2 inch. This type tie shall permit both vertical and horizontal movement and shall be installed where masonry by-passes steel columns and where masonry is parallel and adjacent to steel beams and joists.

c. Flexible anchors: Where masonry is to be laterally supported from cast-in-place or precast concrete, provide 22 gage galvanized dovetail slots with 3/16 inch diameter galvanized triangular ties.

3. Dowels on Lintels: Where masonry is supported on the top of lintels and plates provide #4 reinforcing bar by 6 inch rods or 1/2 inch diameter by 6 inch headed studs at 32 inch spacing, unless otherwise noted, welded to top of steel and extending into cores or cavity of masonry above. Grout cores or cavity at rods.

D. Neoprene Expansion Joint Filler (for face brick)

1. Provide expansion joints in exterior brick masonry conforming to ASTM D-1056 where indicated on the Drawings. The following products are acceptable:

a. "Neo-Seal IV 2218-3" as manufactured by Williams Products, Inc., Troy, Michigan; or Architect approved equal;
http://www.sweets.com/index/mfg.htm?site=undefined&id=624

E. Rubber Control Joints

1. Provide rubber control joints designed for standard sash block in CMU walls where control joints (CJ) are indicated on the Drawings or as specified in Section 04200. The following products are acceptable. Rubber control joints shall conform to ASTM D2000.

a. Basis of Design: “Everlastic Slot Seal Std. 2015-3” as manufactured by Williams Products, Inc., Troy, Michigan.
http://www.sweets.com/index/mfg.htm?site=undefined&id=624

b. Other equal products as manufactured by Dur-o-wal or Heckman are acceptable.

F. Through-Wall Flashing:

1. Provide flashings, shown to be built into masonry, extended and exposed beyond the exterior surface of the wall.

a. Stainless steel: 0.0156 thick, ASTM A 240, Type 304

2. All masonry wall flashings are to be set in a bed of mortar and covered with a bed of mortar.
3. All seams shall be welded and watertight.

a. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer

G. Through-Wall Flashing

1. Provide concealed through-wall flashings, shown to be built into masonry.

2. Provide self-adhering membrane flashing similar to Heckmann No. 82 Rubberized Asphalt through wall flashing or Hohmann & Barnard “Textroflash”. The flashing is to be 18 inches wide to allow 12 inches vertical extension up the related backup wall.
3. All masonry wall flashings are to be set in a bed of mortar and covered with a bed of mortar.

H. Reinforcing Bars

1. Size, length, and spacing shall be as indicated on the Drawings.
2. Where No.3 and larger are indicated, they shall be deformed steel, conforming to ASTM A615, Grade 60.

I. Intersecting Masonry Wall Joint Reinforcing: Horizontal bed joint reinforcement for conditions where interior non-load-bearing masonry walls intersect exterior or interior load-bearing walls at 90 degrees shall be wire mesh wall ties made of 1/2 inch mesh by 16 gage hot dip mill-galvanized wire, 1 inch less in width than width of wall.

J. Column Isolation: Around all columns in masonry walls, provide 3/8 inch "Ceramar Flexible-Foam" expansion joint filler as manufactured by W.R. Meadows, Inc.; http://www.wrmeadows.com; or Architect approved equal.

K. Caging Devices and Centering Clips

1. In hollow concrete masonry cores or brick cavities to be reinforced with vertical reinforcing steel bars and filled with grout, provide 9 gage galvanized steel caging devices. The following products are acceptable:

   a. Rebar Positioner AA239, AA Wire Products Company, Chicago, Illinois; or Architect approved equal.
   b. Rebar Positioner 3400, Masonry Reinforcing of America, Charlotte, North Carolina; or Architect approved equal.
   c. Spider Type Rebar Positioner, National Wire Products Industries, Baltimore, Maryland; or Architect approved equal.

L. Grouted Anchor Bolts

1. In hollow concrete masonry units: HILTI HIT C20 Renovation Anchors, Hilti, Inc., Tulsa, Oklahoma; http://www.us.hilti.com; or Architect approved equal.
2. In solid or grouted masonry units: HILTI HIT C100 System, Hilti, Inc., Tulsa, Oklahoma; http://www.us.hilti.com; or Architect approved equal.

M. Preformed Expansion Joint Material: Provide closed cell polyethylene expansion joints equal to "Expansion-Joint Filler" by Sonneborn Building Products; or Architect approved equal. http://www.chemrex.com/sonneborn/index.htm

N. Plastic cells vents that are full height and depth of the masonry head joint similar to Hohmann & Barnard 342 Rectangular Weep Holes with Mortar Trap Weep Vents.

O. Brick Vents Minimum .125” 6063-T5 aluminum alloy with 204-R1 clear anodized finish. Provide 45 degree overlapping blades with storm lip. Provide insect screen. Size: 16-1/2” x 7-3/4”.

P. Mortar Dropping Control Devices

1. "Hohmann & Barnard" as manufactured by Hohmann & Barnard, Inc.: http://www.h-b.com/
2. Install "Hohmann & Barnard" Mortar Trap according to the manufacturer's written installation instructions. Thickness shall be as required to fill the cavity.

PART 3 - EXECUTION

3.1 INSTALLATION

A. See Section 04 20 00, Unit Masonry, for installation of masonry accessories specified under this Section.

END OF SECTION 04 05 23

SECTION 04 20 00 – UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Provide labor, materials, and equipment necessary for complete installation of unit masonry, including the installation of rigid cavity insulation as shown on the Drawings and specified herein.

B. Work installed under this Section, but materials or products furnished under the following Divisions or Sections:

1. Masonry mortar furnished under the Work of Section 04 05 13
2. Masonry grout furnished under the Work of Section 04 05 16
3. Masonry accessories furnished under the Work of Section 04 05 23
4. Anchor bolts, steel plates, and steel lintels; refer to Division 5

    a. Installation of lintels in masonry walls shall be included under the Work of this Section.

5. Wood bucks and nailing blocks in masonry construction; refer to Section 06 10 00.

C. Cooperate with other trades requiring items of equipment or services to be installed within or in conjunction with Unit Masonry Work.

D. Other Materials provided and installed by this Section:

1. Integral water repellent additive
2. Masonry cleaners

1.2 SUBMITTALS

A. Upon regular presentation within past 6 months of representative units by approved manufacturer, a test report from an independent laboratory showing resultant weight, compressive strength (based on net area), and water absorption properties, as well as adherances to standards where so specified, for:

Name of Manufacturer
Date of Manufacture of Test Specimen
Dimension Measurements (in.)
Calculated Gross Area (sq.in.)
Calculated Net Area (sq.in.)
Total Load (lbs.)
Net Unit Load (psi)
Sample Weight (lbs.)
Dry Weight (lbs.)
Wet Weight (lbs.)
Immersed Weight (lbs.)
Density (pcf)
Moisture Content (%)
Absorption (%)

C. Letter from approved manufacturer certifying that provided units will meet or exceed qualities of tested representative units for:

1. Each proposed type of concrete masonry unit.

D. Approved manufacturer's published complete product data, with particular items to be provided clearly marked thereon, for:

2. Proposed masonry cavity wall insulation.

E. A test report from an independent testing laboratory showing compressive strength of concrete masonry prisms constructed from the concrete masonry units and mortar to be used in the masonry work for:

1. Each proposed type and size of concrete masonry unit as required on the Reinforced Masonry Plans in the Drawings.

F. Submit minutes from preinstallation conference.

G. Installer’s examination report.

I. Submit written masonry inspection reports as specified in 1.3.C herein.

J. Certified Lumber (for wood used in formwork if any):

1. Submit chain-of-custody certificate from one of the certifying organizations listed in the Quality Assurance Article of Section 06 10 01, certifying that lumber is harvested from a well-managed forest.
2. Lumber shall be clearly marked by one of the certifying organizations listed in the Quality Assurance Article of Section 06 10 01.

1.3 QUALITY ASSURANCE

A. Standards: Comply with the provisions of the following in accordance with the Florida Building Code 6th Edition (2017), except as otherwise shown or specified.

1. ACI 530/ASCE 5/TMS 402-011 Building Code Requirements for Masonry Structures
2. ACI 530.1/ASCE 6/TMS 602-011 Specifications for Masonry Structures
3. NCMA-TEK 70A Concrete Masonry Prism Strength.
4. NCMA-TEK 132
5. NCMA-TEK 23A Grouting for Concrete Masonry Walls.
6. NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry.
7. ASTM C140 Standard Methods of Sampling and Testing Concrete Masonry Units.
8. Comply with ALL NCMA-TEK Standards.

B. Changes in the source or brand of masonry materials during construction will require resubmission and re-testing at the Contractor's expense.

C. Concrete Masonry Inspection

1. Provide Masonry inspection for masonry elements where it is imperative that

construction produces elements which can attain high design strengths. These masonry elements include, but are not limited to, grout filled CMU walls, CMU bearing walls, and grout filled and vertically reinforced CMU walls.

2. Submit written reports for each section of wall inspected to include:

   a. Project identification name and number.
   b. Name of Masonry Contractor.
   c. Name of inspecting service.
   d. Date of report.
   e. Specific location of work inspected.
   f. Horizontal joint reinforcing size, type, spacing, and lap.
   g. Preparation of cores and cavities to be grouted. Inspect every core and cavity.
   h. Vertical reinforcing centering clip size, type, spacing, and proper alignment.
   i. Size spacing and lap of vertical reinforcing and installation in centering clips.
   j. Installation and vibration of grout in cores and cavities.
   k. Remarks as to general conditions pertinent to the strength and quality of the masonry work.

3. Inspection shall use NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry and NCMA-TEK 132 Inspector's Guide for Concrete Masonry Construction as guidelines.
4. The masonry inspection agency shall be selected prior to the pre-masonry conference and shall have the inspector who will inspect this project attend the conference.

D. Fire Performance Characteristic: Where indicated, provide materials and construction identical to those of assemblies whose fire resistance has been determined per ASTM E119 by a testing and inspection organization, by equivalent concrete masonry thickness, or by other means acceptable to authorities having jurisdiction.

1.4 TESTS OF CONCRETE MASONRY PRISMS

A. For grout filled and reinforced or un-reinforced concrete masonry or brick masonry wall construction tests for the compressive strength of prisms as described in ASTM C 1388.

1. Provide a minimum of one set of 3 masonry prisms for testing per each 5000 square feet of masonry wall construction as required on the Structural Masonry Plan in the Drawings.

B. Submit written reports for each prism tested Provide the project identification name and number, date of report, name of Contractor, name of Testing service, name of material suppliers, specific location where masonry represented by the prism is used, test results, and values specified in the referenced specification. Indicate whether or not tested prism is acceptable for intended use.

C. If the compressive strength tests fail to meet the minimum requirements specified, the concrete masonry represented by such tests shall be considered deficient in strength.

D. Deficient masonry construction shall be removed and replaced by the Contractor without additional cost to the Owner. In lieu or removal and replacement, additional cores may be grouted as required and directed by the Architect without additional cost to the Owner.

1.5 MASONRY INSPECTION

A. The Contractor for the Work of this Section is responsible for all masonry inspections and reports as specified herein.

B. Provide masonry construction inspection of concrete masonry walls indicated as requiring inspection on the Masonry Plans to ensure that masonry construction is in conformance with the Contract Documents. Masonry inspection is required for those masonry elements which must be constructed to attain high design strengths, such as, but not limited to, vertically reinforced grouted CMU walls, grouted CMU wall, and load-bearing CMU walls.

C. Qualification of Inspection Agency: Refer to Division 1 requirements.

D. Inspection shall use NCMA-TEK 65 Field Inspection of Engineered Concrete Masonry and NCMA-TEK 132 Inspector's Guide for Concrete Masonry Construction as guidelines.

E. The individual or individuals who will perform the masonry inspection shall be present for the Pre-masonry Conference.

F. The masonry inspector shall prepare a written report or reports for each day of inspection.

G. The masonry inspector shall be present and observe all grouting operations in walls requiring inspection. The masonry inspector shall be present at the project site within sufficient time, in advance of grouting operations, to inspect the construction to insure its conformance to the contract Documents and that grouting may proceed. Periodically, the masonry inspector shall be present during the placing of masonry units and reinforcement. No grouting shall be permitted unless the masonry inspector is present and has indicated that the masonry construction is properly prepared for the grouting operation.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver masonry materials to project in undamaged condition.

B. Store and handle masonry units off the ground, under cover, and in a dry location to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, and other causes. If units become wet, do not place until units are in an air-dried condition.

C. Store cementitious materials off the ground, under cover, and in dry location.

D. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

E. Store masonry accessories including metal items to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

A. Protect partially complete masonry against weather, when Work is not in progress, by covering top of walls with strong, waterproof, non-staining membrane. Extend membrane

at least 2 foot down both sides of walls and anchor securely in place.

B. Protect partially complete masonry walls against wind damage by bracing as required until support of walls is integral with the building structure.

C. Protect masonry against freezing when the temperature of the surrounding air is 40 degrees F and falling. Heat materials and provide temporary protection of complete portions of masonry work. Comply with the requirements of the governing code and with the "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes of Brick and Tile Construction by the Brick Institute of America (BIA).

D. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Remove immediately any grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and mortar splatter by means of coverings spread on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes from mortar droppings.

E. Cold-Weather Construction: Comply with referenced unit masonry standard for cold-weather construction and the following:

1. Do not lay masonry units that are wet or frozen.
2. Remove masonry damaged by freezing conditions.

F. Hot-Weather Construction: Comply with referenced unit masonry standard.

G. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Comply with referenced unit masonry standard and other requirements specified in this Section applicable to each material indicated.

2.2 MASONRY UNITS

A. Obtain masonry units from one manufacturer for uniform texture and color for each kind required, for each continuous area and visually related areas.

Concrete Masonry Units (CMU):

1. Manufacturer: Shall be member of the National Concrete Masonry Association.
2. Size: Manufacturer's standard units with face dimensions of 15-5/8 by 7-5/8 inches (actual), 15-5/8 inches by 3-5/8 inches (actual), 7-5/8 inches by 7-5/8 inches.
3. Hollow Load-Bearing (HL) CMU: Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of (2420 psi) (1900 psi) on the net section.
4. Solid Loadbearing CMU (Solid CMU): Provide units complying with ASTM C90, 2N Class Designation for the aggregates, with a minimum compressive strength of (2420 psi) (1900 psi) on the gross section.
5. Lightweight Units: ASTM C331 aggregate, except that aggregate material shall be limited to blast furnace slag, clay, shale, or slate. Dry net weight shall be not more than 105 lbs. per cu. ft. Strength shall be indicated above.
6. Medium Weight Units: ASTM C33 concrete aggregates for a net weight between 105 pounds and 125 pounds per cu. ft. Strength shall be as indicated above.
7. Normal Weight Units: ASTM C33 concrete aggregates for a dry net weight of not less than 125 pounds per cu. ft. Strength shall be as indicated above.
8. Curing: Cure units in a moisture-controlled atmosphere or in an autoclave at normal pressure and temperature to comply with ASTM C90, Type I. (Linear drying shrinkage shall be 3 percent or less).
9. Curing: Cure units in a non-moisture controlled atmosphere to comply with ASTM C90, Type II.
10. Exposed Face:
    a. Manufacturer's standard color and texture. Smooth (Sand) face. No open textured block will be accepted.
11. Provide masonry lintels at all openings greater than 1’-0” in width that occur in CMU walls.

2.3 CAVITY WALL INSULATION

1. "Styrofoam-SM": Dow Chemical
2. "Foamular 250": UC Industries, Inc.
3. “Certifoam”: DiversiFoam Products.

A. Mastic: Shall be equal to Contech Brands "PL200" or H.B. Fuller "Maxbond" for application to outside face of inner wythe of cavity walls.

B. Sealant: Shall be equal to Contech Brands "PL300" for sealing insulation joints and penetrations.

2.4 MASONRY CLEANERS

A. Job-Mixed Detergent Solution: Solution of trisodium phosphate (1/2-cup dry measure) and laundry detergent (1/2-cup dry measure) dissolved in one gallon of water.

B. Job-Mixed Muriatic Solution: Solution of 1-part muriatic acid and 10 parts clean water, mixed in a nonmetallic container with acid added to water.

C. Proprietary Acidic Cleaner: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry surfaces of type indicated below without discoloring or damaging masonry surfaces; expressly approved for intended use by manufacturer of masonry units being cleaned.

1. For masonry not subject to metallic oxidation stains, use formulation consisting of a concentrated blend of surface-acting acids, chelating, and wetting agents.
2. For dark colored masonry not subject to metallic oxidation stains, use formulation consisting of a liquid blend of surface-acting acids and special inhibitors.
3. For masonry subject to metallic oxidation stains, use formulation consisting of a liquid blend of organic and inorganic acids and special inhibitors.
4. Available Products: Subject to compliance with requirements, a product that may be used to clean unit masonry surfaces includes, but is not limited to, the following:
5. Products: Subject to compliance with requirements, provide the following:

b. "Sure Klean No. 600 Detergent," ProSoCo, Inc.
c. "Sure Klean No. 101 Lime Solvent," ProSoCo., Inc.
d. "Sure Klean Vana Trol," ProSoCo, Inc.

2.6 SOURCE QUALITY CONTROL

A. Brick Tests: For each type and grade of brick indicated, units will be tested by qualified independent testing laboratory per ASTM C 67.

B. Concrete Masonry Unit Tests: For each type, class, and grade of concrete masonry unit indicated, units will be tested by qualified independent testing laboratory for strength, absorption, and moisture content per ASTM C 140.

2.7 PREFORMED INSULATION INSERTS

A. U-shaped, preformed insulation inserts shall be extruded expanded polystyrene preformed and individually molded with a minimum density of 1 pcf, and shall conform to ASTM C578, Type I. Install in CMU block at producer’s plant.

B. Manufacturer: “Korfil” U-Shaped Concrete Block Insulating Systems by Concrete Block Insulating Systems, West Brookfield, MA.

C. Shape: U-shaped insert accomplishing compression fit with inside faces of both the front and rear face shells and the central web of the CMU allowing re-bar placement at center of CMU core, and handhold access at center web of the CMU.

2.8 INTEGRAL WATER REPELLANT ADDITIVE

A. Acceptable Manufacturers: “Dry-Block” by W.R. Grace and Company; or Architect approved equal.

B. Install the integral waterproofing additive in all smooth face CMU, split-face CMU and

ground face CMU installed in exterior walls.

C. Integral water repellent additive shall comply with ASTM E514, extended to 72 hours, ASTM C1357, ASTM C1314, and ASTM C1148.

D. Description: Integral liquid polymeric admixture for CMU added during block production.

E. Water Permeance of Masonry: Capable of achieving a Class E Rating when evaluated using ASTM E 514 with the test extended to 72 hours, using the rating criteria specified in ASTM E 514-74.

F. Flexural Bond Strength of Masonry: An increase of minimum 10% in masonry flexural bond strength shall occur as a result of adding integral water-repellent CMU and mortar admixtures when compared to a control (containing no admixtures) CMU and mortar when tested according to ASTM C 1357.

G. Compressive Strength of Masonry Prisms: Maximum 5% decrease in compressive strength of prisms shall occur as a result of adding integral water-repellent CMU and mortar admixtures when compared to a control (containing no admixtures) CMU and mortar when tested according to ASTM C 1314.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other specific conditions, and other conditions affecting performance of unit masonry.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of unit masonry.

B. Examine rough-in and built-in construction to verify actual locations of piping connections prior to installation.

C. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Comply with referenced unit masonry standard and other requirements indicated applicable to each type of installation included in Project.

B. Thickness: Build cavity and composite walls and other masonry construction to the full thickness shown. Build single-wythe walls to the actual thickness of the masonry units, using units of nominal thickness indicated.

C. Build chases and recesses as shown or required to accommodate items specified in this and other Sections of the Specifications. Provide not less than 8 inches of masonry between chase or recess and jamb of openings and between adjacent chases and recesses.

D. Leave openings for equipment to be installed before completion of masonry. After

installation of equipment, complete masonry to match construction immediately adjacent to the opening.

E. Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to provide continuous pattern and to fit adjoining construction. Use full-size units without cutting where possible.

F. Matching Existing Masonry: Match coursing, bonding, color, and texture of new masonry with existing masonry.

G. Frozen Materials and Work: Do not use frozen materials mixed or coated with ice or frost. For masonry which is specified to be wetted, comply with the BIA recommendations. Do not build on frozen work. Remove and replace masonry work damaged by frost or freezing.

3.3 CONSTRUCTION TOLERANCES

A. Comply with construction tolerances of referenced unit masonry standard.

B. Variation from Plumb: For vertical lines and surfaces of columns, walls and arises do not exceed 1/4” in 10”, or 3/8” in a story height not to exceed 20’, nor 1/2" in 40’ or more. For external corners, expansion joints, control joints and other conspicuous lines, do not exceed 1/4” in any story or 20’ maximum, nor 1/2" in 40’ or more. For vertical alignment of head joints do not exceed plus or minus 1/4" in 10’, 1/2" maximum.

C. Variation from Level: For bed joints and lines of exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines, do not exceed 1/4" in any bay or 20' maximum, nor 1/2" in 40' or more. For top surface of bearing walls do not exceed 1/8" between adjacent floor elements in 10' or 1/16" within width of a single unit.

D. Variation of Linear Building Line: For position shown in plan and related portion of columns, walls and partitions, do not exceed 1/2" in any bay or 20' maximum, nor 3/4" in 40' or more.

E. Variation in Cross-Sectional Dimensions: For columns and thicknesses of walls, from dimensions shown, do not exceed minus 1/4" nor plus 1/2".

F. Variation in Mortar Joint Thickness: Do not exceed bed joint thickness indicated by more than plus or minus 1/8", with a maximum thickness limited to 1/2". Do not exceed head joint thickness indicated by more than plus or minus 1/8"

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint widths and for accurate locating of openings, movement-type joints, returns, and offsets. Avoid the use of less-than-half-size units at corners, jambs, and where possible at other locations.

B. Lay up walls to comply with specified construction tolerances, with courses accurately spaced and coordinated with other construction.

1. For the first and second block courses above and below apertures, run reinforcing continuous or extend two feet back from aperture edge. Refer to notes on Structural drawings.

C. Lay-up walls plumb and true and with courses level, accurately spaced and coordinated with other work. Do not wedge partitions tight against structural ceiling or beams, but provide a caulk or insulation filled joint between top of masonry and the structural roof deck, structural steel framing or structural floor deck. Stop masonry a minimum of 1/2 inch from vertical, horizontal and sloped steel surfaces.

D. Pattern Bond: Lay concrete masonry units in running bond. Lay concealed masonry with all units in a wythe bonded by lapping not less than 2 inches. Lay masonry with vertical joints plumb, one above the other. Bond and interlock each course of each wythe at corners unless otherwise shown.

E. Stopping and Resuming Work: In each course, rack back 1/2-unit length for one-half running bond or 1/3-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly (if required), and remove loose masonry units and mortar prior to laying fresh masonry.

F. Built-In Work: As construction progresses, build-in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

1. Fill space between hollow metal frames and masonry solidly with mortar, unless otherwise indicated.
2. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.
3. Fill cores in hollow concrete masonry units with grout 3 courses (24 inches) under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
4. Install adjustable hollow metal frame anchors, locating anchors on jambs in horizontal bed courses near the top and bottom of each frame and at intermediate points not over 24 inches apart.
5. Fill jambs and heads of all hollow metal door and window frames installed in CMU or concrete walls solid with grout.
6. Rake joints around exterior side of exterior hollow metal door frames for sealant under Division 7.
7. Where hollow metal frames do not wrap around masonry jambs and heads, rub exposed corners of block to remove sharp, irregular edges.
8. Wash brick veneer prior to installing aluminum window units.

G. Intersecting Masonry Walls: Where interior nonload-bearing masonry partition or wall intersects an exterior or interior load-bearing masonry wall at 90 degrees, stop horizontal joint reinforcing in interior partition 4 inches short of intersection. Horizontal joint reinforcing in exterior or interior load-bearing wall shall run continuous. In the same

courses as horizontal reinforcing, install wire mesh extending 8 inches minimum into interior partition and projecting into the exterior wall to within 2 inches of exterior face of wall. Install wire mesh reinforcing in horizontal joints 16 inches o.c. vertically.

H. Intersecting Masonry Walls: Where interior CMU walls intersect other CMU walls located in all Cells and areas accessible to inmates, or jail population, all intersecting walls shall be of “toothed” construction. Interlock every other course by “toothing” every other course.

I. Grout masonry walls where indicated on drawings.

3.5 MORTAR BEDDING AND JOINTING

A. Mix mortar ingredients for a minimum of 5 minutes in a mechanical batch mixer. Use water clear and free of deleterious materials which would impair the work. Each mortar batch is allowed only one retempering. Do not use mortar which has begun to set after the first re-tempering or if more than 2-1/2 hours has elapsed since initial mixing.

B. Lay brick and other solid masonry units with completely filled bed and head joint; butter ends with sufficient mortar to fill head joints and shove into place. Butter ends of brick in hand and in the wall at closures. Do not slush head joints.

C. Lay hollow concrete masonry units with full mortar coverage on horizontal and vertical face shells; also bed webs in mortar in starting course on footings and foundation walls and in all courses of piers, columns and pilasters, and where adjacent to cells or cavities to be reinforced or to be filled with concrete or grout.

D. Joints: Maintain joint widths shown, except for minor variations required, to maintain joint alignment. Lay walls with 3/8 inch joints. Cut joints flush for masonry walls which are to be concealed or to be covered by other materials. For exposed masonry, provide joints as follows:

1. All Exposed Joints: Concave tooled.
2. All Concealed Joints: Struck flush.

E. Remove masonry units disturbed after laying; clean and relay in fresh mortar. Do not pound corners at jams to fit stretcher units which have been set in position. If adjustments are required, remove units, clean off mortar, and reset in fresh mortar.

3.6 CAVITIES/AIR SPACES

A. Keep cavities/air spaces clean of mortar droppings and other materials during construction. Strike joints facing cavities/air spaces flush.

B. Tie exterior wythe to interior wythe with individual metal ties. Stagger alternate courses.

C. Tie exterior wythe to interior wythe with continuous horizontal joint reinforcing embedded in mortar joints at not more than 16 o.c.

D. Where pintle and eye joint reinforcement is shown, concrete masonry wythes may be laid up full height separate from facing wythe.

F. Provide flashing around entire perimeter at base of walls in first course above grade. Provide in-wall flashing and weep holes above exterior wall openings and within exterior walls that project above adjacent lower roof(s).

3.7 CAVITY WALL INSULATION

A. On units of rigid insulation, install small pads of adhesive spaced approximately 1'-0" o.c. both ways on inside face or attach to inside face with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.

1. Fill all cracks and open gaps at all perimeter edges in insulation with crack sealer compatible with insulation and masonry.
2. Coordinate adhesive with emulsion damp-proofing in Section 07150.

3.8 HORIZONTAL JOINT REINFORCEMENT

A. Provide continuous horizontal joint reinforcing as shown and specified. Fully embed longitudinal side rods in mortar for their entire length with a minimum cover of 5/8 inch on exterior side of walls and 1/2 inch at other locations. Lap reinforcement a minimum of 6 inches at ends of units. Do not bridge control and expansion joints with reinforcing.

B. Space continuous horizontal reinforcing as specified in Section 04 05 23.

C. Reinforce masonry openings greater than 1 foot wide, with horizontal joint reinforcing placed in 2 horizontal joints approximately 8 inches apart, both immediately above the lintel and immediately below the sill. Extend reinforcing a minimum of 2 foot beyond jambs of the opening except at control joints.

D. Cut or interrupt joint reinforcement at control and expansion joints, unless otherwise indicated.

E. Provide continuity at corners and wall intersections by use of prefabricated "L" and "T" sections. Cut and bend reinforcement units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.10 ANCHORING MASONRY TO STRUCTURAL MEMBERS

A. Anchor masonry to structural members where masonry abuts or faces structural members to comply with the following:

1. Provide an open space not less than 1 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar or other rigid materials.
2. Anchor masonry to structural members with flexible anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.11 ANCHORING SINGLE-WYTHE MASONRY VENEER

A. Anchor single-wythe masonry veneer to metal studs with masonry veneer anchors to comply with the following requirements:

1. Fasten each anchor section through sheathing to metal studs with 2 metal fasteners of type indicated.
2. Embed tie section in masonry joints. Provide not less than 2-inch air space between back of masonry veneer wythe and face of sheathing.
3. Locate anchor section relative to course in which tie section is embedded to allow

maximum vertical differential movement of tie up and down.

4. Space anchors as indicated but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally with not less than one anchor for each 2 sq. ft. of wall area. Install additional anchors within 1'-0" of openings and at intervals around perimeter not exceeding 8 inches.
2. Adjustable components shall be installed over a strip of self-adhering membrane.

B. Install vents at the top of each continuous air space in masonry veneer walls.

3.12 MOVEMENT (CONTROL AND EXPANSION) JOINTS

A. Install control and expansion joints in unit masonry where indicated, or if not indicated, space at a maximum of 2 times the wall height not to exceed 30’ o.c. Build in related items as the masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

B. Form control joints in concrete masonry as follows:

1. Fit bond breaker strips into hollow contour in ends of block units on one side of control joint. Fill the resultant core with grout and rake joints in exposed faces.
2. Install preformed control joint gaskets designed to fit standard sash block.
3. Install special shapes designed for control joints. Install bond breaker strips at joint. Keep head joints free and clear of mortar or rake joint.

C. Build in horizontal pressure-relieving joints where indicated; construct joints by either leaving an air space or inserting nonmetallic 50 percent compressible joint filler of width required to permit installation of sealant and backer rod specified in Division 7 Section "Joint Sealers."

1. Locate horizontal pressure-relieving joints beneath shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

D. Control Joint Locations: If control joints are not shown on the Drawings, provide as follows:

1. Not to exceed 30 feet between joints in CMU walls, unless otherwise noted.
2. At change from wall setting on foundation to wall setting on floor slab.
3. At change from exterior wall to interior wall.
4. At walls setting on floors, that cross floor construction and control joints.
5. At columns within masonry walls.
6. At changes in wall thickness.

E. Column Isolation from Masonry: Continuously wrap steel columns or structural supports within masonry walls with 3/8 inch expansion joint filler sheets (column isolation). Secure with light gage wire. Refer to Section 04 05 23 for column isolation specifications.

3.13 LINTELS

A. Install steel lintels where indicated and/or as required for masonry openings.

B. Provide masonry lintels where shown and wherever openings of more than 1'-0" for brick size units and 2'-0" for block size units are shown without structural steel or other

supporting lintels. Provide formed-in-place masonry lintels. Temporarily support formed-in-place lintels.

1. For hollow concrete masonry unit walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout.

C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

D. For all openings in non-load bearing CMU or brick, with lintels not shown on Structural Drawings, provide the following lintels:

1. CMU Lintel: Use bond beam lintel block. Fill with concrete or grout. All lintel block shall be 8” nominal height by the wall thickness. Extend lintel 24” into wall on each side of opening. Concrete or grout shall have a minimum of f’c = 4000 psi. Provide 2 - #5 rebar top and bottom. Lintel shall be shored in the center for 28 days. Maximum lintel clear span = 10’-0”.

3.14 FLASHING/WEEP HOLES

A. Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to the downward flow of water in the wall, and where indicated.

B. Prepare masonry surfaces so that they are smooth and free from projections that could puncture flashing. Place through-wall flashing on sloping bed of mortar and cover with mortar. Seal penetrations in flashing with adhesive/sealant/tape as recommended by flashing manufacturer before covering with mortar.

C. Install flashings as follows:

1. At lintels and shelf angles, extend flashing a minimum of 4 inches into masonry at each end. Extend stainless steel flashing at the outer edge of outer wythe, with self-adhering flashing extending from 3/4 inches back from masonry edge, through masonry veneer and up backup wall 12 inches. The top edge should be provided with termination bar and sealant. Where interior surface of inner wythe is concealed by furring, carry flashing completely through the inner wythe and turn up approximately 2 inches, unless otherwise indicated.
2. At heads and sills and where flashing is interrupted, extend flashing as specified above unless otherwise indicated but turn up ends not less than 2 inches to form a pan.
3. Install flashing in masonry veneer walls as specified above but carry flashing up face of sheathing at least 12 inches and behind air infiltration barrier/building paper.
4. Interlock end joints of ribbed sheet metal flashings by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer and seal and lap with adhesive as recommended by the flashing manufacturer.
5. Turn down sheet metal flashings at exterior face of masonry to form drip.
6. Cut off flashing flush with face of wall after masonry wall construction is completed.
7. Install brick vents in the head joints of the first brick course above each flashing and the third course of brick below each flashing and spaced at a maximum of 4’-0” o.c. horizontally.
8. All joints in copper flashings shall be soldered and connected in accordance with SMACNA requirements. All joints shall be soldered and sealed forming a watertight installation as specified herein.

D. Install weep holes in the head joints in exterior wythes of the first course of masonry immediately above embedded flashings and as follows:

1. For weep holes with product specified in Part 2 of Section 04 05 23.
2. Space weep holes 16 or 24 inches o.c., according to chosen brick size
3. In un-insulated cavities/air spaces place Mortar Net per section 04 05 23 to a height equal to height of first course but not less than 2 inches immediately above flashing embedded in the wall, as masonry construction progresses, to splatter mortar droppings and to maintain drainage.
4. In insulated cavities/air spaces cover cavity/air space side of open weep holes with copper or plastic insect screening before placing loose-fill masonry insulation in cavity.

E. Install reglets and nailers for flashing and other related construction where shown to be built into masonry.

F. Provide concealed flashing in the first in the first course above grade. Provide concealed flashing at other locations in masonry work as shown. Prepare masonry surfaces smooth and free from projections which might puncture flashing. Place through-wall flashing on bed of mortar and cover with mortar. Seal flashing penetrations with mastic before covering with mortar. Terminate flashing 1/4 inch beyond face of wall and bend down at 45-degree angle to create a drip edge, unless otherwise shown. Extend stainless steel flashing at the outer edge of outer wythe, with self-adhering flashing extending from 3/4 inches back from masonry edge, through masonry veneer and up backup wall 12 inches. Provide weep holes in the head joints of the first course of masonry immediately above concealed flashings, spaced 16 inches o.c.

1. Interlock end joints of deformed metal flashings by over-lapping deformations not less than 1-1/2 inches and seal lap with elastic sealant, or in accordance with manufacturer's instructions.

3.15 INSTALLATION OF REINFORCED UNIT MASONRY

A. Install reinforced unit masonry to comply with requirements of referenced unit masonry standard.

B. Temporary Formwork: Construct formwork and shores to support reinforced masonry elements during construction.

1. Construct formwork to conform to shape, line, and dimensions shown. Make sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

C. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.

D. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.

3.16 PARGING

A. Parge pre-dampened masonry walls where indicated with Type S or N mortar applied in 2 uniform coats to a total thickness of 3/4 inch. Scarify first parging coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.

C. Damp cure parging for at least 24 hours and protect until cured.

3.17 GROUTED FOUNDATION WALLS

A. Where concrete masonry foundations are required by the Drawings, reinforcing and grouting shall be completed within 72 hours after the completion of the wall and prior to backfilling on either side of the foundation wall.

3.18 VERTICAL REINFORCED CONCRETE MASONRY

A. Where grout filled or steel reinforced concrete block masonry foundations or masonry walls are called for on the Drawings, they shall be reinforced and grouted in accordance with the Drawings and details. All cells to be grouted shall be clean and free of mortar protrusions and droppings in the cells.

B. The low-lift grouting procedure shall be used as described in the Drawings and in NCMA-TEK 23A Grouting for Masonry Walls. Maximum height of grouting shall be 4 feet.

C. Grout to completely fill each cavity with homogenous grout, extending from the lowest course to the top of the reinforced portion of the foundation or wall. Concrete or mortar shall not be used as grout for CMU.

1. Aggregate used in the grout shall be small enough not to interfere with placement and plasticity.

D. After the grout is placed, it shall be consolidated with a small vibrator. The top of the grout filling shall be stopped 1-1/2 inches below the top of the concrete block, except for the top course in the wall where the grout shall be struck flush with the top. If highly absorptive masonry units are used, the grout shall be re-vibrated after it has begun to stiffen.

E. Caging devices and centering clips shall be spaced vertically such that every section of vertical reinforcing steel bar is restrained by 2 clips or devices, one near its top and one near its bottom.

3.19 ANCHORING MASONRY WORK

A. Provide anchoring devices of the type shown and as specified.

B. Anchor masonry to structural members where masonry abuts or faces such members to comply with the following:

1. Provide an open space not less than 1/2 inch width between masonry and

structural member, unless other types of anchoring devices are shown. Keep open space free of mortar or other rigid materials.

2. Anchor masonry to structural members with metal ties embedded in masonry joints and attached to structure. Provide anchors with flexible tie sections, unless other types of anchoring devices are shown.
3. Space anchors as shown, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally.
4. The ends of wall ties shall be embedded in mortar joints. Wall tie ends shall engage outer face shells of hollow units by at least 1/2 inch. Wire wall ties shall be embedded at least 1-1/2 inch into the mortar bed of solid masonry units or solid grouted hollow units.
5. Unless otherwise required, wythes not bonded by headers shall be bonded with wall ties as follows:

    a. Size - Minimum number of ties required
    b. #9 gage - One wall tie wire per 2.67 sq.ft.
    c. 3/16 inch diameter - One wall tie wire per 4.50 sq.ft.

6. Unless accepted by the Architect/Engineer, reinforcement shall not be bent after being embedded in grout or mortar.
7. Unless otherwise required adjustable ties shall meet the following requirements:

    a. Use one tie for each 1.77 sq.ft. of wall area.
    b. Neither horizontal nor vertical spacing shall exceed 16 inches.
    c. Maximum misalignment of bed joints from one wythe to the other shall be 1-1/4 inch.
    d. Maximum clearance between connecting parts of the ties shall be 1/16 inch.

3.20 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or if units do not match adjoining units. Install new units to match adjoining units and in fresh mortar or grout, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge any voids or holes, except weep holes, and completely fill with mortar. Point-up all joints including corners, openings, and adjacent construction to provide a neat, uniform appearance, prepared for application of sealants.

C. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave 1/2 panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent, polyethylene film, or waterproof masking tape.
4. Wet wall surfaces with water prior to application of cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean brick by means of bucket and brush hand-cleaning method described in BIA "Technical Note No. 20 Revised" using the following masonry cleaner:

a. Job-mixed detergent solution.
b. Job-mixed acidic solution.
c. Proprietary acidic cleaner; apply in compliance with directions of acidic cleaner manufacturer.
d. Cleaning shall be complete prior to the installation of the aluminum windows.

6. Clean concrete masonry by means of cleaning method indicated in NCMA TEK 8-2A applicable to type of stain present on exposed surfaces.
7. Clean all exposed concrete masonry of efflorescence in strict accordance with NCMA TEK 8-3A.

D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure unit masonry is without damage and deterioration at time of Substantial Completion.

END OF SECTION 04 20 00

SECTION 05 12 00 – STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and all general provisions of the Contract apply to this Section.

1.2 SUMMARY

A. The Work required under this Section consists of structural steel, steel erection, shop painting, field touch-up painting, and related items necessary to complete the Work.

B. Miscellaneous angles, channels, anchor bolts, bent plates, sleeves, sag rods, leveling plates, bearing plates for structural steel and steel joists, and other incidental items of structural steel required to be built into concrete or masonry shall be provided as indicated or specified and be furnished to respective trades at proper time; including instructions and templates for their installation.

C. Provide, where specifically called for; steel shelf angles, perimeter angle closure, and accessories.

D. For openings in metal deck 10 by 10 inches and larger, provide steel reinforcing members. Reinforcing shall be not less than 3 by 3 inches by 3/8 inch angles, unless noted otherwise on Drawings. Openings in deck shall be cut under Section 05 31 00, Steel Deck.

1.3 SUBMITTALS

A. Product data or manufacturer's specifications and installation instructions for following products. Include laboratory test reports and other data to show compliance with specifications (including specified standards).

1. Structural steel (each type), including certified copies of mill reports covering chemical and physical properties.
2. High-strength bolts (each type), including nuts and washers.
3. Structural steel primer paint.
4. Shrinkage-resistant grout.

B. Shop drawings shall be prepared under supervision of a licensed Structural Engineer, in the State in which the Project is located, including complete details and schedules for fabrication and assembly of structural steel members, procedures, and diagrams.

1. Include details of cuts, connections, camber, holes, and other pertinent data. Indicate welds by standard AWS symbols and show size, length, and type of each weld.
2. Provide setting drawings, templates, and directions for installation of anchor bolts and other anchorages to be installed as work of other sections.
3. Complete shop drawings by approved fabricator including plan layouts of columns and anchor bolt locations, erection diagrams, and shop detail drawings. Symbols and indications used for structural components on design drawings must appear identically on submitted shop drawings. Types of electrodes proposed for welding processes must also appear thereon.

a. The fabricator must review and check shop drawings prior to submission to the Architect.

C. Letter from a Professional Engineer within the State of Florida certifying that he has studied the design drawings, that shop drawings have been prepared under his direct guidance and supervision, and that provided components and connections will meet or exceed loading requirements, where loads are shown at element ends. Such letter of certification must be evidenced by Engineer's full signature and seal authenticity. Architect/Engineer's review of shop drawings will not begin until such certification has been received. This certification is to verify the adequacy of members and connections designed by the fabricator and is not intended to require verifications of the design of structural elements shown on the plans.

D. Test reports conducted on shop- and field-bolted and welded connections. Include data on type(s) of tests conducted and test results.

E. Shop drawing packages shall be by building submitted in sequence corresponding to Construction Manager’s building construction schedule.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following:

1. AISC's "Code of Standard Practice for Steel Buildings and Bridges" and including the "Commentary on the Specification for Structural steel Buildings," and the current supplements
2. AISC's "Seismic Provisions for Structural Steel Buildings" and "Supplement No. 2."
3. AISC's "Specification for Structural Steel Buildings--Allowable Stress Design and Plastic Design."
4. AISC's "Specification for the Design of Steel Hollow Structural Sections."
5. AISC's "Specification for Allowable Stress Design of Single-Angle Members."
6. RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
7. ASTM A6 "Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling."
8. AWS "Structural Welding Code - Steel," AWS D1.1 and its latest revision.

B. Qualifications for Welding Work: Qualify welding procedures and welding operators in accordance with AWS "Qualification" requirements.

1. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests. Documentation of current certification is required.
2. If re-certification of welders is required, retesting will be Contractor's responsibility.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site at such intervals to ensure uninterrupted progress of work.

B. Deliver anchor bolts and anchorage devices, which are to be embedded in cast-in-place concrete or masonry, in ample time to not to delay work.

C. Store materials to permit easy access for inspection and identification. Keep steel members off ground by using pallets, platforms, or other supports. Protect steel members and packaged materials from erosion and deterioration. If bolts and nuts become dry or rusty, clean and re-

lubricate before use.

1. Do not store materials on structure in a manner that might cause distortion or damage to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.6 INSPECTION

A. The materials and workmanship to be furnished under this Specification shall be subject to inspection in the mill, shop, and field by the Architect/Engineer. Inspection will be conducted without expense to the Contractor; however, inspection in the mill or shop shall not relieve the Contractor of his responsibility to furnish materials and workmanship in accordance with Contract Documents.

PART 2 - PRODUCTS

2.1 ACCEPTABLE FABRICATORS

A. Firms acceptable as fabricators for structural steel Work under this Section shall be members of The American Institute of Steel Construction **or** shall be certified by an approved independent professional testing agency as being qualified for Category I Conventional Steel Structures in conformance to the requirements of the AISC Quality Certification Program.

2.2 MATERIALS

A. Metal Surfaces, General: For fabrication of work that will be exposed to view, use only materials that are smooth and free of surface blemishes including pitting, rust and scale seam marks, roller marks, rolled trade names, and roughness. Remove such blemishes by grinding, or by welding and grinding, prior to cleaning, treating, and applying surface finishes.

B. Rolled Structural Steel Shapes, Plates, and Bars: ASTM A36.

C. Structural Steel Tubular Products

1. Square, Rectangular, and Special Shapes: ASTM A500, Grade B.
2. Round, Structural Steel Pipe: ASTM A53, Type E or S, Grade B.

D. Steel Castings: ASTM A27, Grade 65-35, medium-strength carbon steel.

E. Headed Stud-Type Shear Connectors: ASTM A108, Grade 1015 or 1020, cold-finished carbon steel with dimensions complying with AISC Specifications.

F. Anchor Bolts: ASTM A307, nonheaded type unless otherwise indicated.

G. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular low-carbon steel bolts and nuts.

1. Provide hexagonal heads and nuts for all connections.
2. Provide either hexagonal or square heads and nuts, except use only hexagonal units for exposed connections.

H. High-Strength Threaded Fasteners: Heavy hexagon structural bolts, heavy hexagon nuts, and hardened washers, as follows:

1. Quenched and tempered medium-carbon steel bolts, nuts, and washers, complying with ASTM A325. Use 3/4-inch bolts, unless noted otherwise on Drawings. Use bearing type connections with threads included in the shear plane.

   a. Where indicated as galvanized, provide units that are zinc coated, either mechanically deposited complying with ASTM B695, Class 50, or hot-dip galvanized complying with ASTM A153.

2. Quenched and tempered alloy steel bolts, nuts, and washers, complying with ASTM A490.
3. High-strength fasteners shall be domestically manufactured.

I. Electrodes and Flux for Submerged Arc Welding: AWS Code and ASTM A588, Series A233, Series E60 or E70 as required.

J. Electrodes and Flux for Submerged Arc Welding: AWS Code and ASTM A588, Series F60 and F70.

K. Structural Steel Primer Paint: Steel Structures Painting Council (SSPC) - Paint 15.

L. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621 current accepted edition.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Sure-Grip High Performance Grout; Dayton Superior.
   b. Euco N.S.; Euclid Chemical Co.
   c. Crystex; L & M Construction Chemicals, Inc.
   d. Masterflow 713; Master Builders.
   e. Sealtight 588 Grout; W. R. Meadows.
   f. Five Star Grout; U.S. Grout Corp.

M. Where trusses are indicated with continuous members, they shall be full length without splices or welded with full-penetration shop welds ground flush with grinding in the direction of applied stress and with weld soundness established by radiographic or ultrasonic inspection in accordance with the requirements of 9.2.5.2 or 9.2.5.3 of AWS D1.1 Splices will not be permitted at points of maximum stress. Field splices of tension members shall be designed to develop 110 percent of the spliced sections.

2.3 FABRICATION

A. Shop Fabrication and Assembly: Fabricate and assemble structural assemblies in shop to greatest extent possible. Fabricate items of structural steel in accordance with AISC Specifications and as indicated on final shop drawings. Provide camber in structural members as shown.

1. Properly mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials.
2. Where finishing is required, complete assembly, including welding of units, before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.

B. Connections: Weld or bolt shop connections, as shown.

1. Bolt field connections, except where welded connections or other connections are indicated.

a. Provide high-strength threaded fasteners for principal bolted connections, except where unfinished bolts are indicated.
b. Provide unfinished threaded fasteners for only bolted connections of secondary framing members to primary members (including purlins, girts, and other framing members taking only nominal stresses) and for temporary bracing to facilitate erection.

C. High-Strength Bolted Construction: Install high-strength threaded fasteners in accordance with AISC "Specifications for Structural Joints using ASTM A325 or A 490 Bolts."

D. Welded Construction: Comply with AWS Code for procedures, appearance and quality of welds, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that will produce true alignment of axes without warp.

E. Built-up welded door frames attached to structural steel framing. Weld exposed joints continuously and grind smooth. Plug-weld steel bar stops to frames, except where shown removable. Secure removable stops to frames with countersunk, cross-recessed head machine screws, uniformly spaced not more than 10 inches o.c., unless otherwise indicated.

F. Holes for Other Work: Provide holes required for securing other work to structural steel framing and for passage of other work through steel framing members, as shown on final shop drawings.

G. Provide threaded nuts welded to framing and other specialty items as indicated to receive other work.

H. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame-cut holes or enlarge holes by burning. Drill holes in bearing plates.

I. Expansion Joints: Provide expansion joints in steel shelf angles when part of structural steel frame; locate at vertical brick expansion joints.

2.4 SHOP PAINTING

A. Shop-paint all structural steel work, except those members or portions of members to be embedded in concrete or mortar. Paint embedded steel that is partially exposed; paint exposed portions and initial 2 inches of embedded areas only.

1. Do not paint surfaces to be welded or high-strength bolted with friction-type connections.
2. Do not paint surfaces scheduled to receive sprayed-on fireproofing.
3. Coat with tar all steel encased in concrete.

B. Surface Preparation for Interior Steel (SSPC - SP 3): After inspection and before shipping, clean steel work to be painted.

1. Clean all steel installed in the interior of the building in accordance with SSPC - SP 3, Power Tool Cleaning.
2. Prior to power tool cleaning, remove visible oil, grease, soluble welding residue and salts in accordance with SSPC - SP 1, Solvent Cleaning.
3. After power tool cleaning and prior to shop painting, remove dirt, dust, and all similar contaminants from the surface.

C. Shop Prime Painting: Immediately after surface preparation, apply structural steel rust inhibited primer paint in accordance with manufacturer's instructions and at rates as specified. Use painting methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Interior steel receiving the surface preparation SP 3 above, shall be prime painted with primer as follows:

a. Primer shall meet the standards listed in SSPC Paint 15, Type I, Red Oxide, or FS-TT-P-636 Red Oxide.

D. Galvanizing: All steel lintels exposed to the exterior and installed in exterior walls shall be hot-dipped galvanized with a G-90 coating.

2.5 SOURCE QUALITY CONTROL

A. Design of Members and Connections: Details shown are typical; similar details apply to similar conditions, unless otherwise indicated. Verify dimensions at site whenever possible without causing delays in the work.

1. Promptly notify Architect/Engineer whenever design of members and connections for any portion of structure are not clearly indicated.

PART 3 - EXECUTION

3.1 INSPECTION

A. Erector must examine the areas and conditions under which structural steel work is to be installed and notify the Contractor in writing of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Erector.

3.2 ERECTION

A. Comply with the AISC Specifications and Code of Standard Practice and with specified requirements.

B. Surveys: Employ a licensed land surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces, and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection until corrections have been made or until compensating adjustments to structural steel work have been agreed upon with Architect.

C. Temporary Shoring and Bracing: Provide temporary shoring and bracing members with connections of sufficient strength to bear imposed loads. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guy lines to achieve proper alignment of structures as erection proceeds.

D. Temporary Planking: Provide temporary planking and working platforms as necessary to effectively complete work.

E. Setting Bases and Bearing Plates: Clean concrete and masonry bearing surfaces of bond-reducing materials and rough-in to improve bond to surfaces. Clean the bottom surface of base and bearing plates.

1. Setting Plate Procedure:

    a. Set loose and attached base plates and bearing plates for structural members on wedges or other adjustable devices.
    b. Tighten the anchor bolts after the supported members have been positioned and plumbed. Do not remove wedges or shims, but if protruding, cut off flush with the edge of the base or bearing plate prior to packing with grout.
    c. Pack bedding grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials, and allow to cure in strict compliance with the manufacturer's instructions, or as otherwise required.

2. Double Nut Procedure

    a. Install lower nuts and washers to required elevation.
    b. Erect column and install upper nuts and washers.
    c. After structure has been erected and plumbed, adjust lower nuts to relieve racking, adjust elevation, and distribute load equally to all anchor bolts.
    d. Tighten nuts.
    e. Pack bedding grout solidly between bearing surfaces and bases or plates to ensure that no voids remain. Finish exposed surfaces, protect installed materials,

and allow to cure in strict compliance with the manufacturer's instructions, or as otherwise required.

F. Field Assembly: Set structural frames accurately to lines and elevations indicated. Align and adjust various members forming part of complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces that will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

G. Level and plumb individual members of structure within specified AISC tolerances.

H. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.

I. Splice members only where indicated and accepted on shop drawings.

J. Erection Bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds, and grind smooth at exposed surfaces.

1. Comply with AISC Specifications for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
2. Do not enlarge unfair holes in members by burning or by using drift pins, except in secondary bracing members. Ream holes that must be enlarged to admit bolts.

K. Gas Cutting: Do not use gas cutting torches in field for correcting fabrication errors in primary structural framing. Cutting will be permitted only on secondary members that are not under stress, as acceptable to Architect. Finish gas-cut sections equal to a sheared appearance when permitted.

L. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint. Apply paint to exposed areas using same material as used for shop painting.

1. Apply by brush or spray to provide minimum dry film thickness of 1.5 mils.

M. Touch-Up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint on structural steel is included in Division 09 under painting work.

N. Lintels and Shelf Angles: Weld, bolt, or rivet members together where so indicated.

1. Lintels shall have 8 inch bearing at each end, minimum, unless shown otherwise. Bearing pressures shall not exceed the allowable stress for masonry.
2. Where shelf angles are attached to concrete with bolts and adjustable inserts, provide slotted holes in proper size and spacing in the vertical leg of shelf angles.
3. Loose lintels are not acceptable.

3.3 HIGH STRENGTH STEEL BOLTS

A. Structural joints using high strength bolts, hardened washers, and nuts shall be tightened to a high tension; the materials, methods of installation and tension control, type of wrenches to be used, and inspection methods shall conform to specifications for "Structural Joints using ASTM A325 or A490 Bolts," as approved by the Research Council on Structural Connections of the Engineering Foundation.

B. The high strength bolts used shall have a suitable identifying mark placed on top of the head before leaving the factory.

C. Tightening of nuts shall be done by the turn-of-nut method, according to the specifications for "Structural Joints using ASTM A325 or A490 bolts," unless direct tension indicator washers are used, in which case tightening will terminate when proper gap is attained.

D. For turn of the nut method, bolts that have been "Snug-Tight" shall be marked with identifying symbol and then given an additional 1/2 turn. Marks shall be such that visual inspection can be made of finished connections. Snug tight is defined as the tightness developed by the full effort of a man using a spud wrench on all bolts in the connections.

E. High-strength fasteners shall be domestically manufactured.

3.4 ERECTION ALIGNMENT

A. Framing: The framing shall be carried up true, plumb, and level within a tolerance of 1:500; and temporary bracing shall be introduced, wherever necessary, to take care of loads to which the 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 the Contractor as part of his equipment. As erection progresses, the Work shall be securely connected to take care of dead load, wind, and erection stresses.

3.5 FIELD QUALITY CONTROL

A. Correct deficiencies in structural steel work that inspections and laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as necessary to reconfirm any noncompliance of original work and to show compliance of corrected work.

B. Shop-Bolted Connections: Inspect or test in accordance with AISC specifications.

1. Verify that gaps of installed Direct Tension Indicators are less than gaps specified in ASTM F959, Table 2.

C. Shop Welding: Inspect and test during fabrication of structural steel assemblies, as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Perform visual inspection of all welds.
3. Perform tests of welds as follows. Inspection procedures listed are to be used at Contractor's option.

    a. Liquid Penetrant Inspection: ASTM E165.
    b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
    c. Radiographic Inspection: ASTM E94; minimum quality level "2-2T."
    d. Ultrasonic Inspection: ASTM E164.

D. Field-Bolted Connections: Inspect in accordance with AISC specifications.

1. For Direct Tension Indicators, comply with requirements of ASTM F959. Verify that gaps are less than gaps specified in Table 2.

E. Field Welding: Inspect and test during erection of structural steel as follows:

1. Certify welders and conduct inspections and tests as required. Record types and locations of defects found in work. Record work required and performed to correct deficiencies.
2. Perform visual inspection of all welds.
3. Perform tests of welds as follows:

    a. Liquid Penetrant Inspection: ASTM E165.
    b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration not acceptable.
    c. Radiographic Inspection: ASTM E94; minimum quality level "2-2T."
    d. Ultrasonic Inspection: ASTM E164.

END OF SECTION 05 12 00

SECTION 05 21 00 – STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes steel joists and joist girders for floor and roof framing. Types of joists required include the following:

1. K-Series Open Web Steel Joists

B. When outriggers, angles, or other components are attached to the open web steel joists in the shop in such a way that they are a component part of the joists, they are to be provided under this Section.

C. The Work includes bridging anchors, sag rods, wall anchors, and beam anchors.

1.3 SUBMITTALS

A. Product data and installation instructions for each type of joist and accessories.

1. Include manufacturer's certification that joists comply with SJI "Specifications."
2. Certification from joist manufacturer that joists are properly designed and will be furnished to meet live loads, dead loads, and slope conditions indicated on the Drawings.

B. Complete shop drawings by approved fabricator including plan layouts of columns and anchor bolt locations, erection diagrams, and shop detail drawings. Symbols and indications used for structural components on design drawings must appear identically on submitted shop drawings. Types of electrodes proposed for welding processes must also appear thereon.

1. Provide templates or location drawings for installation of anchor bolts and metal bearing plates.
2. Shop drawing packages shall be by building submitted in sequence corresponding to Construction Manager’s building construction schedule.

C. Letter from a Professional Engineer licensed within the State of construction activities certifying that he has carefully studied the design drawings, that shop drawings have been prepared under his direct guidance and supervision, and that provided components and connections will meet or exceed loading requirements. Such letter of certification must be evidenced by Engineer's full signature and seal of authenticity. Architect/Engineer's review of shop drawings will not begin until such certification has been received.

1.4 QUALITY ASSURANCE

A. Provide joists fabricated in compliance with the following and as herein specified.

1. SJI "Standard Specifications and Load Tables" for K Series Open Web Steel Joists, latest edition, sizes as indicated on the Drawings.
2. Comply with Factory Mutual requirements.

B. Qualification of Field Welding Work

1. Qualify welding processes and welding operators in accordance with the AWS "Standard Qualification Procedure." Welders shall be certified to perform the type of work required.

C. Inspection: Inspect joists and girders in accordance with SJI "Specifications."

D. The deflection of floors and roofs with plaster ceiling or soffits suspended or attached, due to the design live load, shall not exceed 1/360 of the span; other roofs, not to exceed 1/240 of the span.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle steel joists as recommended in SJI and AISC "Standard Specifications," in a manner to avoid excessive stresses deforming members.

B. Bent joist members or broken welds shall be cause for joist rejection. Rejected joists shall be replaced without delay.

1.6 JOB CONDITIONS

A. During the construction period, Contractors shall provide means for the adequate distribution of concentrated loads so that the carrying capacity of any joist is not exceeded.

PART 2 – PRODUCTS

2.1 MANUFACTURER

A. Member firms of the Steel Joist Institute will be acceptable manufacturers of steel joist specified herein.

2.2 MATERIALS

A. Steel: Comply with SJI and AISC "Standard Specifications."

1. Yield strength used as a basis for the design stresses shall be as follows:

a. Chords = 50,000 psi
b. Webs = 36,000 psi or 50,000 psi

2. Evidence that the steel furnished meets or exceeds the design yield strength shall be provided, on Architect's request, in the form of certified test reports.
3. Deduct the area of holes in chords from the area of the chord when calculating the strength of the member.

B. Steel Bearing Plates: ASTM A36.

C. Unfinished Threaded Fasteners: ASTM A307, Grade A, regular hexagon type, low carbon steel.

D. Nonmetallic Shrinkage-Resistant Grout: Premixed, nonmetallic, noncorrosive, nonstaining

product containing selected silica sands, Portland cement, shrinkage compensating agents, plasticizing and water-reducing agents, complying with CE-CRD-C621-89A.

1. Products: Subject to compliance with requirements, provide one of the following:

   a. Sure-Grip High Performance Grout; Dayton Superior.
   b. Euco N.S.; Euclid Chemical Co.
   c. Crystex; L & M Construction Chemicals, Inc.
   d. Set Grout; Master Builders.
   e. Sealtight 588 Grout; W. R. Meadows.
   f. Five Star Grout; U.S. Grout Corp.

E. Shop Prime Painting: Immediately after surface preparation, apply steel joist rust inhibiting primer paint in accordance with manufacturer's instructions and at rates as specified. Use painting methods that result in full coverage of joints, corners, edges and exposed surfaces. Primer shall meet the standards listed in SSPC Paint 15, Type I, Red Oxide, or FS-TT-P-636 Red Oxide.

1. Do not apply primer to joists indicated to receive sprayed-on fireproofing

2.3 FABRICATION

A. General: Fabricate steel joists in accordance with SJI and AISC "Standard Specifications," and as follows:

1. Make shop connections and splices using either arc or resistance welding. Shop-bolted connections are not acceptable.
2. Do not splice web members; use only full length pieces.
3. Top and bottom chords shall be uniform size throughout their full length.
4. Do not splice bottom chord members in the middle third of the span.
5. Splices in bottom chord members shall be certified by the joist fabricator to provide 100 percent of the strength of the chord section used.

B. Holes in Chord Members: Provide holes in chord members where shown for securing other work to steel joists; however, deduct area of holes from the area of chord when calculating strength of member.

C. Extended End: Provide extended ends on joists where indicated, complying with SJI "Specifications" and load tables.

D. Ceiling Extension: Provide ceiling extensions in areas having ceilings attached directly to joist bottom chord. Provide either an extended bottom chord element or a separate unit, to suit manufacturer's standards, of sufficient strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.

E. Top Chord Extension: Provide top chord extensions on joists where indicated, complying with SJI "Specifications" and load tables.

F. Bridging: Provide horizontal or diagonal type bridging for joists and joist girders, complying with SJI "Specifications." Provide bridging anchors for ends of bridging lines terminating at walls or beams.

G. End Anchorage: Provide end anchorages, including steel bearing plates, to secure joists to adjacent construction, complying with SJI "Specifications."

H. Header Units: Provide header units to support tail joists at openings in floor or roof system not framed with steel shapes.

I. Top Chords: Shall be absolutely flat across its full width and length for application of metal decking.

J. Bottom Chords: Shall be extended and connected to columns or webs of girders at column lines and where shown on structural drawings.

K. Joist Ends: Shall be beveled when slope exceeds 1/4 inch in 12 inch or sloped shoes shall be provided.

L. Shop Painting:

1. Remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories before application of shop paint.
2. Apply one shop coat of steel primer paint to steel joists and accessories by spray, dipping, or other method to provide a continuous dry paint film thickness of not less than 1.0 mil.

PART 3 - EXECUTION

3.1 PREPARATION

A. Roof joist anchorage shall be designed to resist gross uplift force indicated on the Drawings.

B. Joist anchorage for un-enclosed areas and roof overhangs shall be designed to the upward pressure indicated on the Drawings.

3.2 ERECTION

A. Place and secure steel joists in accordance with SJI "Specifications," final shop drawings, and as herein specified.

B. Anchors: Furnish anchor bolts, steel bearing plates, and other devices to be built into concrete and masonry construction.

1. Provide unfinished threaded fasteners for anchor bolts, unless high strength bolts indicated.

C. Placing Joists: Do not start placement of steel joists until supporting work is in place and secured. Place joists on supporting work, adjust and align in accurate locations and spacing before permanently fastening.

D. Provide temporary bridging, connections, and anchors to ensure lateral stability during construction.

E. Bridging: Install bridging simultaneously with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords where terminating at walls or beams.

F. Fastening Joists: Comply with the following:

1. Field weld joists to supporting steel framework and steel bearing plates where indicated in accordance with SJI "Specifications" for type of joists used. Coordinate welding sequence and procedure with placing of joists.
2. Bolt joists to supporting steel framework in accordance with SJI "Specifications" for type

of joists used.

a. Use unfinished threaded fasteners for bolted connections, unless otherwise indicated.

G. End Anchorage

1. At steel supports the joist ends shall extend not less than 2-1/2 inches over beams.
2. At masonry the joist ends shall extend not less than 4 inches over walls. The center line of bearing the joist shall coincide with the center line of the masonry bearing plate and the masonry wythe on which it bears, except where 2 joists from opposite sides bear on the same wythe.
3. Ends shall be anchored with the equivalent of two 3/16 inch fillet welds 1-1/2 inches long or two 1/2 inch bolts.

H. Field Welding

1. The total length of weld at a cross-section shall not exceed 50 percent of the overall developed width of cold-formed members.
2. Extreme caution must be exercised during welding. Completely cover and protect masonry and concrete in place from damage during welding.

I. Touch-Up Painting: After joist installation, paint field bolt heads and nuts and abraded or rusty surfaces on joists and steel supporting members. Wire brush surfaces and clean with solvent before painting. Use the same type of paint as used for shop painting.

END OF SECTION 05 21 00

SECTION 05 31 00 – STEEL DECKING

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes steel deck units for floor and roof applications.

1. Metal roof deck units – vented
2. Corrugated steel forms
3. Metal cover plates and closure strips

B. Related Work

1. The cutting, drilling, or punching of openings smaller than 10 by 10 inches for passage of pipes, ducts, and the attachment of other items shall be performed in the field by the respective trades requiring same.
2. For openings 10 by 10 inches and larger, each shall be predetermined and provided or cut under this Section. Steel framing members indicated or required around openings 12 by 12 inches and larger through decks shall be provided and erected under Section 05 12 00, Structural Steel.

1.3 SUBMITTALS

A. Product data including manufacturer's specifications and installation instructions for each type of decking and accessories. Provide test data for mechanical fasteners used in lieu of welding for fastening deck to supporting structures.

B. Shop drawings showing layout and types of deck units, anchorage details, and conditions requiring closure strips, supplementary framing, sump pans, cant strips, cut openings, special jointing, and other accessories. Shop drawings shall be submitted by building in sequence in accordance with the Construction Manager’s construction schedule.

1.4 QUALITY ASSURANCE

A. Codes and Standards: Comply with provisions of the following codes and standards, except as otherwise indicated:

1. American Iron and Steel Institute (AISI), “North American Specification for the Design of Cold-Formed Steel Structural Members."
2. American Welding Society (AWS), D1.3 "Structural Welding Code - Sheet Steel."
3. Steel Deck Institute (SDI), "Design Manual for Composite Decks, Form Decks and Roof Decks."

B. Qualification of Field Welding: Use qualified welding processes and welding operators in

accordance with "Welder Qualification" procedures of AWS. Welded decking in place is subject to inspection and testing. Owner will bear expense of removing and replacing portions of decking for testing purposes if welds are found to be satisfactory. Remove work found to be defective and replace with new acceptable work.

C. Design Criteria:

1. Compute the properties of metal roof deck sections on the basis of the effective design width as limited by the provisions of the SDI specifications. Provide the deck section properties, including section modulus and moment of inertia per foot of width.
2. Allowable Deflection: Design and fabricate deck for a maximum deflection of 1/240 of the clear span under the uniform live load.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel for Galvanized Metal Deck Units: ASTM A653, grade as required to comply with SDI specifications.

B. Miscellaneous Steel Shapes: ASTM A36.

C. Shear Connectors: Headed stud type, ASTM A108, Grade 1015 or 1020, cold-finished carbon steel, with dimensions complying with AISC specifications.

D. Shear Connectors: Strap type, ASTM A1011, Grade D, hot-rolled carbon steel.

E. Sheet Metal Accessories: ASTM A653, commercial quality, galvanized.

F. Galvanizing: ASTM A653, G60 (.60 oz. per sq.ft.).

G. Galvanizing Repair: Where galvanized surfaces are damaged, prepare surfaces and repair in accordance with procedures specified in ASTM A780.

H. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.

I. Acoustic Sound Barrier Closures: Manufacturer's standard mineral fiber closures.

J. Self-Drilling Screws: Hilti No. 10 self-drilling screws or approved equal.

K. Powder Actuated Fasteners: Hilti ENP$^{3/}$ENPH3/ENP2/ENKK pins or approved equal.

2.2 FABRICATION

A. General: Form deck units in lengths to span three or more supports, with flush, telescoped, or nested 2-inch laps at ends and interlocking or nested side laps, of metal thickness, depth, and width as indicated.

B. Metal Roof Deck Units: Provide deck configurations that comply with SDI "Specifications and Commentary for Steel Roof Deck." Types, depths and gauges as indicated on the drawings.

C. Vented Roof Deck Units: Provide deck configurations complying with SDI "Roof Deck

Specifications", of metal thickness, depth and width as shown. All deck receiving lightweight cellular concrete shall be vented a minimum of 0.5 percent open, unless a greater percentage is required by the lightweight concrete manufacturer or U.L. Design number.

D. Metal Cover Plates: Fabricate metal cover plates for end-abutting floor deck units of not less than same thickness as decking. Form to match contour of deck units and approximately 6 inches wide.

E. Metal Closure Strips: Fabricate metal closure strips, for cell raceways and openings between decking and other construction, of not less than 0.045-inch min. (18 gage) sheet steel. Form to provide tight-fitting closures at open ends of cells or flutes and sides of decking.

PART 3 - EXECUTION

3.1 INSPECTION

A. Install must examine the areas and conditions under which metal decking items are to be installed. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in a manner acceptable to the Installer.

3.2 INSTALLATION

A. General: Install deck units and accessories in accordance with manufacturer's recommendations, shop drawings, and as specified herein.

B. Place deck units on supporting steel framework and adjust to final position with ends accurately aligned and bearing on supporting members before being permanently fastened. Do not stretch or contract side lap interlocks.

1. Do not start placement of deck units before supporting members are installed. Place deck units on supporting metal steel framework and adjust to final position with ends bearing on supporting members and accurately aligned end to end before being permanently fastened.

    a. Lap ends 1-1/2 inch deck units not less than 2 inches.
    b. Butt ends of 3 inch deck units.
    c. Do not stretch or compress the side-lap interlocks.
    d. Place deck units flat and square, secured to adjacent framing without warp or excessive deflection.

C. Align deck units for entire length of run of cells and with close alignment between cells at ends of abutting units.

D. Place deck units flat and square, secured to adjacent framing without warp or deflection.

E. Do not place deck units on concrete supporting structure until concrete has cured and is dry.

F. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.

G. Attach deck to supports with 5/8" puddle welds as follows, unless otherwise noted on Drawings:

1. Corrugated Metal Roof Deck: Per Structural Drawings.
2. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Use welding washers where recommended by deck manufacturer.
3. Mechanical fasteners may be used in lieu of welding. Locate mechanical fasteners and install in accordance with deck manufacturer's instructions.
4. Uplift Loading: Install and anchor roof deck units to resist net uplift loading of as shown on plans. Keep the interiors of cells that will be used as raceways free of welds having sharp points or edges.

H. Cutting and Fitting: Cut and neatly fit deck units and accessories around other work projecting through or adjacent to the decking, as shown.

I. Reinforcement at Openings: Provide additional metal reinforcement and closure pieces as required for strength, continuity of decking, and support of other work shown.

J. Hanger Slots or Clips: Provide UL-approved hanger slots between cells or flutes of lower element where floor deck units are to receive hangers for support of ceiling construction, air ducts, diffusers, or lighting fixtures.

1. Hanger clips designed to clip over male side lap joints of floor deck units may be used instead of hanger slots.
2. Locate slots or clips at not more than 14 inches o.c. in both directions, not over 9 inches from walls at ends, and not more than 12 inches from walls at sides, unless otherwise indicated.
3. Provide manufacturer’s standard hanger attachment devices.

K. Joint Covers: Provide metal joint covers at abutting ends and changes in direction of floor deck units, except where taped joints are required.

L. Closure Strips: Provide metal closure strips at open uncovered ends and edges of roof decking and in voids between decking and other construction. Screw into position with #10 tek screws at 12” oc to provide a complete decking installation.

1. Provide flexible closure strips instead of metal closures, at Contractor's option, wherever their use will ensure complete closure. Install with adhesive in accordance with manufacturer's instructions.

M. Touch-Up Painting: After decking installation, wire brush, clean, and paint scarred areas, welds, and rust spots on top and bottom surfaces of decking units and supporting steel members.

1. Touch-up galvanized surfaces with galvanizing repair paint applied in accordance with manufacturer's instructions.

N. In areas where shop-painted surfaces are to be exposed, apply touch-up paint to blend into adjacent surfaces.

O. Placing and Fastening Corrugated Steel Forms: Place steel forms with ribs perpendicular to supports and secure with plug welds, No. 12 self-tapping screws, or powder actuated fasteners to each support. Space connectors at 12 inches on center. Provide at least 2 inches for end laps occurring over supports and laps sides at least one corrugation.

P. Ridge and Valley Plates: Weld ridge and valley plates to the top surface of the roof decking. Lap end joints not less than 3 inches, with laps made in the direction of water flow.

Q. Repair and Valley Plates:

1. Holes up to 1/2 inch in diameter fill with urethane or silicone sealant and cover with duct tape.
2. Holes above 1/2 inch diameter require sheet metal plate patches fastened to deck.

3.3 SUPPORT OF OTHER WORK

A. Suspension wires, straps, and chains such as those used to support acoustical ceilings, ductwork, and lights shall not be attached to or through steel roof decks.

B. Attachment of steel stud wall tracks may be braced to steel decks but shall not support or suspend from the steel deck. Nothing shall be suspended from the steel deck.

END OF SECTION 05 31 00

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes the following:

1. Structural dimension lumber framing.
2. Non-structural dimension lumber framing.
3. Rough opening framing for doors, windows, and roof openings.
4. Sheathing.
5. Fire retardant treated wood materials.
6. Miscellaneous framing and sheathing.
7. Communications and electrical room mounting boards.
8. Concealed wood blocking, nailers, and supports.

1.3 REFERENCE STANDARDS

A. AFPA (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; American Forest and Paper Association; 2012.
B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.
C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
D. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood Protection Association; 2012.
E. PS 1 - Structural Plywood; 2009.
F. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology, Department of Commerce; 2010.
G. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2014.

1.4 SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
C. Evaluation Reports: For the following, from ICC-ES:
   1. Wood-preservative-treated wood.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect from weather and contact with damp or wet surfaces. Stack lumber, plywood, and other panels. Provide for air circulation within and around stacks and under temporary coverings.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

1.6 WARRANTY

A. Correct defective Work within a five year period after Date of Substantial Completion.
B. See Section 017800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber.
B. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber. Provide dressed lumber, S4S, unless otherwise indicated. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.
C. Lumber fabricated from old growth timber is not permitted.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3B for exterior construction not in contact with the ground, and Use Category UC4A for items in contact with the ground.
   1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.
C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
D. Application: Treat items indicated on Drawings, and the following:
   1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
   2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
   3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.

2.3 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction, including but not limited to, the following:
   1. Blocking.
   2. Nailers.
   3. Where necessary for installation of other work and not otherwise prohibited.
B. Moisture Content: 19 percent maximum for lumber items are not specified to receive wood preservative treatment.

C. Grade: For dimension lumber sizes, provide No. 3 or Standard grade lumber per ALSC's NGRs of any species. For board-size lumber, provide No. 3 Common grade per NELMA, NLGA, or WWPA; No. 2 grade per SPIB; or Standard grade per NLGA, WCLIB or WWPA of any species.

2.4 CONSTRUCTION PANELS

A. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

B. Other Applications:
1. Plywood Concealed From View But Located Within Exterior Enclosure: PS 1, C-C Plugged or better, Exterior grade.
2. Plywood Exposed to View but not exposed to Weather: PS 1, A-D, or better.
3. Other Locations: PS 1, C-D Plugged or better.

2.5 ACCESSORIES

A. Fasteners and Anchors:
1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
3. Anchors: Toggle bolt type for anchorage to hollow masonry.

B. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

C. Sill Flashing: As specified in Section 076200.

D. Water-Resistive Barrier: As specified in Section 072500.

PART 3 EXECUTION

3.1 PREPARATION

A. Where wood framing bears on cementitious foundations, install full width sill flashing continuous over top of foundation, lap ends of flashing minimum of 4 inches and seal.

B. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

C. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION, GENERAL

A. Set rough carpentry to required level s and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

B. Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

C. Set carpentry to required level s and lines, with members plumb, true to line, cut, and fitted.

D. Fit carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

E. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

F. Select material sizes to minimize waste.
G. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
H. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.3 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.
B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.
C. Install structural members full length without splices unless otherwise specifically detailed.
D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual.
E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.
F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.
G. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.4 WOOD SLEEPERS, BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.
C. In metal stud walls, provide continuous blocking around door and window openings for anchorage of frames, securely attached to stud framing.
D. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
E. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
F. Provide the following specific non-structural framing and blocking:
    1. Cabinets and shelf supports.
    2. Wall brackets.
    3. Handrails.
    4. Grab bars.
    5. Towel and bath accessories.
    6. Wall-mounted door stops.
    7. Chalkboards and marker boards.
    8. Wall paneling and trim.
    9. Joints of rigid wall coverings that occur between studs.

3.5 TOLARANCES

A. Framing Members: 1/4 inch from true position, maximum.
B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.6 CLEANING

A. Waste Disposal: Comply with the requirements of Section 017419 - Construction Waste Management and Disposal.
   1. Comply with applicable regulations.
   2. Do not burn scrap on project site.
   3. Do not burn scraps that have been pressure treated.
   4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.
B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 06 10 00

SECTION 06 41 16 – PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS

PART 1 GENERAL

1.1 SUMMARY

Minimum standards for the laminate clad fixed casework used for base and wall cabinets in classrooms and other fabrications such as reception desks.

1.2 REFERENCES: Latest Editions

1. Florida Building Code
2. Americans with Disabilities Act
3. AWI Architectural Woodwork Institute: Architectural Woodwork Quality Standards
4. ANSI American National Standards Institute
5. NEMA LD3
6. AWS Architectural Woodwork Standards.
7. BHMA A156.9 - American National Standard for Cabinet Hardware; Builders Hardware Manufacturers Association; 2010 (ANSI/BHMA A156.9).

1.3 QUALITY ASSURANCE

1. Contractor qualifications: Employ only experienced Contractors (Installers) skilled in the successful installation of the specified materials and assemblies on similar projects for a minimum of five (5) years. Installers shall be state-certified or licensed Contractors, or locally registered Contractors in Orange County, Florida.
2. Manufacturer Qualifications: Employ only manufacturers with at least five (5) years experience making the specified materials as a current catalog and regular production item.
3. Source Limitations: Provide products of the same manufacturer for all cabinets.

1.4 QUALITY STANDARD

1. All Cabinets shall comply with AWI's Woodwork Quality Standards for grades of interior architectural woodwork, construction, finishes and other requirements.
   a. Provide AWS Certificate with shop drawings indicating that the woodwork complies with the requirements of the grades specified.
2. Provide written documentation that the project has been registered as an AWI/QCP Guarantee and Inspection Service program (GIS) and the project is given an inspection number supplied by AWI.

1.5 WARRANTY

1. Cabinet Manufacturer shall warrant all casework products against manufacturing defects in materials and workmanship for a period of one (1) year.
2. Manufacturer shall warrant against structural failure of the cabinet body for a period of two (2) years.
3. Installers Warranty: The installer shall warrant the entire installation against defects in material and workmanship for a period of one (1) year.
4. Duration of all warranties shall begin on the date of Substantial Completion.
5. Products will be repaired or replaced by Manufacturer, without cost to the Owner.

1.6 SAMPLE MATERIALS

1. Each contractor shall submit a sample of the Cabinet. If the sample deviates from the specification and Design Criteria in any way, the Contractor must submit a substitution request. If the product is comparable to the specification, the Contractor must submit a comparable product request.
   a. Sample does not have to be full scale but large enough to display all the materials listed in this standard to include: fronts, tops, backs, sides laminate, shelf, pulls, slides, backing, rails, hinges, base, doors and drawers.
   b. The Sample may be an on-site mock up and may be used as part of work upon Architect and OCPS approval.

1.7 MOCK-UP

1. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
2. Locate where directed.
3. Mock-up may remain as part of the Work.

1.8 FIELD CONDITIONS

1. Protect units from moisture damage.
2. During and after installation of cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.1 FABRICATION

1. Lumber Grading: Comply with NIST Voluntary Product Standard PS20.
2. AWS Grade: Custom.
3. Cabinets shall be designed to support 75 lbs per linear foot per row of shelving. This includes design of attachment to wall or blocking.
4. Cabinets shall be fabricated at one factory/plant and shipped from one factory/plant directly to the job site.
5. All Cabinets shall be manufactured in a climate-controlled environment, stored after fabrication in a climate controlled (temperature and humidity) storage area and shipped to the job site in an enclosed container (semi-tractor trailer).

2.2 MATERIALS

1. Core Material:
   a. Particleboard: Premium Industrial Grade, minimum 47 lb. density, formaldehyde-free, ANSI (Cabinets and countertops)
   b. Medium-Density Fiberboard (MDF): Premium Industrial Grade, minimum 48 lb. density, standards per Composite Panel Association (CPA A208.2), formaldehyde-free (Cabinets and countertops).
   c. Marine Grade Plywood: Specially designed panel made entirely of Douglas-fir or Western Larch. The grade of all plies of veneer is B or better. Exposure rating is EXTERIOR and the glue used is a fully waterproof structural adhesive (Countertops & backsplashes in sink areas).
   d. Veneer Core Plywood: Hardwood, Grade AA, formaldehyde-free. Exposure rating is EXTERIOR and the glue used is water resistant (Framing).
   e. Lumber: Solid wood hardwood, kiln-dried, select Poplar, Fir or Grade III mill option

(Framing).

2. Adhesive: Water based low Volatile Organic Compound (VOC) Non-toxic, PVA adhesive
3. Laminates:
   a. High Pressure Decorative Laminate VGS (.028) NEMA LD 3
   b. High Pressure Decorative Laminate HGS (.048) NEMA LD 3.
   c. High Pressure Cabinet Liner CLS (.020) NEMA LD 3.
   d. High Pressure Backer BKH (.028) NEMA LD 3.
   e. Thermally Fused Melamine Laminate TFM NEMA LD 3.

2.3 HARDWARE

1. Hinges: Steel institutional five knuckle with interlaying leaves, 270-degree swing.
2. Door Catches: Provide magnetic, self-aligning or heavy duty, spring loaded, large 11/16" diameter roller mounted catch at bottom edge of door to protect adjacent surfaces that are within the door swing. All doors over 48" in height shall have top and bottom catches.
3. Pulls: Solid aluminum or stainless-steel wire pulls, fastened from back with two screws. For sliding doors, provide recessed stainless steel flush pulls. Provide two pulls for drawers more than 24 inches wide. Pull design shall comply with Americans with Disability Act (ADA).
4. Drawer Slides: Manufacturers standard epoxy coated metal, nylon rollers, and 100 pounds dynamic load. Provide outstop and outkeeper to maintain drawer in 80% open position.
5. Locks: Cylinder type with 5-disc tumbler mechanism. All cabinets shall have locks.
6. Adjustable Shelf supports: Two-pin-locking heavy duty plastic shelf rests complying with BHMA A156.9, Type B04013.
7. Heavy duty shelf brackets. Factory finished steel sheet.
   a. Steel thickness: 1/8 inch.
   b. Minimum loading capacity: 1000 pounds.
   c. Size: As indicated on drawings.
   d. Finish: Textured powder coat.
   e. Color: To be selected by Architect from manufacturer's standard color selections.
8. Restraint Chains: Provide chain restraint chains on all Classroom tall cabinets.

2.4 DESIGN REQUIREMENTS

1. Base Cabinet: Construction/racking test……800 lbs.
2. Cabinet Front: Joint loading test……..425 lbs.
3. Wall Cabinet: Static Load Test……2,000 lbs.
4. Drawer Front: Joint loading test……600 lbs.
5. Drawer Construction: Static load test……750 lbs.
6. Cabinet adjustable shelf support device/static load test……300 lbs.
7. Cabinet adjustable shelves……50 lb./sq. ft.

2.5 PLASTIC LAMINATE

1. High Pressure Decorative Laminate: NEMA LD 3 VGS & HGS.
2. Vertical Surfaces: GP-28 high pressure complying with ANSI/NEMA LD 3.

2.6 CABINET CONSTRUCTION

1. Countertops and backsplashes: 1/2" solid surface material.
2. Base: 4- inch high, 3/4-inch veneer core exterior plywood or lumber.
3. Tops and bottoms: 3/4-inch core material glued and doweled to cabinet sides.
    a. Tops, bottoms and sides are particleboard or medium density fiberboard.
    b. High Pressure Plastic Laminate.
4. Cabinet backs: Shall be fully bound (dadoed) into sides, top and bottom, recessed 7/8" from the cabinet rear. Rear, unexposed side of back shall be toe-nailed to cabinet body with mechanical fasteners and solidified with a continuous bead of industrial grade hot melt adhesive to withstand a bond test as described in ANSI/WDMA I.W.1A. All cabinet backs shall have a minimum of two – ¾-inch x 4 "laminate clad flush mounting blocks (hang rails).
    a. Hang rails shall be located at rear of cabinet back and fastened to cabinet sides. Provide 2 hang rails at wall cabinet, 1 hang rail at base cabinet and three hang rails at tall cabinets.
5. Doors/Drawer Fronts: Flush overlay, 3/4" thick particleboard.
    a. Front: High Pressure Laminate with balanced liner.
6. Edges: 3 mil PVC.
    a. Shelving: 1"thick particleboard, maximum 36" unsupported width.
    b. Front Edge: 3 mil PVC
    c. Top and Bottom: Thermally Fused Melamine.
7. Drawer
    a. Bottom: 1/2", fully bound (dadoed) into front, sides and back laminated with thermally fused melamine.
        1) Body to include sides, back and sub-front 1/2" laminated with thermally fused melamine.
    b. Drawer Sides (Alternative): White Blum Metabox drawer side system with integrated drawer slides including ancillary fastening accessories.
8. Construction Tolerances
    a. Gap between doors, drawers, panels and frames shall be 1/8".
    b. Countertops (General): Exposed edges and corners of countertops machine profile to 1/8" radius.
9. Miscellaneous Materials:
    a. Furring, blocking, shims, and hanging strips
    b. Anchors

c. Adhesives

PART 3 EXECUTION

3.1 EXAMINATION

1. Verify adequacy of backing and support framing.
2. Verify location and sizes of utility rough-in associated with work of this section.

3.2 INSTALLATION

1. Do not start installation until the building is enclosed and the HVAC system controls the temperature and humidity (75 degrees, 55 RH) in the room space.
2. Erect the cabinets plumb, level, true and straight with no distortions. Countertops shall be installed to with-in 1/8-inch of level in a 10-foot length.
3. Adjust hardware so that the doors and drawers operate smoothly with no warp or bind.
4. All cabinet faces shall be plumb and true from door face to door face. There shall be no side hanging or non-plumb doors. Seams shall be flush.
5. Use filler sections to fit “equal dimensions” on walls. Filler sections limited to 3” maximum.

3.3 SPECIAL INSTALLATION PROCEDURE / ADJUSTMENT PROCEDURES

1. Provide all items and accessories as required for a total and complete installation in every respect.
2. Proceed with installation only after unsatisfactory conditions have been corrected. Installation of any items indicates all conditions are satisfactory and acceptance of previous Work by other Contractors.
3. Adjust cabinets and hardware so that doors and drawers are level and operate smoothly**.**

3.4 CLEANING

1. All modular cabinet surfaces shall be cleaned of construction spoils, dirt, spills, dust and stains. The modular cabinet manufacturer shall recommend cleaning solvent. Clean all surfaces, edges and cabinet interiors.
2. Remove and dispose of all packing materials and related construction debris.
3. Protection: Protect casework from damage during construction until date of Substantial Completion, replace damaged work.

END OF 06 41 16

SECTION 07 16 00 – CEMENTICIOUS WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Cement-base waterproof coating for concrete and masonry surfaces.

B. Work includes all applicable sealants, and repairs needed to ensure a complete waterproof system for concrete and masonry components at locations indicated.

1.2 RELATED SECTIONS

A. Section 03300-Cast In Place Concrete.

B. Section 04200-Unit Masonry.

1.3 SUBMITTALS

A. Materials list of items proposed to be provided under this Section.

B. Product Data
1. Low Emitting Materials.
(a) Submit manufacturer's Material Safety Data Sheet Indicating VOC limits of all products.
(b) Submit manufacturer's certification that all products comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

C. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.

D. Manufacturer's current recommended installation procedures which, when reviewed by the Architect, will become the basis for accepting or rejecting actual installation procedures used on the Work.

E. Written documentation of applicator's qualifications, including reference projects of similar scope and complexity, with current phone contacts of architects and owners for verification.

F. Warranty.

1.4 QUALITY ASSURANCE

A. Applicator qualifications:
1. Engage an experienced applicator who is certified in writing by waterproofing manufacturer as qualified to install manufacturer's waterproofing. Applicator shall have at least three years experience in installing materials of types specified and shall have successfully completed at least three projects of similar scope and complexity.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site in original containers with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, shelf life, and directions for storing and mixing with other components.

B. Store materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by waterproofing manufacturer. Protect stored materials from direct sunlight.

C. Remove and replace material that cannot be applied within its stated shelf life.

1.6 WARRANTY

A. Provide against defective materials and workmanship for a period of one-year following date of completion.
   1. Manufacturer's standard warranty covering materials.
   2. Applicator's standard warranty covering workmanship.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with the specified requirements, provide products by the following:

B. Cementitious waterproof coating systems:
   1. "Eucoseal" by The Euclid Chemical Company.
   2. "Thorseal" by BASF Construction chemicals LLC.

C. Quick setting, non-shrink, waterproof patching mortar:
   1. "Dam-it" by The Euclid Chemical Company.
   2. "Waterplug" by BASF Construction chemicals LLC.

D. Acrylic bonding agent:
   1. "Flex-Con" by The Euclid Chemical Company.
   2. "Acryl 60" by BASF Construction chemicals LLC.

E. Substitutions:
   1. Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1, and Section 01630-Product Substitution Procedures.

F. Toxicity/IEQ: Comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools

2.2 WATER

A. Water used shall be clean and potable.

2.3 ACCESSORIES

A. Provide other materials not specifically described but required for a complete and proper installation, as selected by the Contractor and approved by the manufacturer as compatible, subject to review of the Project Consultant.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Surfaces to be coated must be clean. Chip, sandblast, or grind off all defective materials, glazed smooth concrete, previous coatings, paint and foreign matter such as grease, form oil block filler, curing compounds and efflorescence.

B. Repair all cracks, joints, holes or breaks with quick setting non-shrink waterproof mortar.

C. Cut back form ties 1 inch and patch flush and smooth.

D. Pre-Dampen the surface prior to application of waterproof coating.

3.2 MIXING

A. Per manufacturer's written instructions.

3.3 INSTALLATION

A. Apply EUCOSEAL with a stiff fiber brush at an application rate of 2 lb. per 10 FT2. Scrub well into damp wall filling all pores and finish with final strokes in one direction. Keep a wet edge. Allow 24 hours to dry. Apply second coat at a rate of 1 lb per 10 FT2.

B. Level Wall, Trowel Application: Mix 2 parts of Eucoseal with 1 part clean white silica sand and trowel apply material to wall at approximately 1/8 inch.

END OF SECTION 07 16 00

SECTION 07 21 00 - THERMAL INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Applications of building insulation include, but are not limited to, the following:
   1. Extruded rigid polystyrene insulation board at exterior cavity walls and as indicated on the Drawings.
   2. Extruded foam insulation polyisocyanurate boards at interior side of exterior walls and as indicated on drawings.
   3. Sound Attenuation Batts, for use at interior walls.

1.2 RELATED SECTIONS

A. Section 01 52 40-Construction Waste Management.

B. Section 04 20 00-Unit Masonry.

C. Section 09 21 16-Gypsum Board Assemblies.

1.3 REFERENCES

A. ANSI Standard SI2.60-2002, Acoustical Performance Criteria, Design Requirements and Guidelines for Schools.

B. ASTM C587-Preformed, Cellular Polystyrene Thermal Insulation.

C. ASTM C 665-Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

D. ASTM C 1289-Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

E. ASTM E 84-Surface Burning Characteristics of Building Materials.

F. GREENGUARD Product Emission Standard for Children & Schools.

G. International Organization for Standardization (ISO) 14021 – 1999; Environmental Labels and Declarations

H. Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services.

1.4 SUBMITTALS

A. Manufacturer’s Data: Submit manufacturer’s specifications and installation instructions for each type of insulation required. Include data sustaining that materials comply with specified requirements.

B. Product Data
   1. Low Emitting Materials.
      (a) Submit manufacturer’s Material Safety Data Sheet Indicating VOC limits of all products.

(b) Submit manufacturer's certification that all products comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD™ Product Emission Standard for Children & Schools.

2. Recycled Content:
   (a) Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   (b) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
   (c) If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
   (d) If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.

1.5 QUALITY ASSURANCE

A. Fire Ratings: Comply with fire-resistance and flammability ratings as shown and specified.

B. Thermal Conductivity: The thicknesses shown are for the thermal conductivity, k-value at 75 degrees Fahrenheit, specified for each material. Provide adjusted thickness as directed for the equivalent use of material having a different thermal conductivity.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protection from Deterioration: Do not allow insulation materials to become wet or soiled.

B. Comply with manufacturer's recommendations for handling, storage and protection during installation. Protect plastic insulation from exposure to sunlight.

C. Fire Hazard: Do not deliver plastic insulation materials to the project site ahead of installation time. Protect at all times against ignition. Complete installation and concealment of plastic materials as rapidly as possible in each area of work.

1.7 PROJECT CONDITIONS

A. Examination of Substrate: Examine the substrate and the conditions under which the insulation work is to be performed. Do not proceed with the insulation work until unsatisfactory conditions have been corrected.

PART 2 PRODUCTS

2.1 INSULATION

A. Extruded Polystyrene Board Insulation: Rigid, closed cell, polystyrene insulation board:
1. Manufacturer: Subject to compliance with the specified requirements, provide products from the following:
   (a) Manufacturer: Basis of Design; Dow Chemical Company, Styrofoam Brand.
2. Characteristics:
   (a) Thickness: 2 inch thick; R-10
   (b) Size: Manufacturer's standard lengths and widths.
   (c) Thermal Resistance Aged R-value per inch @ 75 degrees mean temperature: 5.0
   (d) Compressive Strength (pounds per square inch) minimum: 15

(e) Flexural Strength (pounds per square inch) minimum: 40
(f) Water Absorption (percent by volume) maximum: 0.1
(g) Water vapor permeance (max perm): 0.8-1.1
(h) Dimensional Stability (percent linear change) maximum: 2.0
(i) Coefficient of Linear Thermal expansion: 3.5
(j) FM 4880
(k) Complies with ASTM C 578.
(l) Maximum Use Temperature: 165 Degrees Fahrenheit.
(m) Flame Spread: 5
(n) Smoke Development: 165

B. Extruded Polyisocyanurate Board Insulation: Glass fiber reinforced foam core insulation board with reflective aluminum facers on both sides:
1. Manufacturer: Subject to compliance with the specified requirements, provide products from the following:
(a) Manufacturer: Dow Chemical Company, “Thermax Sheathing”.
2. Characteristics:
(a) Thickness: 1 inch thick; R-6.5.
(b) Size: Manufacturer’s standard lengths and widths.
(c) Thermal Resistance Aged R-value per inch @ 75 degrees mean temperature: 6.5
(d) Compressive Strength (pounds per square inch) minimum: 25
(e) Flexural Strength (pounds per square inch) minimum: 55
(f) Water Absorption (percent by volume) maximum: <0.03
(g) Water vapor permeance (max perm): 0.8-1.1
(h) Dimensional Stability (percent linear change) maximum: 0.1
(i) Complies with ASTM C1289 Type I, Class 2.
(j) Maximum Use Temperature: 165 Degrees Fahrenheit.
(k) Flame Spread: 25.
(l) Smoke Development: 250.

C. Sound Attenuation Blankets: Glass fiber blanket, for friction-fit installation.
1. Manufacturer: Subject to compliance with the specified requirements, provide products from the following:
(a) Manufacturer:
(1) Certain Teed “Sound Control Batts.”
(2) Knauf quiet Therm Insulation.
(3) Manville “Sound Control Batt”.
(4) Owens Corning QuietZone Acoustic Batt Insulation.
(b) Thickness: 3.5 inches or per STC required.
(c) Flame Spread: 25.
(d) Smoke Development: 50.

D. Adhesive for Bonding Insulation: Provide the type recommended by the insulation manufacturer and adhesive manufacturer for the type insulation and substrate. All insulation adhesive materials shall satisfy the requirements of Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

E. Mechanical Anchors: Where required, type and size shown or, if not shown, as recommended by the insulation manufacturer for the type of application shown and condition of substrate.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer's written instructions for the particular conditions of installation in each case including method of support or anchorage to the substrate as appropriate for each application indicated. If printed instructions are not available, or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work.

B. Extend insulation full thickness as shown over entire surface to be insulated. Cut and fit tightly around obstructions and fill voids with insulation.

C. Apply a single layer of insulation of the thickness indicated, or the required thickness for the thermal value indicated, unless otherwise shown or required to make up the total thickness.

D. Thermal Insulation at Interior face or Exterior Masonry or Concrete Walls.
1. Adhere 1 inch thick Thermax to inside face of wall.
2. Tape all joints with 3 inch wide tape.
3. Provide 1-5/8 inch x 20 gage steel stud furring @ 16 inches o.c. braced to the wall with metal clip angles at 4'-0" o.c. maximum for gypsum wallboard application. Avoid penetrations through the insulation except for what is required to brace the studs.

E. Sound Insulation:
1. Install caulking strip between floor and ceiling tracks and concrete surface. Set steel studs in tracks with friction, 24 inches on center. Install caulking where studs abut columns and masonry walls.
2. Install gypsum wallboard vertically and fasten to studs with self-drilling Phillips head drywall screws.
3. Install sound attenuation batt insulation in cavity between steel studs by friction fit.
4. Install gypsum wallboard on opposite side of wall with drywall screws as above.
5. Fill and tape joints and fill screw heads on wallboard surface with standard drywall finishing materials.
6. Caulk finished partition airtight at floor, sidewall and ceiling on both sides with a non-shrinking acoustical sealant, which is concealed.

END OF SECTION 07 21 00

SECTION 07 26 00 – VAPOR BARRIER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Vapor Barrier is to be installed at all interior slab-on-grade.

1.2 RELATED SECTIONS

A. Section 02200-Earthwork.

B. Section 03300-Cast-In-Place Concrete.

1.3 SUBMITTALS

A. Submit properly identified manufacturer's literature before starting work.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements (Latest Editions): Comply with the requirement of Florida Department of Health and Rehabilitative Services (HRS), Office of Radiation Control as stated in "Radon-Resistant Construction Guidelines for Use in Florida", and Florida Building Code.

PART 2 PRODUCTS

2.1 MATERIALS

A. Vapor Barrier: Ten-mil polyethylene film minimum.

B. Tape: Type recommended by vapor barrier manufacturer; except at vertical penetrations, use reinforced duct tape.

PART 3 EXECUTION

3.1 INSTALLATION

A. Lay vapor barrier over entire area to receive interior slab work.
   1. Lay vapor barrier with seams perpendicular to and lapped in direction of concrete pour.
   2. Seal all joints by lapping 4 inches minimum and tape all joints.
   3. Turn edges up to 4 inches to top of slab.
   4. Where expansion joints are indicated at adjacent vertical surfaces, extend vapor barrier beyond expansion joint filler and turn up to top of slab.
   5. Do not allow screed supports or other items to penetrate vapor barrier.

B. Extend vapor barrier over surfaces of areas to be protected from vapor or transmission from conditioned space to unconditioned space after placement of insulation.
   1. Seal all joints by lapping 4 inches minimum and tape all joints.
   2. Repair any punctures or tears before placement of finished surface materials.

C. Continuously tape entire perimeter of vapor barrier to adjacent surfaces; around all pipe penetrations; and vapor membrane joints; to seal and prevent vapor moisture penetration.

3.2 PROTECTION

A. Protect vapor barrier from damage until permanent covering is in place.

B. Repair punctures and tears in vapor barrier using patches of the material overlapping the puncture or tear a minimum of 12 inches. Seal with tape.

END OF SECTION 07 26 00

SECTION 07 54 19 - THERMOPLASTIC MEMBRANE ROOFING

PART 1 GENERAL

1.1 PERFORMANCE REQUIREMENTS

1. Purpose: Provide installed roofing membrane and base flashings that remain watertight; do not allow water ponding 24 hours after a rain event; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
2. Structural Performance: Provide a membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to withstand the effects of the following:
   a. Wind Loads: In accordance with Florida Building Code (current edition).
3. Anchoring Guideline:
   a. Membrane Roofing: Fully adhered on Light Weight Insulating Concrete.
      1) Install adhered sheet.
         a) Secure membrane edges under battens or termination bars. Locate battens or termination bars continuously around the edge of the roof on the flat of the deck adjacent to the roof edge or parapet, around penetrations such as curbs in the field of the roof, and elsewhere as detailed.
         b) Peel Stops: Install battens or termination bars continuously around the perimeter of the roof.
         c) Field membrane sheets shall be installed so the water sheds and the laps do not create a dam.
         d) Install crickets where slopes may be dammed by flat surfaces of curbs for roof hatches, vents, fans, etc.
      2) Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane to ensure a watertight seam installation.
   b. Membrane Flashings and Preformed Flashing Accessories: Fully adhered.
      1) Flash penetrations and field-formed inside and outside corners with sheet flashing. Prefabricated flashings as furnished by manufacturer are required and should be used wherever possible, field formed/fabricated are to be used only by acceptance of the Owner.
      2) Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
      3) Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
         a) Install horizontal rows of intermediate fasteners vertically up walls, area dividers, and parapets. Install at a maximum of 18” above the finish roof membrane and every 18” vertical.
         b) Space fasteners at 6” in these horizontally running vertical rows.
      4) Secure top edge of preformed boots and pipe flashings with stainless steel wormgear type drawbands.
      5) Apply a bead of sealant large enough to entirely fill the void at shaped term bars, reglets, and drawbands. Tool to shed water and insure full adherence to surfaces.
   c. Flexible Walkways:
      1) Install flexible walkways between and connecting the main roof access point and rooftop equipment requiring routine or seasonal maintenance or adjustment.
      2) Heat weld to substrate and fully adhere walkway products to substrate with compatible adhesive.
4. Maintainability: Design roofing system and its related flashings so that removal of adjoining construction, or other types of adjacent roofing system(s), will not be necessary in order to replace membrane roofing or flashings during the life of the building.

1.2 QUALITY ASSURANCE

1. Manufacturer Qualifications: A qualified manufacturer that is UL listed for membrane roofing system identical to that used for this Project.
   a. Original Manufacturer: Provide membrane roofing of original manufacturer.
   b. Track Record: Provide membrane roofing of same formulation, with not less than a ten year track record of successful performance under the proposed conditions of installation.
2. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by membrane roofing system manufacturer prior to bidding to install manufacturer's product and that is eligible to receive manufacturer's warranty.
   a. Provide documentation indicating that all personnel onsite that have been trained by the manufacturer and any authorized to operate the automatic and hand welders shall provide documentation from the manufacturer certifying training within the last year.
3. Source Limitations: Obtain components for membrane roofing system from roofing membrane manufacturer.
   a. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
4. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test- response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency. Identify materials with appropriate markings of applicable testing and inspecting agency.
5. Preinstallation Conference:
   a. Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".
   b. Meet with Construction Manager, Project Manager, SDOC Building Envelope Consultant (if applicable), Architect, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
   c. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
   d. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   e. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening. Specify Light Weight Insulating Concrete compressive strength requirement to match (not exceed) the Florida Approved Product Assembly. The quality control testing shall be performed by the Roofing System Contractor.
   f. Bond-breaker and curing compounds for Concrete tilt-wall shall contain no diesel, kerosene, waxes or silicones that may inhibit the optimal adhesion of vertical flashing. The concrete shall be prepared for proper flashing adhesion, by the removal of oils, waxes, paraffins and all other incompatible materials that could affect the bond.
   g. Review structural loading limitations of roof deck during and after roofing.
   h. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
   i. Review governing regulations and requirements for insurance and certificates.
   j. Review temporary protection requirements for roofing system during and after installation.
   k. Review roof observation and repair procedures after roofing installation.
   l. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

1.3 SUBMITTALS

1. Product Data and Samples:
   a. Product Data: For each type of product indicated.

b. Samples for Verification: For sheet roofing, membrane flashing, walkway products, roof cover fasteners, termination bars, and battens.

2. Shop Drawings: Include plans, elevations, sections, details, and attachments to other Work.
   a. Membrane sheet layout.
   b. Membrane flashings and terminations.
   c. Walkpad layout.

3. Installer Certificates: Signed by roofing system manufacturer, certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system and is eligible to receive required manufacturer's warranty.

4. Manufacturer Certificates: Signed by roofing system manufacturer.
   a. Certifying intent to warrant, and intent to comply with (SDOC) Contract Documents and indicating that the details or features that provide the most benefit to the Owner shall be the minimum accepted by the manufacturer.
   b. Certifying that roofing system complies with requirements specified in "Performance Requirements" and "Quality Assurance" Articles.
      1) Submit evidence of meeting performance requirements. Include Engineering Calculations signed and sealed by the qualified professional engineer who was responsible for their preparation.

5. Warranty Requirements:
   a. Manufacturer Warranty: Manufacturer's standard form, without monetary limitation (NDL type), in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials, workmanship, items identified not in conformance with the project documents within specified warranty period. Failure includes roof leaks.
      1) Warranty includes roofing membrane, base flashings, roofing membrane accessories, walkway products and other components of membrane roofing system.
      2) Warranty Period: 20 years from date of Substantial Completion.
      3) Special Warranty Rider: Coverage for winds up to and including 120 mph (3-second gust).
      4) Provide a warranty for all buildings (or separate warranties for each individual building in phased construction projects) on the school's campus identified as to building and square footage, or separately and specifically identify each building on the school's campus included in and covered by the warranty with its respective square footage.
   b. Installer Warranty: Including all components of membrane roofing system such as roofing membrane, base flashing, fasteners, and walkway products.
      1) Warranty Period: Two years from date of Substantial Completion.
      2) Provide separate warranties for each individual building on the school's campus identified as to building and square footage, or separately and specifically identify each building on the school's campus included in and covered by the warranty with its respective square footage.
      3) During the warranty period, upon notification by SDOC, the Installer must be on site within 24 hours to make necessary permanent or temporary repairs. Should the Installer fail to make such repairs within the time period, SDOC may have the repairs made and charge the cost to the Installer; such repairs by SDOC shall not void the system warranty. Emergency repairs required reasonably and immediately to protect life or property shall not void this warranty. Installer roof access shall not be unreasonably denied. Delay of construction contract payment by Construction Manager/Contractor shall not be cause to withhold warranty performance.

6. Maintenance Data: For roofing system to include in maintenance manuals:
   a. Comply with requirements in Division 01 Section "Closeout Procedures".
   b. Visual inspection checklist indicating specific flashings and details to be inspected. Include items such as base flashing, seams, reglets and counterflashings, roof edge flashings, roof penetration flashings, roof curb flashings, boot flashings, roof drain areas, parapet wall flashings, copings, roof membrane seams, etc. Applicable items shall be listed per project.
      1) Include a set of instructions detailing preventative maintenance and noting a list of harmful substances which may damage the roofing membrane.

2) Include procedures for exercising warranty and guarantee provisions, leak calls, temporary repairs and future modifications to roof system.

c. Copies of as-built roofing details.
d. Roof plan indicating penetrations, detail locations, roof drains, and seams.
e. Copy of SPRI / NRCA "Manual of Roof Inspection, Maintenance and Emergency Repair for Existing Single-Ply Roofing Systems".

7. FBC Compliance: Contractor's final statement of compliance.

8. Inspection Reports: Copy of all roofing system manufacturer's inspection reports of roofing installation shall be submitted for review by the Designer and forwarded to the Owner. Submit separate reports to Owner Designer for each building not to exceed 20,000 sq. ft. per report per inspection by the Manufacturer's Representative.

PART 2 PRODUCTS

2.1 MATERIALS, PRODUCTS, EQUIPMENT, MANUFACTURED UNITS

1. Manufacturers:

a. Where title below introduces lists, the following requirements apply for product selection:

1) Products: Subject to compliance with requirements, provide one of the products and respective methods of installation specified.

a) Product Certification: "Cool Roof Rating Council" (CRCC) Product Certification as recognized by EPA for the Energy Star Program; a third-party rating system for radiative properties of roof surfacing materials.

2. Roofing Membrane: (Initial solar reflectance shall be greater than 0.70, which means the cool roof is reflecting greater than 70 percent of the solar radiation.

a. PVC Sheet, Type II or Type III, fiber reinforced.

1) Products:
a) Sika-Sarnafil Inc.; "Sarnafil G410" Feltback: Fully adhered to LWIC.

2) Thickness: 60 mils (1.5 mm), nominal, membrane.
3) Color: "Bright White".

b. PVC Sheet: Type III, fabric reinforced.

1) Products:
a) Duro-Last Roofing, Inc.; "Duro-Last" Feltback: Fully adhered to LWIC assemblies.

2) Thickness: 60 mils (1.5 mm), nominal, membrane.
3) Color: "Bright White".

c. PVC Sheet: Type III, fabric reinforced.

1) Products:
a) Carlisle Corporation: " Sureflex Fleece Back": Fully adhered to LWIC assemblies - Upon SDOC Approval

2) Thickness: 60 mils (1.5 mm), nominal, membrane.
3) Color: White.

d. PVC Sheet: Type III, fabric reinforced.

1) Products:
a) GAF Corporation: "EverGuard Fleece-back": Fully adhered to LWIC assemblies - Upon SDOC Approval

2) Thickness : 60 mils (1.5 mm), nominal, membrane.
3) Color : White.

e. PVC Sheet: Type III, fabric reinforced.

1) Products:

a) John Mansville Corporation: “JM PVC Fleece Backed”: Fully adhered to LWIC assemblies - Upon SDOC Approval

2) Thickness : 60 mils (1.5 mm), nominal, membrane.
3) Color : White.

f. KEE Sheet: fabric reinforced.

1) Products:
a) Seaman Corporation: “8552 FiberTite-SM Fleeceback”: Fully adhered to LWIC.

2) Thickness : 60 mils (1.5 mm), nominal, membrane.
3) Color : White.

g. Membrane shall meet EPA Energy Star standards.

3. Auxiliary Materials.

a. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
b. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as sheet membrane.
c. Laminated Metal: Manufacturer's standard minimum 25 gauge galvanized steel laminated with a minimum 20 mil compatible polymeric coating, of same color as sheet membrane.
d. Bonding Adhesive:

1) Roofing Membrane: Manufacturer's standard solvent or water-based bonding adhesive for membrane.
2) Sheet Flashing: Manufacturer's standard solvent-based bonding adhesive for base flashings.

e. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
f. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, or aluminum alloy bar, approximately 1 inch (25 mm) wide, pre-punched.
g. Polymeric Battens: Manufacturer's standard high performance thermoplastic polymer strip, approximately 1 inch (25 mm) wide, pre-punched.
h. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.
i. Miscellaneous Accessories: Provide preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.
j. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface- textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.
k. Sacrificial Pads: Provide sacrificial pads under all lightning protection aerials and cable coupling terminations.
l. Pitch Pans: Pitch pans are not acceptable.

PART 3 EXECUTION

3.1 PRODUCT DELIVERY, STORAGE AND HANDLING

1. All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.
2. Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.
3. Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.
4. As a general rule all adhesives shall be stored at temperatures between 40°F (4°C) and 80°F (27°C). Read instructions contained on adhesive canister for specific storage instructions.

5. All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.
6. Any materials which the Owner's representative or Roofing Manufacturer determines to be damaged are to be removed from the job site and replaced at no cost to the Owner.

3.2 JOB CONDITIONS

1. Roofing materials may be installed under certain adverse weather conditions but only after consultation with Roofing Manufacturer, as installation time and system integrity may be affected.
2. Only as much of the new roofing as can be made weathertight each day, including all flashing and detail work, shall be installed. All seams shall be heat welded before leaving the job site that day.
3. All work shall be scheduled and executed without exposing the interior building areas to the effects of inclement weather. The existing building and its contents shall be protected against all risks.
4. All surfaces to receive new insulation, membrane or flashings shall be dry. Should surface moisture occur, the Applicator shall provide the necessary equipment to dry the surface prior to application.
5. All new and temporary construction, including equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.
6. Uninterrupted waterstops shall be installed at the end of each day's work and shall be completely removed before proceeding with the next day's work. Waterstops shall not emit dangerous or unsafe fumes and shall not remain in contact with the finished roof as the installation progresses. Contaminated membrane shall be replaced at no cost to the Owner.
7. The Applicator is cautioned that certain membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with thermoplastic membranes. The Applicator shall consult Roofing Manufacturer regarding compatibility, precautions and recommendations.
8. Arrange work sequence to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage. Where such access is absolutely required, the Applicator shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over membrane or plywood over insulation board shall be provided for all new and existing roof areas that receive rooftop traffic during construction.
9. Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air or similar methods.
10. The Applicator shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.
11. All roofing, insulation, flashings and metal work removed during construction shall be immediately taken off site to a legal dumping area authorized to receive such materials. Hazardous materials, such as materials containing asbestos, are to be removed and disposed of in strict accordance with applicable City, State and Federal requirements.
12. All new roofing waste material (i.e., scrap roof membrane, empty cans of adhesive) shall be immediately removed from the site by the Applicator and properly transported to a legal dumping area authorized to receive such material.
13. The Applicator shall take precautions that storage and application of materials and equipment does not overload the roof deck or building structure.
14. Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.
15. All rooftop contamination that is anticipated or that is occurring shall be reported to Roofing Manufacturer to determine the corrective steps to be taken.
16. The Applicator shall verify that all roof drain lines are functioning correctly (not clogged or blocked) before starting work. Applicator shall report any such blockages in writing (letter copy to CM and Roofing Manufacturer) to the Owner's Representative for corrective action prior to the installation of the roof system.

17. Applicator shall immediately stop work if any unusual or concealed condition is discovered and shall immediately notify Owner of such condition in writing for correction (letter copy to CM and Roofing Manufacturer).
18. Site cleanup, including both interior and exterior building areas that have been affected by construction, shall be completed to the Owner's satisfaction.
19. All landscaped areas damaged by construction activities shall be repaired at no cost to the Owner.
20. The Applicator shall conduct fastener pullout tests in accordance with the latest version of the SPRI/ANSI Fastener Pullout Standard to verify condition of the deck/substrate and to confirm expected pullout values.
21. The roofing membrane shall not be installed under the following conditions without consulting Roofing Manufacturer for precautionary steps:
    a. The roof assembly permits interior air to pressurize the membrane underside.
    b. Any exterior wall has 10 percent or more of the surface area comprised of opening doors or windows.
    c. The wall/deck intersection permits air entry into the wall flashing area.
22. Precautions shall be taken when using adhesives at or near rooftop vents or air intakes. Adhesive odors could enter the building. Coordinate the operation of vents and air intakes in such a manner as to avoid the intake of adhesive odor while ventilating the building. Keep lids on unused cans at all times.
23. Protective wear shall be worn when using solvents or adhesives or as required by job conditions.
24. Roofing membranes are slippery when wet or covered with snow, frost, or ice. Working on surfaces under these conditions is hazardous. Appropriate safety measures must be implemented prior to working on such surfaces. Always follow OSHA and other relevant fall protection standards when working on roofs.

3.3 FIELD QUALITY CONTROL

1. Manufacturer's Inspections: Manufacturer inspections shall be accomplished by technical representatives with technical department of roof membrane manufacturer.
    a. In-progress inspections: Not less than three for each building but not to exceed 20,000 sq.ft. per inspection.
        1) Make first in-progress inspection within 4 days of start of installation for each respective building.
    b. Substantial Completion inspection, for each building.
    c. Final Completion inspection, for each building.
    d. Follow-up Roof Inspections: Arrange for roofing system manufacturer's technical personnel to provide follow-up inspections of roofing installation and sign off on all previously identified deficiencies.
    e. 11^{th} month inspection, for each building.
    f. 23^{rd} month inspection, for each building.
2. Notify Owner not less than 48 hours in advance of dates and times of inspections. Manufacturer’s technical representative shall provide written report for every field inspection and forward copy to the Architect, Construction Manager/Contractor/Project Manager, SDOC Building Envelop Consultant (if applicable) and Roofing Contractor.
3. Written and signed documentation shall be provided by the Manufacturers Technical Inspection Representative indicating all deficiencies identified in their reports have been corrected and verified.

3.4 COORDINATION / EXHIBITS

1. Drawing Items: In addition to general requirements for coordinating Drawings with specifications, Drawings should indicate the following:
    a. Roof areas, identifying UL ratings when applicable.
    b. Roof plan indicating slopes, drain locations, penetrations, roofing termination conditions.
    c. Thicknesses and taper of insulation. Show locations and extent of crickets, tapered edge strips, and transitions.
    d. Base flashings, nailers, and flashing receivers/counterflashings at terminations of roofing.

e. Tie-ins with other roofing systems, existing and new.
f. Locations and large-scale details of roof expansion joints; area dividers; hatches, skylights, and other accessories; penetrations; and equipment supports.
g. Locations and dimensions of walkway products.
h. Adjacent construction or assemblies that may impact maintainability.

2. Specification Items: Related Design Guideline include the following:
   a. Division 07 Design Guideline "Sheet Metal Flashing and Trim" for flashings and counterflashings.
   b. Division 07 Design Guideline "Roof Accessories" for roof curbs and hatches, and equipment supports.
   c. Division 07 Design Guideline "Joint Sealants".
   d. Division 26 Design Guideline "Lightning Protection for Structures" for thru-roof assemblies.

3. Cross-Discipline Items:
   a. Show rooftop mechanical items, including equipment, curbs, smoke vents, tie-downs, anchors, etc.
   b. Show rooftop plumbing items, including drains, hose bibs, hydrants, etc.
   c. Show rooftop electrical items, including photocells, receptacles, conduit, lightning thru- roof assemblies, etc.

END OF SECTION 07 54 19

SECTION 07 62 00 - FLASHING AND SHEET METAL

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Flashing, counter-flashing, roofing grounds and nailers, and fabricated sheet metal items.

1.2 RELATED SECTIONS

A. Section 061000-Rough Carpentry.

B. Section 079200-Joint Sealants.

1.3 REFERENCES

A. ANSI-SPRI/ES-1.

B. American Society for Testing and Materials (ASTM):
1. A 167-Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
2. B 32-Specification for Solder Metal.
3. A 240-Heat-resisting Chromium and Chromium-nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
4. D 2822-Standard Specification for Asphalt Roof Cement.

C. Florida Building Code.

D. (ISO) 14021 – 1999-Environmental Labels and Declarations

E. National Roofing Contractors Association (NRCA) “Roofing and Waterproofing Manual” Detail for installation of units.

F. Sheet Metal and Air-Conditioning Contractor’s National Association, Inc. (SMACNA): Architectural Sheet Metal Manual”, latest Edition. Details for fabrication of units, including flanges and installation to coordinate with type of roofing indicated SUBMITTALS

G. Properly identified product data and descriptive literature before starting work.
1. Recycled Content:
   (a) Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
   (b) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
   (c) If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
   (d) If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.

2 Regional Materials:
   (e) Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
   (f) Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.

(g) Product Value: Indicate dollar value of product containing local/regional materials; include materials cost only.
(h) Product Component(s) Value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.

H. Shop Drawings on flashing and sheet metal work.

I. Samples:
1. 8 inches square samples of specified sheet materials to be exposed as finished surfaces.
2. Samples of factory fabricated products exposed as finished work. Provide complete with specified factory finish.

1.4 QUALITY ASSURANCE

A. Regulatory Requirements: Ensure flashing and sheet metal complies with requirements of Florida Building Code, NRCA, SMACNA, and ANSI-SPRI/ES-1.

B. Coordinate application of flashings with application of roofing, protruding material, and roof accessories to provide a complete weather tight installation under provisions of the specified warranty requirements.

C. All work shall be performed in accordance with referenced standards.

1.5 PRE-INSTALLATI0N MEETING

A. Shall not occur without Shop Drawings approved by the Contractor and accepted by the A/E. Shall convene a minimum of two weeks before starting work of this section.

B. Required Attendees:
1. Contractor.
2. Subcontractor using materials in this section (ie: roofing, roofing equipment, doors, & windows).
3. Roofing, roofing equipment, doors and window manufacturers.
4. Installers of deck or substrate construction to receive roofing work.
5. Installers of doors, windows, roof-top units and other work in and around roofing that must precede or follow roofing work (including mechanical work if any).
6. Any other subcontractors associated with work of this section.
7. Architect.
8. Owner’s Project Manager.
9. Owner’s Maintenance Foreman.
10. Building Department Representative.

C. The Contractor shall make arrangements for the meeting and notify the parties required to attend.

D. Agenda shall include:
1. Review preparation and installation procedures and coordinating and scheduling required with related work.
2. Review roof, roof equipment, doors, and window system requirements (drawings, specifications, and other contract documents).
3. Review Shop Drawings and associated submittals.
4. Review manufacturer's technical materials.

5. Review and finalize construction schedule related to work and verify availability of materials, personnel, equipment and facilities needed to make progress and avoid delays.
6. Review required inspection, testing, certifying and material usage accounting procedures.
7. Review weather and forecasted weather conditions, and procedures for coping with unfavorable conditions, including temporary roofing.
8. Tour representative areas of doors, windows, roofing substrates (decks), inspect and discuss condition of the substrate, roof drains, curbs, penetrations and other preparatory work performed by other trades.

1.6 SPECIAL WARRANTIES

A. By Membrane Producer: Provide a 20-year Special Warranty from the roof membrane producer covering correction of defects in the steel blocking and sheet metal component of Roof Assembly.

B. By Steel Roof Blocking and Roofing Sheet Metal Producer and Installer: Provide a 10 year Special Warranty in which the SRB producer/installer agrees to correct defective SRB work.
1. See 075419 for full requirements of this Special Warranty that shall accompany the Roof Assembly Special Warranty.
2. At time of project closeout, submit this signed Special Warranty to the roof membrane producer for transmittal to Contractor, A/E, and board.

PART 2 PRODUCTS

2.1 MATERIALS

A. All manufactured flashing and sheet metal products are to contain recycled content.

B. Sheet Material:
1. Type 302 or 304 stainless steel, 24 gage, complying with ASTM A 167.
2. Flashing for Pipes, Conduits, and Round Equipment Supports: Type 304 stainless steel, 26 gage, 2B, complying with ASTM A 240.
3. Solder: Under provisions of ASTM B 32.
4. Fastening Devices: Ensure fasteners are compatible with metal and roofing system. Use of powder-activated fasteners is prohibited.
   (a) Where use of wood is approved in writing by the Owner for re-roofing:
      (1) Attaching sheet metal to wood with concealed fastenings: Hot dip galvanized ring shank roofing nails not less than 1-1/4 inch long.
      (2) Attaching sheet metal to wood with exposed fastenings: No. 10 x 1-1/4 inch pan head stainless steel sheet metal screws. Provide neoprene sealant washers and stainless steel washers under screw heads.
   (b) Attaching sheet metal to metal walkway covers: No. 10 x 1-1/4 inch pan head stainless steel sheet metal screws. Provide neoprene sealant washers and stainless steel washers under screw heads.
   (c) Attaching Sheet Metal to Masonry or Concrete: No. 10 x 1-1/4 inch pan head stainless steel masonry screws. Provide neoprene sealant washers and stainless steel washers under screw heads.
5. Roofing Cement: Plastic roofing cement complying with the requirements of ASTM D 2822 or as appropriate and as recommended by roofing manufacturer.

2.2 ACCESSORIES

A. Splash Blocks: Refer to Section 076210-Gutters and Downspouts

B. Roof Drain Flashing: Minimum 4 pound per square foot, 36 inches x 36 inches lead flashing installed under provisions of the latest NRCA specifications.

2.3 FABRICATION

A. Fabricate flashing and sheet metal work under provisions of accepted shop drawings.

B. Base Flashings at Metal Walkway Covers Abutting Concrete and Masonry:
1. Fabricate using sheet stainless steel to detail indicated, in not over 10 foot sections.
2. Provide 2-inch minimum upturned wall flange behind counter-flashing.
3. Where flutes are parallel to abutting wall, provide horizontal roof flange extending 2 inches on nearest flattop on roof decking.
4. Where flutes abut wall, provide 2-inch roof flange.

C. Cants:
1. Pre-fabricated 16 gage, galvanized, minimum 4 inch vertical height, formed at 45 degree angle to walls and parapets.
2. Manufacturer: Subject to compliance with the specified requirements, provide products by the following manufacturer (Basis of Design – BOD):
   (a) Mfr: Concrecel USA; Product: ARBS (Alternative Roof Blocking System). Provide steel roof blocking (SRB) from a fabricator licensed by the ARBS patents holder.
   (b) Substitutions:
      (1) Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1, and Section 01630-Product Substitution Procedures.

D. Copings:
1. Fabricate in approximately 10-foot sections using sheet 24-gage stainless steel to detail as indicated.
2. Provide a continuous 16-gage stainless steel outer hold-down cleat with punched holes at 6 inches on center and face fasten at inward facing parapet components with removable fasteners as required for sheet metal.
3. Provide 8-inch wide joint covers.
4. Manufacturer: Subject to compliance with the specified requirements, provide products by the following manufacturer (Basis of Design – BOD):
   (a) SBC Industries, North Miami, Florida. Provide steel roof blocking (SRB) from a fabricator licensed by the ARBS patents holder.
   (b) Substitutions:
      (1) Will be considered by the A/E and Owner when submitted per requirements of Division-0 and Division-1 Product Substitution Procedures.

E. Curb to Duct Flashing and Counter Flashing:
1. Fabricate from stainless steel to fit duct curbs and ducts projecting from curbs.
2. Provide 4-inch vertical flange to cover top edge of bituminous base flashings. Form flange bottom towards curb, with 1/4 inch bottom edge bent 1/4 inch out and hemmed.
3. At top of curbs bend metal 90 degrees and extend horizontally over to duct, then bend upward and extend vertically not less than 3 inches from top edge of flashing out 3/8 inch to receive sealant.
4. Provide for field soldered lap joints at corners and 1-inch lap joints at horizontal miter splices.

F. Edge Drips:
1. Fabricate using sheet 24 gage stainless steel drip edge to detail indicated, in not over 10 foot sections.
2. Provide a continuous 16-gage galvanized continuous cleat with punched holes spaced as necessary. If cleat extends 6 inches or more below top fastener, provide second row of punched holes spaced as necessary.
3. Provide 4 inch roof flange, and extend bottom drip not less than 1 inch below bottom of roof sheathing, with kick to dispel water 3/4 inch from finish wall.
4. Manufacturer: Subject to compliance with the specified requirements, provide products by the following manufacturer (Basis of Design – BOD):
   (a) Mfr: Concrecel USA; Product: ARBS (Alternative Roof Blocking System). Provide steel roof blocking (SRB) from a fabricator licensed by the ARBS patents holder.
   (b) Substitutions:
      (1) Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1, and Section 01630-Product Substitution Procedures.

G. Pipes, Conduits, Wires, and Round Equipment Supports Penetrating Roofing or Resting on Roofing:
1. Type 304 stainless steel, 26 gage, complying with ASTM A 240.
2. Form tubular stainless steel sleeves sized to shape of penetration, not less than 8 inches above finished roofing with 4 inch wide base flange welded to water-tight to sleeve.
3. Shop punch flanges.
4. Seal flashing and cover with protective umbrella.
5. Pre-manufactured roof penetration seals.
6. Manufacturer: Subject to compliance with the specified requirements, provide products by the following manufacturer (Basis of Design – BOD):
   (a) SBC Industries, North Miami, Florida. Provide steel roof blocking (SRB) from a fabricator licensed by the ARBS patents holder.
   (b) Substitutions:
      (1) Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1, and Section 01630-Product Substitution Procedures.

H. Sanitary Vent Stack Flashings:
1. 4 pound per square foot lead flashing.
2. Form tubular lead flashing sleeve not less than 8 inches high with a diameter 1/2 inch larger than the vent stack.
3. Provide a 4-inch wide flange soldered water-tight.
4. Provide vandal-proof vent covers.

I. Scuppers:
1. Fabricate using stainless steel to profiles and details shown.
2. Lock seam corners, solder water-tight and hem outer exposed edges.
3. Provide 4-inch wide minimum flanges formed to fit cants, decks and vertical wall surface.
4. Shop punch flanges for fastenings at 6 inches on center.

J. Stucco Stop with Counter-flashing (2-piece):
1. Fabricate in approximately 10-foot sections using sheet stainless steel to detail as indicated.
2. Provide receiver with 1-1/2 inch wall flange, 3/4-inch sloping stucco stop, and 3/4-inch flange bend downward with 1/2-inch hem.
3. Shop punch wall flange for fastening.

4. Provide shop fabricated soldered corner splices extending 4 inches each way.
5. Provide counterflashing with 1-1/2 inch 45 degree top flange with 1/4-inch kick back at top and a 4-inch bottom flange formed inward 3/4 inch towards wall with a hemmed 1/2-inch kick at bottom.
6. Provide 1-1/2 inch x 4-inch storm cleats.
7. Manufacturer: Subject to compliance with the specified requirements, provide products by the following manufacturer (Basis of Design – BOD):
   (a) SBC Industries, North Miami, Florida. Provide steel roof blocking (SRB) from a fabricator licensed by the ARBS patents holder.
   (b) Substitutions:
      (1) Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1, and Section 01630-Product Substitution Procedures.

K. Stucco Stop with Counter-flashing (1-piece for re-roofing):
1. Fabricate in approximately 10-foot sections using sheet stainless steel to detail as indicated.
2. Provide counterflashing with 1/2 inch 45 degree leg for sealant with 1-1/2 inch wall flange with a 4-inch bottom flange formed inward 3/4 inch towards wall with a hemmed 1/2-inch kick at bottom.
3. Shop punch wall flange for fastening.
4. Provide shop fabricated soldered corner splices extending 4 inches each way.
5. Manufacturer: Subject to compliance with the specified requirements, provide products by the following manufacturer (Basis of Design – BOD):
   (a) SBC Industries, North Miami, Florida. Provide steel roof blocking (SRB) from a fabricator licensed by the ARBS patents holder.
   (b) Substitutions:
      (1) Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1, and Section 01630-Product Substitution Procedures.

L. Surface Mounted Flashing (1-piece):
1. Fabricate in approximately 10-foot sections using sheet stainless steel to detail as indicated.
2. Provide flashing with 1-1/2 inch wall flange with 1/4-inch kick at top to receive sealant, a 1/2 inch 135 degree sloping top flange and a 4-inch bottom flange formed inward 3/4 inch towards wall with a hemmed 1/2-inch kick at bottom.
3. Shop punch wall flange for fastening to meet wind loads per FBC.
4. Provide shop fabricated corner splices extending 4 inches.
5. Manufacturer: Subject to compliance with the specified requirements, provide products by the following manufacturers (Basis of Design – BOD):
   (a) SBC Industries, North Miami, Florida. Provide steel roof blocking (SRB) from a fabricator licensed by the ARBS patents holder.
   (b) Substitutions:
      (1) Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1.

M. Window Head Flashings:
1. Fabricate using sheet stainless steel to detail and dimension indicated.
2. Hem bottom drop edge.
3. Shop punch wall flange for fastenings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.2 INSTALLATION

A. Lap, rivet, lock, or seal joints, as field conditions require.

B. Provide necessary reinforcement, miscellaneous fittings, and accessories.

C. Apply flashing and sheet metal work including miscellaneous fittings and accessories to even, smooth, sound, thoroughly clean and dry surfaces that are free from defects that might affect application. Prime metal flanges that receive bitumen under provisions of FBC and manufacturer's requirements.

D. Perform soldering work slowly, with properly heated coppers to thoroughly heat seam material and sweat solder through full width of seam that shows no less than 1 inch of evenly flowed solder. Solder under provisions of ASTM B 32.
1. Start soldering immediately after application of flux.
2. Solder flat locked seam.

E. Isolate dissimilar metals with accepted isolation paint or other accepted materials.
1. Do not place in contact with nor in positions where drainage across such paint or other materials will occur.

F. Make flashing and sheet metal work water and weather tight, with lines, arises and angles sharp and true and plane surfaces free from waves and buckles.

G. Provide sufficient fasteners and related hardware to ensure a complete and weather tight system.

H. Base Flashings at Aluminum Walkway Covers Abutting Concrete and Masonry:
1. Set flashing tight against wall and with roof flange set on aluminum deck in bed of sealant.
2. Secure roof flanges to metal deck with No. 10 x 1/2 inch stainless steel sheet metal screws at 6 inches on center maximum. Provide sealant washers and stainless steel washers under screw heads.

I. Cants Strips: Install at transitions of roof membrane with flat vertical surfaces.

J. Copings:
1. Secure outer hold-down cleat to woodblock at 6 inches on center with ring shank roofing nails.
2. Install coping over cleat. Allow 1/8-inch space between each coping section.
3. Secure inside face of coping with removable grommet type fasteners.
4. Provide 1 inch to 1-foot slope at coping to inner parapet wall.
5. Install joint covers in full bed of sealant.

K. Door Hoods:
1. Set hoods level over doors where required with wall flanges bedded in full bed of sealant.
2. Secure hood wall flanges to wall with No. 10 x 3/4 inch stainless steel screws at 6 inches on center.
3. Provide sealant washers and stainless steel washers under screw heads.

L. Curb to Duct Flashing and Counterflashing:

1. Install flashings after ducts through curbs are in place and after bituminous base flashings are completed.
2. Place flashings in place on curbs and solder corners and corner miter laps water-tight.
3. Secure counter-flashings to vertical edge of curb nailers with No. 10 stainless steel sheet metal screws through sealant washers at not over 12 inches on center.
4. Secure vertical upturned duct flashing to duct with No. 10 stainless steel sheet metal screws through sealants washers at not over 6 inches on center.
5. Seal joint between flashings and ducts with sealant as specified in Section 07920.

M. Edge Drips:
1. Install a continuous 20-gage stainless steel cleat.
2. Set 24 gage stainless steel edge drip roof flanges in full bed of roofing cement over completed roofing.
3. Lap splices 4 inches minimum and seal top horizontal surface laps with cold bitumen.
4. Stagger nails at flange to roof deck at 4 inches on center.
5. Cover roof flanges with 2-ply felt stripping set in full bed of roofing cement.
6. Locate drip bottom not less than 3/4 inch away from finished vertical surfaces.

N. Roof Drains:
1. Prime roof drain flanges before applying roof felts.
2. Set lead in full bed of cold bitumen over intermediate plies or cap sheet.
3. Strip lead cover with 2 layers of roofing felts in solid coats of hot bitumen.

O. Roof penetration materials at all pipes, conduits and round equipment supports.
1. After preliminary examination install conical sealant cover with sealant.

P. Sanitary Vent Stack Flashings:
1. Install under provisions of the latest NRCA specifications.

Q. Scuppers:
1. Set scuppers in full bed of roofing cement over completed base flashing and roof membrane.
2. Secure to masonry walls and concrete decks with stainless sheet metal screws in lead shields at 6 inches on center.
3. Secure to wood nailers with stainless steel sheet metal screws at 6 inches on center.

R. Stucco Stop with Counterflashing (2-piece):
1. Set receiver on masonry and concrete walls where indicated.
2. Lap spices 4 inches minimum and seal laps with sealant.
3. Secure to wall with No. 10 x 1-1/4 inch minimum Tap-Con screws 12 inches on center maximum.
4. Check for membrane/bitumen seal on top of felt flashing before counterflashing installation.
5. Attach storm cleats at 30 inches on center and with 1 cleat at each joint.
6. Insert counterflashing into receiver, and secure tightly with storm cleats.

S. Surface Mounted Flashing (1-piece):
1. Set on masonry and concrete walls over base flashing where indicated.
2. Lap splices 4 inches minimum and seal laps with sealant.
3. Secure to wall with No. 10 x 1-1/4 inch Tap-Con pan head screws at 12 inches on center maximum. Provide neoprene sealant washers and stainless steel washers.
4. Where corrugated metal wall occurs, place premolded neoprene filler strip on wall immediately above top of metal base flashing.
   (a) Set filler strip in sealant and seal abutting edges of filler strip with sealant.

(b) Place counterflashing over filler strip set in sealant and secure flashing to metal wall through filler strip with No. 10 x appropriate length stainless steel sheet metal screws at 6 inches on center maximum and centered on wall flutes.
(c) Provide sealant washers and stainless steel washers under screw heads.

5. Check for membrane/bitumen seal on top of felt flashing before flashing installation.

T. Window Head Flashings:
1. Set wall flange in full bed of sealant over windows.
2. Secure to prefinished wall panels with No. 10 x 3/4 inch pan head stainless steel sheet metal screws at 10 inches on center.
3. Provide sealant washers and stainless steel washers under screw heads.

END OF 07 62 00

SECTION 07 71 29 - ROOF EXPANSION JOINTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Stainless steel roof expansion assemblies.

1.2 RELATED SECTIONS

1. 06100- Rough Carpentry.
2. 076200- Flashing and Sheet Metal.
3. 079200- Joint Sealants.

1.3 REFERENCES

A. ANSI-SPRI/ES-1.

B. American Society for Testing and Materials (ASTM):
1. A 167-Specification for Stainless and Heat Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
2. B 32-Specification for Solder Metal.
3. A 240-Heat-resisting Chromium and Chromium-nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
4. D 2822-Standard Specification for Asphalt Roof Cement.

C. Florida Building Code.

D. National Roofing Contractors Association (NRCA) “Roofing and Waterproofing Manual” Detail for installation of units.

E. Sheet Metal and Air-Conditioning Contractor’s National Association, Inc. (SMACNA): Architectural Sheet Metal Manual”, latest Edition. Details for fabrication of units, including flanges and installation to coordinate with type of roofing indicated.

1.4 SUBMITTALS

A. Submit samples of expansion joint cover with labels attached.

B. Submit shop drawings on fabricated work, showing details of all conditions, material types, weights, gages, joining, sealing, and fastening.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements: Ensure flashing and sheet metal complies with requirements of Florida Building Code, NRCA, SMACNA, and ANSI-SPRI/ES-1.

B. Design Function: Ensure roof expansion joint covers provide complete watertight assemblies capable of movement in all directions, while meeting or exceeding the design pressures shown on the Contract Documents.

C. Before starting roofing and ordering of materials, a pre-roofing conference will be held to discuss specified roof expansion joint covers and proper applications.

D. Coordinate application with the application of flashings, roofing system, wood bases, and roof accessories to provide a weather tight installation under provisions of warranty requirements.

1.6 SPECIAL WARRANTIES

A. By Membrane Producer: Provide a 20-year Special Warranty from the roof membrane producer covering correction of defects in the steel blocking and sheet metal component of Roof Assembly.

B. By Steel Roof Blocking and Roofing Sheet Metal Producer and Installer: Provide a 10 year Special Warranty in which the SRB producer/installer agrees to correct defective SRB work.
1. See 07500 for full requirements of this Special Warranty that shall accompany the Roof Assembly Special Warranty.
2. At time of project closeout, submit this signed Special Warranty to the roof membrane producer for transmittal to Contractor, A/E, and board.

PART 2 PRODUCTS

2.1 ROOF EXPANSION JOINTS

A. 22 gage stainless steel expansion assembly.

B. Manufacturer: Subject to compliance with the specified requirements, provide products by the following manufacturer Basis of Design (BOD):
1. Mfr: Concrecel USA; Product: ARBS (Alternative Roof Blocking System). Provide steel roof blocking (SRB) from a fabricator licensed by the ARBS patents holder.
2. Substitutions:
(a) Will be considered by the A/E and Owner.

2.2 MATERIALS

A. Metal Flanges: Stainless steel, Type 4030 dead soft, 0.015-inch thick minimum.

B. Insulation: Maintain the R-value of the roof assembly.

C. Nails: Neoprene grommeted 1-1/2 inch hold-tite nails matching metal.

D. Screws: Neoprene grommeted No. 8 pan head stainless steel screws. A concrete sub-base, provide compatible lead shields for screws.

E. Adhesives and Sealant: As supplied by manufacturer of components for use with roofing system.

F. Single Ply Roofing Roof Expansion Joints: Compatible with and under provisions of single ply roofing membrane manufacturer’s recommendations.

PART 3 EXECUTION

3.1 INSTALLATION

A. According to manufacturer’s published recommendations and requirements for a complete watertight installation.

B. Install expansion joint cover flanges in full bed of roofing cement over completed roof membrane and complete base flashing systems on cants. Provide additional sealant to seal exposed top ends of expansion joint cover weather tight.
1. Secure metal flanges in compliance with FBC.
2. At splice points in expansion joint cover install adhesives and sealant under provisions of manufacturer’s directions. Do not use bituminous roofing cement or other materials not recommended by expansion joint manufacturer.

END OF SECTION 07 71 29

SECTION 07 92 00 - JOINT SEALANTS

PART 1 PART 1 GENERAL

1.1 SECTION INCLUDES

A. Sealants and caulking for joints between dissimilar materials and to close other joints.

1.2 REFERENCES

A. ASTM C 834-Standard Specification for Latex Sealants.

B. ASTM C 919-Standard Practice for Use of Sealants in Acoustical Applications.

C. ASTM C 920-Standard Specification for Elastomeric Joint Sealants.

D. ASTM D 1056-Standard Specification for Flexible Cellular Materials-Sponge or Expanded Rubber.

E. GREENGUARD Product Emission Standard for Children & Schools.

F. Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services.

G. SWRI (Sealant, Waterproofing and Restoration Institute): Sealants: The Professional's Guide.

1.3 SUBMITTALS

A. Product Data: Indicate chemical characteristics, performance criteria, limitations and color chart for all materials.
   1. Low Emitting Materials.
      (a) Submit manufacturer's Material Safety Data Sheet Indicating VOC limits of all products.
      (b) Submit manufacturer's certification that all products comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

B. Samples: Submit samples of each type of sealant and caulking.

C. Submit manufacturer's installation instructions.

1.4 QUALITY ASSURANCE

A. Single source responsibility: Obtain materials from a single manufacturer.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 3 years documented experience.

C. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

1.5 WARRANTY

A. Replace sealants and caulking which fails because of loss of cohesion or adhesion, or does not cure.

B. Furnish written warranty that work executed under this section is free from defects of material and workmanship for a period of 5 years from date of substantial completion of the entire project.

PART 2 PRODUCTS

2.1 MATERIALS

A. Toxicity/IEQ: All joint sealant materials are to comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

B. Sealant Type 1:
1. Polyurethane base, one-part, chemical curing.
2. Non-sagging type for application in vertical joints.
3. Capable of being immersed in water, withstand movement up to 25 percent of joint width and satisfactorily applied throughout a temperature range of 40 degrees to 90 degrees Fahrenheit.
4. Shore A hardness: Minimum 15, maximum 50.
5. Conforming to Requirements of ASTM C920 Type S Grade NS, Class 25, T, NT, O, M, G, I.
6. Non-staining and non-bleeding.
7. SWRI Sealant Validation.
8. Color: Selected by Project Consultant.

C. Sealant Type 2:
1. Polyurethane base, two-part, chemical curing.
2. Self-leveling type for application in horizontal joints.
3. Capable of being continuously immersed in water, withstand movement of up to 25 percent of joint width and satisfactorily applied throughout a temperature range of 40 degrees to 90 degrees Fahrenheit.
4. Uniform, homogenous, and free from lumps, skins, and coarse particles when mixed.
5. Shore A hardiness: Minimum 30; maximum 35.
6. Conforming to requirements of ASTM C920 Type M, Grade P, Class 25, Use T, NT, M, G, A, O, I.
7. Non-staining and non-bleeding.
8. Color: Selected by Project Consultant.

D. Sealant Type 3:
1. Polyurethane, two-part, chemical cure.
2. Non-sag type for vertical applications.
3. Capable of being continuously immersed in water; withstand movement up to 50 percent of joint width and satisfactory applied throughout a temperature range of 40 degrees to 90 degrees Fahrenheit.
4. Uniform, homogenous, and free from lumps, skins, and coarse particle when mixed.
5. Shore A hardness: Minimum 30, Maximum 40
6. Conforming to requirements of ASTM C920 Type M, Grade NS, Class 25 use T, NT, M, G, A, O.
7. Non-Staining and non-bleeding.

8. Color: Selected by Project Consultant.

E. Sealant Type 4
1. Acrylic base, one-part, solvent curing.
2. Capable of being continuously immersed in water, withstand movement up to 7-1/2 percent of joint width and satisfactorily applied throughout a temperature range of 40 degrees to 90 degrees Fahrenheit.
3. Shore A hardiness: Maximum 55.
4. Non-staining and non-bleeding.
5. Conforming to requirements of ASTM C834.
6. Color: Selected by Project Consultant.

F. Sealant Type 5:
1. Silicone base, one-part, neutral curing.
2. Withstand movement up to 50 percent of joint width and satisfactorily applied throughout a temperature range of 40 degrees to 90 degrees Fahrenheit.
3. Shore A hardiness: Maximum 30.
4. Conforming to requirements of ASTM C920, Type S, Grade NS, Class 50, US = NT, M, G, A. Selected by Project Consultant.
5. SWRI Sealant validation.
6. Color: Selected by Project Consultant.

G. Sealant Type 6:
1. Synthetic Butyl Rubber, one-part moisture cure.
2. Non-sag acoustical sealant.
3. Non-hardening, non-bleeding.
4. Unexposed joints only.

H. Sealant Type 7:
1. Silicone base, one-part moisture cure
2. Shore A hardness: 15
3. Conforming to requirements of ASTM C920 Type S, Grade NS, Class 100/50, Use T, NT, M, G. A and O.
4. SWRI sealant validation.
5. Color: Selected by Project consultant.

I. Back-up Materials:
1. As recommended by caulking or sealant manufacturer and compatible with each material.
2. Preformed material sized to require 25 percent to 50 percent compression upon insertion in joint.
3. Do not use materials impregnated with oil, bitumen or similar materials.

J. Bond Breakers: Where joints are not of sufficient depth to receive back-up material install polyethylene bond-breaking tape at back of joint.

K. Primer:
1. As recommended by manufacturers of caulking or sealant used.
2. Type that will seal the surfaces and prevent absorption of the vehicle essential to the retention of elasticity by the caulking or sealant compound.

L. Accessories: Provide solvent, cleaning agents and other necessary materials as recommended by the caulking or sealant manufacturer essential for a complete installation.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify joint dimensions, physical and environmental conditions are acceptable to receive work of this Section.

B. Verify that substrate surfaces and joint openings are ready to receive work.

C. Verify that joint backing and release tapes are compatible with sealant.

D. Remove loose materials and foreign matter, which might impair adhesion of sealant.

E. Clean and prime joint under provisions of manufacturer’s instructions.

F. Perform preparation under provisions of manufacturer’s instructions.

G. Protect elements surrounding work of this section from damage or disfiguration.

3.2 INSTALLATION

A. Perform work under provisions of ASTM C 804 for solvent release and ASTM C 790 for latex base sealants.

B. Install sealant under provisions of manufacturer’s instruction.

C. Measure joint dimensions and size materials to achieve required width/depth ratios.

D. Install joint backing to achieve a neck dimension no greater than 1/3 of the joint width.

E. Install sealant free of air pockets, foreign embedded matter, ridged and sags.

F. Apply sealant within recommended temperature range. Consult manufacturer when sealant cannot be applied within these temperature ranges.

G. Apply generally with caulking gun of proper nozzle size to fit joints.

H. Apply with sufficient pressure to fill joint from backing to surface.

I. For joints in flat surfaces, neatly tool compound slightly concave with proper tools.

J. Execute finishing of caulking around frames with coving tool.

K. As work progresses, immediately remove compound that may accidentally flow onto adjoining surfaces using manufacturer's recommended solvent and cleaners. Remove excess material from joints immediately.

L. At completion, carefully check all joints for damage and repair-damaged joints.

M. Clean adjoining surfaces.

N. Protect sealants and caulking until cured.

3.3 SCHEDULES

A. Exterior:
1. Perimeters of exterior openings where frames meet exterior facade of building: Type 1 or 3.
2. Expansion and control joints in exterior surfaces of poured-in-place concrete walls: Type 1 or 3.
3. Expansion and control joints in exterior surfaces of pre-cast tilt-up wall panels: Type 7 (unpaintabe) or Type 3 (paintable polyurethane).
   (a) Provide closed cell, oversized backer rod with 1/2-inch thick abuse resistant sealant in vertical and horizontal joints in tilt-wall panels at all non-rated locations to a height of 96 inches above grade or adjacent walking surfaces.
4. Exterior joints in horizontal wearing surfaces: Type 2 in areas subject to foot and vehicular traffic; Type 3 at plazas, malls, patios etc.
5. Skylights and glazing: Type 5.

B. Interior:
1. Seal interior perimeters of exterior openings: Type 1.
2. Expansion and control joints in interior surfaces of poured-in-place concrete walls: Type 1 or Type 3.
3. Expansion and control joints in interior surfaces of pre-cast tilt-up wall panels: Type 1 or Type 3.
4. Interior control and expansion joints in floor surfaces: Type 1 or Type 2.
5. Perimeters of interior frames: Type 1.
6. Perimeters of bath fixtures: Type 4.
7. Exposed interior control joints in drywall: Type 4.
8. Control joints in drywall, perimeter, and between metal framing and substrate in sound rated partitions: Type 6.

END OF 07 92 00

SECTION 07 95 00 – EXPANSION CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes expansion joint cover assemblies.

1.3 SUBMITTALS

A. Product data for each type of expansion joint cover assembly specified, including manufacturer's product specifications, installation instructions, details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Shop drawings showing fabrication and installation of expansion joint cover assembly including plans, elevations, sections, details of components, joints, splices, and attachments to other units of Work.

C. Samples for initial selection purposes in the form of manufacturer's color charts, actual units, or sections of units showing full range of colors, textures, and patterns available for each exposed metal and elastomeric material of expansion joint cover assembly indicated.

D. Samples for verification purposes in full-size units of each type of expansion joint cover assembly indicated; in sets for each finish, color, texture, and pattern specified, showing full range of variations expected in these characteristics.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: Where indicated, provide expansion joint cover assemblies identical to those assemblies whose fire resistance has been determined per ANSI/UL 263, NFPA 251, U.B.C. 43-1, ASTM E 119, or ASTM E814 including hose stream test of vertical wall assemblies, by a testing and inspecting agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to the following:

1. Non-Rated Joints:

a. Architectural Art Manufacturing, Inc., Wichita, KS.
b. Balco Inc., Wichita, KS.
c. D.S. Brown Co., N. Baltimore, OH.

d. Interspan Corp., Jessup, MD.
e. Metalines Inc., Oklahoma City, OK.
f. Watson Bowman Acme Corp., Jacksonville, FL.

2. Rated Joints:

a. Architectural Art Manufacturing, Inc., Wichita, KS.
b. Balco Inc., Wichita, KS.
c. Bio-Fireshield, Concord, MA.
d. Metalines Inc., Oklahoma City, OK.
e. Watson Bowman Acme Corp., Jacksonville, FL.

2.2 MATERIALS

A. Aluminum: ASTM B 221 (ASTM B 221M), alloy 6063-T5 for extrusions; ASTM B 209 (ASTM B 209M), alloy 6061-T6, sheet and plate.

1. Protect aluminum surfaces to be placed in contact with cementitious materials with a protective coating.

B. Extruded Preformed Seals: Single or multicellular elastomeric profiles as classified under ASTM D 2000, designed with or without continuous, longitudinal, internal baffles. Formed to fit compatible frames, in color indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.

C. Preformed Sealant: Manufacturer's standard elastomeric sealant complying with ASTM C 920, Use T, factory-formed and -bonded to metal frames or anchor members; in color indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.

1. Joints 2 Inches (50 mm) Wide and Less: Withstand plus or minus 35 percent movement of the joint width without failure.
2. Joints Greater Than 2 Inches (50 mm) to 4 Inches (100 mm) Wide: Withstand plus or minus 50 percent movement of the joint width without failure.

D. Fire Barriers: Designed for indicated or required dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Tested in maximum joint width condition with a field splice as a component of an expansion joint cover per ANSI/UL 263, NFPA 251, U.B.C. 43-1, ASTM E 119, or ASTM E814 including hose stream test of vertical wall assemblies by a nationally recognized testing and inspecting agency acceptable to authorities having jurisdiction.

E. Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible moisture barrier and filler materials, drain tubes, lubricants, adhesive, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.3 EXPANSION JOINT COVER ASSEMBLIES

A. General: Provide expansion joint cover assemblies of design, basic profile, materials, and operation indicated. Provide units comparable to those indicated or required to accommodate joint size, variations in adjacent surfaces, and dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Furnish units in longest practicable lengths to minimize number of end joints. Provide hairline mitered corners where joint changes directions or abuts other materials. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint cover assemblies.

B. Moisture Barrier: Provide manufacturer's continuous, standard, flexible vinyl moisture barrier under covers at exterior or non-conditioned locations.

C. Fire-Rated Joint Covers: Provide expansion joint cover assemblies with manufacturer's continuous, standard, flexible fire barrier seals under covers at rated locations to provide fire-resistive rating not less than the rating of adjacent construction.

D. Metal Floor-to-Floor Joint Cover Assemblies: Provide continuous extruded metal frames of profile indicated with seating surface and raised floor rim or exposed trim strip to accommodate flooring and concealed bolt and anchors embedded in concrete. Provide assemblies formed to receive cover plates of design indicated and to receive filler materials (if any) between raised rim of frame and edge of plate. Furnish depth and configuration to suit type of construction and to produce a continuous flush wearing surface with adjoining finish floor surface.

1. Flat Cover Plates: Provide cover plates of profile and wearing surface indicated. Extend flat plates to lap each side of joint.
2. Self-Centering Cover Plates: Concealed centering device with the cover plate secured in or on top of frames as to have free movement on both sides.
3. Floor Cover Plate Wearing Surfaces: Provide cover plates with the following type of wearing surfaces.

    a. Smooth flush - no bump.

E. Floor-to-Wall Joints: Provide one frame on floor side of joint only. Provide wall side frame where required by manufacturer's design.

1. Angle Cover Plates: Attach angle cover plates for floor-to-wall joints to wall with countersunk, flat-head exposed fasteners secured to drilled-in-place anchor shields, unless otherwise indicated, at spacing recommended by joint cover manufacturer.

F. Wall, Ceiling, and Soffit Joint Cover Assemblies: Provide interior wall and ceiling expansion joint cover assemblies of same design and appearance. Provide exterior wall and soffit expansion joint cover assemblies of same design and appearance. Provide wall expansion joint cover assemblies compatible with floor expansion joint cover assemblies design and appearance.

1. Self-Centering Cover Plates: Concealed centering device with the cover plate secured in or on top of frames to permit free movement on both sides.

2.4 METAL FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes to products in factory after fabrication. Protect finishes on exposed surfaces before shipment.

B. Aluminum Finishes: Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

1. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 PREPARATION

A. Manufacturer's Instructions: In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for phases of Work, including preparing substrate, applying materials, and protecting installed units.

B. Coordinate and furnish anchorages, setting drawings, templates, and instructions for installation of expansion joint cover assemblies to be embedded in or anchored to concrete or to have recesses formed into edges of concrete slab for later placement and grouting-in of frames.

C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary to secure expansion joint cover assemblies to in-place construction, including threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.

3.2 INSTALLATION

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required to install expansion joint covers. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling. Set floor covers at elevations to be flush with adjacent finished floor materials. Locate wall, ceiling, roof, and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories. Locate anchors at interval recommended by manufacturer, but not less than 3-inches (75 mm) from each end and not more than 24-inches (600 mm) on center.

B. Continuity: Maintain continuity of expansion joint cover assemblies with a minimum number of end joints and align metal members mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames. Adhere flexible filler materials (if any) to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

C. Fire Barriers: Install fire barriers, including transitions and end joints, according to manufacturer's instructions so that fire-rated construction is continuous.

3.3 CLEANING AND PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's instructions.

END OF SECTION 07 95 00

SECTION 08 11 00 - STEEL FRAMES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire rated and non-fire rated standard steel frames and associated accessories that are indicated on the drawings and in schedules.

B. Section Does Not Include: Use of aluminum doors.

1.2 RELATED SECTIONS

1. 061000-Rough Carpentry.
2. 079200-Joint Sealants.
3. 087100-Finish Hardware.
4. 088000-Glazing.
5. 092116-Gypsum Board Assemblies.
6. 099000-Painting.

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. A1011A/1011/M-Specifications for Steel Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High Strength Low-Alloy with improved Formability.
2. A653/A653/M-Specification for Steel Sheet, Zinc-coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed by the Hot Dipped Process (Commercial Steel).
3. A1008/A1008/M-Specification for Steel Sheet and Strip, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, and High-Strength, Low-Alloy with Improved Formability.
4. C270-Mortar for Unit Masonry.
5. E 152-Fire Test of Door Assemblies.

B. ANSI/NAAMM HMMA 861-Guide Specifications for Commercial Hollow Metal Doors and Frames.
1. ANSI=American National Standards Institute.
2. NAAMM=National Association of Architectural Metal Manufacturers.
3. HMMA=Hollow Metal Manufacturers Association.

C. ANSI/SDI A250.8-Recommended Specifications for Standard Steel Doors and Frames.
1. SDI=Steel Door Institute.

D. Factory Mutual (FM).

E. Florida Building Code (FBC).

F. Florida Building Code (FBC) Protocols and required product Notice of Acceptance (NOA).

G. International Organization for Standardization (ISO) 14021–1999; Environmental Labels and Declarations.

H. National Builders Hardware Association-“Recommended Locations for Builder’s Hardware”.

I. National Fenestration Rating Council (NFRC).

J. NFPA 80-Fire Doors and Windows (National Fire Protection Association).

K. NFPA 252-Standard Methods of Fire Tests of Door Assemblies.

L. Underwriters Laboratories (UL).

1.4 SUBMITTALS

A. Product Data: Submit manufacturer's technical product data substantiating that products comply with requirements prior to start of manufacture.
1. Recycled Content:
(a) Indicate recycled content; indicate percentage of pre-consumer and post-consumer recycled content per unit of product.
(b) Indicate relative dollar value of recycled content product to total dollar value of product included in project.
(c) If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
(d) If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
2. Energy Efficiency:
(a) Submit product data indicating energy performance in accordance with the National Fenestration Rating Council (NFRC) methodology.
3. Manufacturer's specifications and catalog cuts.

B. Shop Drawings: Submit for fabrication and installation of steel doors and frames. Include details of each frame type, required reinforcement, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door hardware and reinforcements, details of joints and connections. Show anchorage and accessory items. Show allowable design pressures and impact resistance certification for doors exposed to wind loading.
1. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.
2. Indicate coordination of glazing frames and stops with glass and glazing requirements.
3. Doors and frames shall meet or exceed wind pressure and impact requirements shown on Contract Documents.

C. Label Construction Certification: For door assemblies required to be fire-rated and exceeding sizes of tested assemblies, submit manufacturer's certification for each door and frame assembly constructed to conform to design, materials, and construction equivalent to requirements for labeled construction.

D. Samples: Provide cut-away samples of hollow metal door and frame construction. Submit for review 1 foot 6 inches x 1 foot 6 inches portion of exterior flush door panel construction at upper hinge corner location. Sample to include actual thickness and gages of face sheets, channels, reinforcing plates, insulation, etc. Sample to be prime painted. Submit for review 1-foot long lower portion of exterior hinge side frame construction. Sample to include actual gage thickness of jamb sheet metal, reinforcing plates and floor anchors. Supply sample of expansion anchor fasteners. Jamb sample to be prime painted.

E. Exterior Doors: Submit complete current Florida Building Code Protocols and required product Notice of Acceptance (NOA).

1.5 QUALITY ASSURANCE

A. Provide doors and frames complying with ANSI/SDI 250.8 for Standard doors and ANSI/NAAMM HMMA 861 for custom doors.

B. Fire-Rated Door Assemblies: Where fire rated door assemblies are indicated or required, provide fire-rated door and frame assemblies complying with NFPA 80 and have been tested, listed, and labeled according to ASTM E152 by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

C. Provide factory applied metal labels on fire-rated doors and frames. Field applied labels shall not be acceptable.

D. The Owner reserves the right to select at random up to 2 doors and frames to verify the construction for compliance with this specification. Cost of replacement of these two doors and frames shall be included in the Contract Amount, and entered in the Schedule of Values as a separate line item.

E. All work shall be performed in accordance with referenced standards.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver steel doors and frames cartoned or crated to provide protection during transit and job storage. Provide additional sealed plastic wrapping for factory-finished doors.

B. Inspect steel doors and frames upon delivery for damage. Minor damage may be repaired if refinished items are equal in all respects to new work and acceptable to owner. Remove and replace damaged items as directed.

C. Doors and frames shall be stored at the building site under cover in a vertical position. Doors and frames shall be separated and spaced using wood blocking. Place units on minimum 4 inch high wood blocking. Avoid use of non-vented plastic or canvas shelters that could create a humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4 inch spaces between stacked doors to promote air circulation.

PART 2 PRODUCTS

2.1 MANUFACTURES

A. Manufacturers are accepted upon certification that all requirements of this specification are met.

2.2 MATERIALS

A. All Steel door and frame materials to contain recycled content.

2.3 DOOR FRAMES

A. Fabricate exterior and interior frames to profiles indicated of 14 gage base metal thickness for all frames, bonderized hot-dip zinc coated sheet steel in accordance with ASTM A653, galvanealed with a coating weight of A60 for all frames.

B. Types: Custom type, fully welded and ground smooth and flush, with faces mitered, and stops butted. Head and jamb members with integral stops and with combination buck and trim as shown. Knocked-down (KD) frames are not acceptable.
   1. Corners shall have continuous flush and smooth welds without dishing.
   2. Minimum stop depth shall be 5/8 inch.
   3. Refer to Section 087100-Finish Hardware for mounting heights of hardware.

C. Hardware Reinforcements and Preparations:
   1. Frames shall be mortised, reinforced, and drilled/tapped for mortised hardware according to approved door hardware schedule and templates by hardware supplier.
      (a) Drilling and tapping for surface applied hardware shall be done in the field.
      (b) Locate door hardware according to “Recommended Locations for Builder’s Hardware” published by National Builders Hardware Association or as directed in section 087100-Finish Hardware.
   2. Butt (Hinge) Reinforcing:
      (a) Top Hinge: Steel plate 3/16 inch thick (7 gage) by full width of jamb by 10 inches long, offset as required to have faces of butts flush with doorframe edge and secured by not less than 12 spot welds.
      (b) Other Hinges: Steel plate 3/16 inch thick (7 gage) by 1-1/4 minimum by 10 inches long, offset as required to have faces of butts flush with doorframe edge and secured by not less than 12 spot welds.
   3. Strike Reinforcement: Offset clips of 12-gage steel, 1-1/2 inch x 3/4 inches longer than strike top and bottom.
   4. Closer Shoe Reinforcing:
      (a) 10 gage steel plates (minimum 14 inches long) width of stop near corner of hinge jamb.
      (b) Provide styrofoam or treated wood over plates to allow closer foot screws to seat without interference from grout fill.

D. Silencer (Mute) Provisions: Punch frames to receive silencers on strike jamb (except in weather stripped frames) scheduled in Section 08710-Door Hardware. Provide 3 silencers for single door and 2 silencers for each leaf in pair of doors at head of frame. Install silencers before grouting.

E. Grout Guards at Grouted Frames (refer to article 3.2-Installation below for locations): Provide at masonry openings only; 26 gage sheet metal covers welded to the back of frames at hinges, lock, bolts, tapped reinforcements at hardware.

F. Jamb Anchors for Masonry:
   1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.

G. Jamb Anchors for Cast-In-Place Concrete:
   1. Provide “Hat” sections or “pipe spacers” standard to the manufacturer.
   2. Provide at least three anchors up to 7 feet 6 inches high opening and one anchor for each additional 30 inches of opening height or part thereof for both strike and hinge jambs.
   3. Provide complete with minimum 3/8-inch diameter cadium plated flush head screw complete with expansion anchors.

H. Jamb Anchors for Drywall Stud Partitions.
   1. Compression Type for Drywall Slip-on Frames: Adjustable compression anchors.
   2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.

I. Floor Anchors: Provide 14 gage galvanized sheet steel angle shaped anchors for each jamb extending to the floor, punched for not less than two 3/16 inches diameter cadmium plated bolts and washers each side. Shim anchors to slab with nylon shims.

J. Spreaders: Provide frames with temporary steel spreader bars tack welded to jambs to maintain full rigidity and proper alignment during installation.

K. Security Switch Preparation: Refer to the Drawings.

2.4 FINISHING AND SHOP PAINTING

A. After Fabrication: Grind exposed weld marks smooth and flush, clean and degrease surfaces, apply metallic filler, sand smooth, and apply shop coat of manufacturer's standard zinc-rich rust-inhibitive metal primer baked on.

B. Prime Coat: Thoroughly cover all surfaces to provide uniform dry film thickness of not less than 1.0 mil without runs, smears, or bare spots. Do not paint over fire rating labels.

C. Primer Coat: Use manufacturer's standard rust inhibiting primer complying with ANSI A210.10

2.5 ACCESSORIES

A. Grout: Provide a mortar mix complying with ASTM C270a, Type S-1800-psi minimum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not proceed with the work of this section until conditions detrimental to the proper and timely completion of the work have been corrected in an acceptable manner.

3.2 INSTALLATION

A. Frames:
1. Install plumb, level, and true to line, secured in openings.
2. Install frames according to accepted shop drawings, manufacturer's printed instructions.
3. Fill door frames with grout (jambs and head) at concrete block and masonry walls exterior and interior.
4. Install fire-rated frames according to NFPA 80.
5. Fill surface depressions of hollow metal frames with metallic paste filler and grind smooth to finish.
6. Finish paint frames prior to hardware installation. Do not paint over fire rating labels.

B. Doors:
1. Install in openings plumb, level, and true to line.
2. Apply hardware and adjust to achieve smooth and quiet operation.
3. Install insect/rat screens on interior of exterior door louvers. At exterior doors, caulk perimeter seam between closure channel and doorframe sheet with paint grade exterior sealant, prior to finish paint.
4. Place fire-rated doors with clearances as specified in NFPA Standard No. 80.
5. Finish paint doors prior to hardware installation. Do not paint over fire rating labels.

3.3 ADJUST AND CLEAN

A. Prime Coat Touch-Up: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective plastic wrappings from prefinished doors.

C. Final Adjustments: Check and readjust operating door hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition. Provide final adjustment as follows:
   1. Door Contact with Silencers: Doors shall strike a minimum of two silencers without binding lock or latch bolts in the strike plate.
   2. Head, Strike, and Hinge Jamb Margin: 1/8 inch.
   3. Meeting Edge Clearance, Pairs of Doors: 1/8 inch.
   4. Bolts and Screws: Leave tight and firmly seated.
   5. Soundseal gasketing: Full contact with no gaps.
   6. Vermin Protection:
      (a) Drop Seal: Full contact with no gaps.
      (b) Brush weatherstripping: Full contact.

END OF 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid core, fire-rated and non-rated flush wood doors.

1.2 RELATED SECTIONS

A. 081100-Steel Door Frames: Refer for metal door frames for flush wood doors.

B. 087100-Finish Hardware.

C. 088000-Glazing.

1.3 REFERENCES

A. ASTM - American Society for Materials and Testing

1. D600-Determination of Formaldehyde Concentration in Air from Wood Products.

2. D6330-Determination of Volatile Organic Compounds (Excluding Formaldehyde) Emissions from Wood-Based Panels.

B. GREENGUARD Product Emission Standard for Children & Schools.

C. Intertek Testing Service (ITS)-Warnock Hersey (WH).

D. National Fire Protection Association (NFPA).

E. Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services.

F. Underwriters Laboratory (UL).

G. Window and Door Manufacturers Association (WDMA).

1.4 SUBMITTALS

A. Product Data: Submit door manufacturer's technical data for each type of flush wood door, including details of core and edge construction, trim for openings and louvers, and factory-finishing specifications if applicable.
1. Low Emitting Materials:
(a) Submit manufacturer's Material Safety Data Sheet Indicating VOC limits of all products.
(b) Submit manufacturer's certification that all products comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

B. Shop Drawings: Submit shop drawings indicating location and size of each door, elevation of each kind of door, details of construction, location and extend of hardware blocking, fire ratings, requirements for factory finishing and other pertinent data.

C. Samples: Submit samples, 1 foot square or as indicated, for the following:
   1. Doors: Door faces with solid wood edging representing typical range of color and grain for veneer and solid lumber required.

D. Manufacturer's Full Lifetime Warranty

1.5 REGULATORY REQUIREMENTS

A. Conform to all applicable codes for fire rated doors.

1.6 QUALITY ASSURANCE

A. Quality Standards: Comply with the following standards:
   1. WDMA I.S. 1-A.

B. Fire-rated Wood Doors: Comply with NFPA-80. Provide wood doors which are identical in materials and construction to units tested in door and frame assemblies per ASTM E152 and which are labeled and listed for ratings indicated by UL, ITS-WH or other testing and inspection agency acceptable to authorities having jurisdiction. Provide metal labels mechanically fastened to door. Do not finish paint over labels.

C. The Owner reserves the right to select at random up to 2 doors to verify the construction for compliance with this specification. Cost of replacement of these 2 doors and frames shall be included in the Contract Amount, and entered in the Schedule of Values as a separate line item.

D. Manufacturer: Obtain doors from a single manufacturer.

E. Engineered Wood Products:
   1. Determine formaldehyde concentrations in air from wood products under test conditions of temperature and relative humidity in accordance with ASTM D6007 or E1333.
   2. Determine Volatile Organic Compounds VOC), excluding formaldehyde, emitted from manufactured wood-based panels in accordance with ASTM D6330.

1.7 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Protect doors during transit, storage and handling to prevent damage, soiling and deterioration. Comply with requirements of referenced standards and recommendations of WDMA pamphlet "How to Store, Handle, Finish, Install, and Maintain Wood Doors", as well as with manufacturer's instructions.

B. Identify each door with individual opening numbers which correlate with designation system used on shop drawings for door, frames and hardware, using temporary, removable or concealed markings.

C. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during remainder of constriction period to comply with referenced WDMA quality standards, applicable to Project's location.

1.8 WARRANTY

A. General: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by Manufacturer, Installer and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup or twist) or that show telegraphing of core construction in face veneers, or do not conform to tolerance limitations of referenced quality standards.
   1. Warranty: Include reinstallation, which may be required to repair, or replacement of defective doors where defect was not apparent prior to hanging.
   2. Warranty: In effect for life of installation (as standard with manufacturer) after date of Substantial Completion.

C. Contractor's Responsibility: Replace or refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with specified requirements, provide doors from one of the following:
   1. Algoma Hardwoods Inc.
   2. Eggers Industries.
   3. Graham Wood Doors.
   4. Lambton Doors.
   5. Marshfield Door Systems Inc.

B. Substitutions:
   1. Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1, and Section 01630-Product Substitution Procedure.

2.2 MATERIALS

A. Toxicity/IEQ: All engineered wood products are to comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

2.3 INTERIOR NON-FIRE-RATED DOORS

A. All wood door products shall comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."

B. All engineered wood door products containing composite and particleboard materials shall comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

C. Performance Duty Level: Heavy Duty.

D. Aesthetic Grade: Premium.

E. Door Construction: Five ply (face veneer and crossband glued to each side of core), bonding using hot press method.

F. Core Material (Solid Core Doors):
1. PC-5 FSC UFF PB (FSC Certified, Urea-Formaldehyde Free, Particleboard). Comply with ANSI Standard. A208.1 LD-2, with screw holding power of 125 lbs.
2. Hot pressed only.

G. Stiles (Vertical Edges): Hardwood to match face veneer. Veneered edges are not acceptable.

H. Rails (Horizontal Edges): Hardwood or structural composite lumber.

I. Adhesives: Type I, Waterproof.

J. Factory Seal: Seal top and bottoms when factory finished.

K. Cross Banding: Wood-based composites of a minimum thickness of 1/16 inch. Crossband and face veneers are laminated to the core with interior use adhesive using hot press process. Crossbands must extend the full width of the door.

L. Veneer:
1. Face Grade: A.
2. Veneer Cut: Rotary Cut.
3. Veneer Species:
(a) Stain Grade (provide factory stain finish): White Birch.
4. Veneer Matching: Book Match.
5. Assembly of Spliced Veneers: Running book match.

2.4 INTERIOR FIRE-RATED SOLID CORE DOORS

A. Provide faces and grade to match non-rated doors in same area of building, unless otherwise indicated. Manufacturer's standard core construction as required to provide fire-resistance rating indicated.
1. Pairs: Furnished formed steel edges and astragals for pairs of fire-rated doors, unless otherwise indicated.
2. Mineral Fiber Core: If this core is used, provide non-combustible inner blocking for all surface applied hardware, throughbolts are not acceptable.

2.5 LOUVERS AND LIGHT FRAMES

A. Metal Louvers: Size, type and profile shown and fabricated from the following:
1. Natural Aluminum: Extruded aluminum with natural anodized finish complying with AA-C22A31, Class II.

B. Light Openings in Doors: Manufacturer's standard metal frame for flush glazing, factory-primed.Frames in non-fire rated doors shall match approved frames in fire-rated doors.

2.6 FABRICATION

A. Fabricate flush wood doors in sizes indicated for job-site fitting complying with following requirements:
1. Fixed Transom Panels: Fabricate matching panels with the same configuration, exposed surface and finish as specified for associated doors.
2. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of doors required.
(a) Light Openings:
(1) Trim openings with moldings of material and profile indicated.
(2) Flush Gazing.
3. Louvers: Factory install in prepared openings.

4. Glazing: Field install per provisions of Section 08800-Glass and Glazing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine installed door frames prior to hanging door:
   1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
   2. Do not install doors with defects.

B. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation see Section “Finish Hardware”, of these specifications.

B. Manufacturer’s Instructions: Install wood doors to comply with manufacturer’s instructions and referenced WDMA standard and as indicated.

C. Install fire-rated doors in corresponding fire-rated frames under provisions of requirements of NFPA No. 80.

D. Job-Fit Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Sand and seal (2 coats) cut surfaces after fitting and machining.
   1. Fitting Clearances for Non-Rated Doors: Provide 1/8 inch at jambs and heads; 1/16 inch per leaf at meeting stiles for pairs of doors; and 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch clearance from bottom of door to top of threshold.
   2. Contractor responsible for determining overall thickness of decorative floor finish or covering.
   3. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.
   4. Bevel non-rated doors 1/8 inch in 2 inch at lock and hinge edges.
   5. Bevel fire-rated doors 1/8 inch in 2 inch in lock edge; trim stiles and rails only to extend permitted by labeling agency.

E. Field Finished Doors: Refer to Section 09910-Paints and Coatings, for finishing requirements. Doors shall be primed and finish painted prior to installation of any door hardware. Metal frames for door lights shall be primed and finish painted prior to installation of glass and glazing tape.

F. Door Protection: All Doors are to be Poly Bagged. Poly bags to remain on factory finished doors until final inspection.

G. Operation: Rehang or replace doors, which do not swing or operate freely.

H. Protect doors as recommended by door manufacturer to assure that wood doors will be without damage or deterioration at time of Substantial Completion.

END OF 08 14 16

SECTION 08 71 00 - FINISH HARDWARE

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work in this section shall include furnishing of all items of finish hardware as hereinafter specified or obviously necessary to complete the building, except those items that are specifically excluded from this section of the specification.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Hollow Metal Doors and Frames
B. Aluminum Doors and Frames
C. Wood Doors and Frames

1.3 DESCRIPTION OF WORK

A. Furnish labor and material to complete hardware work indicated, as specified herein, or as may be required by actual conditions at building.
B. Include all necessary screws, bolts, expansion shields, other devices, if necessary, as required for proper hardware application. The hardware supplier shall assume all responsibility for correct quantities.
C. All hardware shall meet the requirements of Federal, State and Local codes having jurisdiction over this project, notwithstanding any real or apparent conflict therewith in these specifications.
D. Fire-rated openings:
   1. Provide hardware for fire-rated openings in compliance with ANSI, NFPA Pamphlet No. 80, NFPA Standards NO. 101, UBC 702 (1997) and UL10C. This requirement takes precedence over other requirements for such hardware. Provide only hardware that has been tested and listed by UL for the types and sizes of doors required, and complies with the requirements of the door and door frame labels.
   2. Where panic exit devices are required on fire-rated doors, provide supplementary marking on door UL label indicating Fire Door to be equipped with fire exit hardware and provide UL label on exit device indicating “Fire Exit Hardware”.
E. Fasteners:
   1. Hardware as furnished shall conform to published templates generally prepared for machine screw installation.
   2. Furnish each item complete with all screws required for installation. Typically, all exposed screws installation.
   3. Insofar as practical, furnished concealed type fasteners for hardware units that have exposed screws shall be furnished with Phillips flat head screws, finished to match adjacent hardware.
   4. Door closers and exit devices to be installed with closed head through bolts (sex bolts).

1.4 QUALITY ASSURANCE

A. The supplier to be a directly franchised distributor of the products to be furnished and have in their employ an AHC (Architectural Hardware Consultant). This person is to be available for consultation to the architect, owner and the general contractor at reasonable times during the course of work.

B. The finish hardware supplier shall prepare and submit to the architect six (6) copies of a complete schedule identifying each door and each set number, following the numbering system and not creating any separate system himself. He shall submit the schedule for review, make corrections as directed and resubmit the corrected schedule for final approval. Approval of schedule will not

relieve Contractor of the responsibility for furnishing all necessary hardware, including the responsibility for furnishing correct quantities.

C. No manufacturing orders shall be placed until detailed schedule has been submitted to the architect and written approval received.
D. After hardware schedule has been approved, furnish templates required by manufacturing contractors for making proper provisions in their work for accurate fitting, finishing hardware setting. Furnish templates in ample time to facilitate progress of work.
E. Hardware supplier shall have an office and warehouse facilities to accommodate the materials used on this project. The supplier must be an authorized distributor of the products specified.
F. The hardware manufactures are to supply both a pre-installation class as well as a post-installation walk-thru. This is to insure proper installation and provide for any adjustments or replacements of hardware as required.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Wrap; protect finishing hardware items for shipment. Deliver to manufacturing contractors hardware items required by them for their application; deliver balance of hardware to job; store in designated location. Each item shall be clearly marked with its intended location.

1.6 WARRANTY

A. The material furnished shall be warranted for one year after installation or longer as the individual manufacturer's warranty permits.
B. Mechanical locks and Electronic Access locks shall be warranted, in writing by the manufacturer against failure due to defective materials and workmanship, for a period of five (5) years commencing from the Date of Purchase. All other electronic hardware (i.e. Power supplies, EL/RX/LX switches ect.) shall be warranted for one (1) year from the Date of Purchase.
C. Overhead door closers shall be warranted, in writing by the manufacturer against failure due to defective materials and workmanship, for a period of ten (10) years commencing on the Date of Final Completion and Acceptance. In the event of failure, the manufacture is to promptly repair or replace the defective with no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. To the greatest extent possible, obtain each kind of hardware from only one manufacturer.
B. All numbers and symbols used herein have been taken from the current catalogues of the following manufacturers.

PRODUCT	SPECIFIED MANUFACTURER	ACCEPTABLE SUBSTITUTION
1) Hinges	Ives	Hager, Stanley
2) Locks & Latches	Corbin/Russwin	Sargent, Yale
3) Power Supplies	Von Duprin	No Substitution
4) Cylinders, Keys, Keying	Corbin/Russwin	No Substitution
5) Exit Devices	Von Duprin	Corbin/Russwin, Precision
6) Door Closers	LCN	Corbin/Russwin
7) OH Stops/Holders	Glynn Johnson	Rixson
8) Magnetic Hold Opens	LCN	Dor-O-Matic
9) Automatic Flushbolts Coordinators, DP Strikes	Ives	Rockwood
10) Wall Stops/Floor Stops, Flushbolts	Ives	Rockwood
11) Kick Plates	Ives	Rockwood
12) Lock Guards	Glynn Johnson	Ives, Rockwood

13)	Threshold/Weather-strip	National Guard	Pemko, Zero
14)	Silencers	Glynn Johnson	Rockwood, Ives

2.2 FINISH OF HARDWARE:

A. Exterior Hinges to be Stainless Steel (32D), Interior Hinges to be Satin Chrome (26D). Door Closers to be Aluminum. Locks to be Satin Chrome (26D), Exit Devices to be Satin Chrome (26D). Overhead Holders to be Satin Chrome (26D), Flat Goods to be Satin Chrome (26D) or Stainless Steel (32D) and the Thresholds to be Mill Finish Aluminum.

2.3 HINGES AND PIVOTS:

A. Exterior butts shall be Stainless Steel. Butts on all out swinging doors shall be furnished with non-removable pins (NRP).
B. Interior butts shall be as listed.
C. Doors 5’ or less in height shall have two (2) butts. Furnish one (1) additional butt for each 2’6” in height or fraction thereof. Dutch door shall have two (2) butts per leaf.

2.4 CYLINDERS AND KEYING:

A. All permanent cylinders, keys and keying shall be supplied by the Contractor. Grand Master keyed into the existing Corbin/Russwin system.
B. Provide six (6) temporary control keys and fifteen (15) construction master keys.
C. Hardware supplier to provide temporary cylinders or cores during the construction phase. The contractor is to change out the temporary cylinders with permanent cylinders. Contractor is to return temporary cores to hardware supplier.

2.5 LOCKSETS:

A. Locksets shall be Mortise type with two piece, hinged, anti-friction, ¾ inch throw, stainless steel, latch bolt, 1 inch throw stainless steel deadbolt, non-handed auxiliary latch, unless specified otherwise, in “L” series, 06A design as manufactured by Schlage.
B. All locksets shall be tested to ANSI/BHMA A156.13 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 6,000,000 cycles must be provided.
C. All locksets are to have the ability to change the handing in the field without taking the lockset apart.
    1. Acceptable substitutions:
        A. Corbin/Russwin – ML2200 NSA.

2.6 EXIT DEVICES:

A. All devices shall be Von Duprin 98 series in types and functions specified. All devices must be listed under “Panic Hardware” in accident equipment list of Underwriters Laboratories. All labeled doors with “Fire Exit Hardware” must have labels attached and be in strict accordance with Underwriters Laboratories. Where lockable lever trim is specified, use Von Duprin 994L Break Away trim.
B. All exit devices shall be tested to ANSI/BHMA A156.3 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 1,000,000 cycles must be provided.
C. All surface strikes shall be roller type and come complete with a plate underneath to prevent movement. And shall be provided with a dead-latching feature to prevent latchbolt tampering.
D. Gaps between the Touch Bar and the door will not be acceptable.
E. Where Removable Mullions are used, use the Keyed Removable Mullion, KR4954 or KR9954 as manufactured by Von Duprin.

1. Acceptable substitutions:
    A. Corbin/Russwin – must meet all of the requirements of the specification as stated above.

2.8 DOOR CLOSERS:

A. All closers shall be LCN 4041 series having non-ferrous covers, forged steel arms separate valves for adjusting backcheck, closing and latching cycles and adjustable spring to provide up to 50% increase in spring power. Provide and Advanced Variable Backcheck (AVB) at all exterior doors.
B. Closers shall be furnished with parallel arm mounted on all doors opening into corridors or other public spaces and shall be mounted to permit 180 degrees door swing wherever wall conditions permit. Furnish with non-hold open arms unless otherwise indicated. Provide a special template arm on closers where there is an additional overhead stop.
C. Door closer cylinders shall be of high strength cast iron construction to provide low wear operating capabilities of internal parts throughout the life of the installation. All door closers shall be tested to ANSI/BHMA A156.4 test requirements by a BHMA certified testing laboratory. A written certification showing successful completion of a minimum of 10,000,000 cycles must be provided.
D. Door closer spindles shall be of high strength heat treated steel with a minimum diameter of 11/16th of an inch by 3 ¼ inches in length with a minimum of 12 teeth.
E. Door closers shall utilize temperature stable fluid capable of withstanding temperature ranges of 120 degrees Fahrenheit to -30 degrees Fahrenheit, without requiring seasonal adjustment of closer speed to properly close the door. Closers for fire-rated doors shall be provided with temperature stabilizing fluid that complies with the standards UBC 7-2 (1997) and UL 10C.
F. Door closers shall incorporate tamper resistant non-critical screw valves of V-slot design to reduce possible clogging from particles within the closer. Closers shall have separate and independent screw valve adjustments for latch speed, general speed, and hydraulic backcheck. Backcheck shall be properly located so as to effectively slow the swing of the door at a minimum of 10 degrees in advance of the dead stop location to protect the door frame and hardware from damage. The use of Pressure Release Valves (PRV) are not acceptable.

1. Acceptable substitutions:
    A. Corbin/Russwin DC8000 A2 arms

2.9 TRIM AND PLATES:

A. Kick plates, mop plates, and armor plates, shall be .050 gauge with 32D finish. Kick plates to be 8” high, mop plates to be 4” high. All plates shall be two (2) inches less full width of door.
B. Push plates, pull plates, door pulls, and miscellaneous door trim shall be shown in the hardware schedule.

2.10 DOOR STOPS:

A. Doorstops shall be furnished for all doors to prevent damage to doors or hardware from striking adjacent walls or fixtures. Wall bumpers equal to Glynn Johnson 60W Series are preferred, but where not practical furnish floor stops equal to Glynn Johnson FB13 or 17 and FB19X series.
B. Where conditions prohibit the use of either wall or floor type stops, furnish surface mounted overhead stops equal to Glynn Johnson, 90 series exterior and 450 series interior.

2.11 THRESHOLDS AND WEATHERSTRIP:

A. Thresholds and weather-strip shall be as listed in the hardware schedule.

2.12 DOOR SILENCERS:

A. Furnish rubber door silencers equal to Glynn Johnson GJ64 for all new interior hollow metal frames, (2) per pair and (3) per single door frame.

PART 3 - EXECUTION

3.1 INSTALLATION:

A. All hardware shall be applied and installed in accordance with the Finish Hardware schedule. Care shall be exercised not to mar or damage adjacent work.
B. Contractor to provide a secure lock-up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items that are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses both before and after installation.
C. No hardware is to be installed until the hardware manufactures have provided a pre-installation class. This is to insure proper installation of the specified products.

3.2 ADJUSTING AND CLEANING:

A. Contractor shall adjust all hardware in strict compliance with manufacturer's instructions. Prior to turning project to owner, contractor shall clean and make any final adjustments to the finish hardware.

3.3 PROTECTION:

A. Contractor shall protect the hardware, as it is stored on construction site in a covered and dry place.
B. Contractor shall protect exposed hardware installed on doors during the construction phase.

3.4 KEY CABINET:

A. Set up and index one (1) Key Cabinet that allows room for expansion for 150% of the number of keys for the project.

3.5 HARDWARE SCHEDULE:

Hardware Group No. 01
For use on mark/door #(s):

301A

Provide each PR door(s) with the following:

Qty	Description		Catalog Number	Finish	Mfr
6	EA	HW HINGE	3CB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	POWER TRANSFER	EPT10 CON	689	VON
1	EA	REMOVEABLE MULLION	KR9954 x STAB	626	VON
1	EA	ELEC PANIC HARDWARE	QEL-98-NL-CON	626	VON
1	EA	PANIC HARDWARE	98-DT	626	VON
1	EA	MORTISE CYLNIDER	1000	626	C-R
1	EA	RIM CYLNIDER	3000	626	C-R
1	EA	SURF. AUTO OPERATOR	9542 LONG2 MS	ANCLR	LCN
1	EA	KEYSWITCH	8310-806K	BLK	LCN

2	EA	ACTUATOR, WALL MOUNT	8310-856	630	LCN
1	EA	THRESHOLD	65A-MSLA-10	A	ZER
1	EA	WIRE HARNESS	CON-12P		VON
1	EA	WIRE HARNESS	CON-6P		VON
1	EA	PUSHBUTTON	621AL	629	SCE
1	EA	POWER SUPPLY	PS904 900-4RL	LGR	VON

Balance of Door Hardware to be supplied by Aluminum Door Supplier 084100
verify door function before installation - wiring diagram by hardware supplier
ACTIVE LEAF ONLY – ADA operator

Hardware Group No. 02
For use on mark/door #(s):

101A

Provide each SGL door(s) with the following:

Qty	Description		Catalog Number	Finish	Mfr
3	EA	HINGE	3CB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM	CL3357 NZD	626	C-R
1	EA	ELECTRIC STRIKE	6211 FSE	630	VON
1	EA	SURFACE CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS	630	IVE
1	EA	PUSHBUTTON	621AL	629	SCE
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

Push button to release electric strike

Hardware Group No. 03
For use on mark/door #(s):

301B

Provide each SGL door(s) with the following:

Qty	Description		Catalog Number	Finish	Mfr
3	EA	HINGE	3PB1 4.5 X 4.5	652	IVE
1	EA	CLASSROOM	CL3355 NZD	626	C-R
1	EA	WALL STOP	WS406/407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

PART 1 GENERAL

1.1 DEFINITION

1. Glass types shall be limited to the following:

   a. Float glass (clear, tinted and coated).
   b. Heat-treated glass.
   c. Laminated (hurricane-resistant) glass.
   d. Fire-rated glazing.

1.2 APPLICATION

1. Intended Use: Glass for windows, doors, side and borrowed lites.
2. Limitations: This Section does not cover curtain-wall, spandrel, polycarbonate or other specialty type glazing.

3.1 REFERENCES

1. AAMA (American Architectural Manufacturer's Association) A 804.1

2. ANSI (American National Standard Institute) Z97.1-Glazing Materials Used in buildings-Safety Performance Specifications and Methods of Test.

3. ASTM (American Society for Testing and Materials):
   a. C 509-Elastomeric Cellular Preformed Gasket and Sealing Material.
   b. C 864-Dense, Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.
   c. C 920-Elastomeric Joint Sealants.
   d. C 1036-Flat Glass.
   e. C 1048-Heat-Treated Flat Glass.
   f. E 199-fire Tests of Building Construction and Materials.
   g. E 2010-Positive Pressure Fire Test of Window Assemblies.
   h. E 2074-Fire Test for Door Assemblies, Including Positive Pressure Testing of Side-Hinged and Pivoted Swinging Doors Assemblies.

4. CPSC (Consumer Product Safety Commission) 16 CFR (Code of Federal Regulation).

5. Florida Building Code (FBC).

6. GANA (Glass Association of North America):
   a. GANA-Glazing Manual.
   b. FGMA (Flat Glass Marketing Association) Sealant Manual.

7. International Organization for Standardization (ISO) 14021–1999; Environmental Labels and Declarations

8. National Fenestration Rating Council (NFRC)

9. NFPA (National Fire Protection Association): NFPA 80-Fire Doors and Windows.

10. Underwriters Laboratories, Inc. (UL): UL 263-fire Tests of Building Construction and Materials.

1.4 QUALITY ASSURANCE

1. Source Limitations
   a. Obtain glazing from one primary-glass manufacturer for each glass type specified. Manufacturers of the individual types may be different; however, glass from within each type shall be from the same manufacturer.
   b. Obtain glazing accessories from one source for each product and installation method specified.
   c. Design Requirements: Design exterior glazing systems to conform to the Florida Building Code and meet the design pressures shown on Contract Documents and meet the Impact Standards, in compliance with Florida Building Code (FBC) product approval and required product Notice of Acceptance (NOA).
   d. Glazing Standards: Comply with recommendation of Flat Glass Marketing Association (FGMA) "Glazing Manual" and "Sealant Manual" except where more stringent requirements are indicated. Refer to those publications for definitions of glass and glazing terms not otherwise defined in this section or other referenced standards.
   e. Safety Glazing Standards: Where safety glass is indicated or required by authorities having jurisdiction, provide type of products indicated which comply with ANSI Z97.1 and testing requirements of CPSC 16 CFR Part 1201 for category II materials.
      1) Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
   f. All work shall be performed in accordance with referenced standards.

1.5 SUBMITTALS

1. Product Data: Submit manufacturer's technical data for each glazing material and fabrication glass product required, maximum allowable design pressure, Impact Standard Certification, including installation and maintenance instructions and the following:
   a. Energy Efficiency:
      1) Submit product data indicating glass and glazing Solar Heat Gain Coefficient (SHGC) and Visible Light Transmittance (VT) in accordance with the National Fenestration Rating Council (NFRC) methodology.

2. Samples: Submit, for verification purposes, 12 inch square samples of each type of glass indicated except for clear single pane units, and 12 inch long samples of each color required, for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative of adjoining framing system in color.

3. Certificates: Submit certificates from respective manufacturers attesting that glass and glazing materials furnished for project comply with requirements.
   a. Separate certification will not be required for glazing materials bearing manufacturer's permanent labels designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authorities having jurisdiction.

4. Compatibility and Adhesion Test Report: Submit statement from sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants and interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.

5. Complete current Florida Building Code (FBC) product approval and required product Notice of Acceptance (NOA).

1.5 WARRANTY

1. Project Warranty shall be as stated in Division 01 of the Specifications.
2. Manufacturer's Warranty Special Warranty on coated glass products shall be (10) ten years.
3. Duration of all warranties shall begin on the date of Substantial Completion.

3.1 DELIVERY, STORAGE AND HANDLING

1. Protect glass and glazing materials during delivery, storage and handling to comply with manufacturer's directions and as required to prevent edge damage to glass, and damage to glass and glazing materials from effects of moisture including condensation, of temperature changes, of direct exposure to sun, and from other causes.

2. Deliver materials in manufacturer's or distributor's packaging, undamaged, complete with installation instructions.

3. Do not expose glazing to temperatures greater than 120 degrees F. or less than 40 degrees F. during storage or transportation.

4. Store off the ground, under cover, protected from weather and construction activities.

5. Do not expose the non-PVB side of glass to UV light.

6. Store sheets of glass vertically. DO NOT LEAN.

3.1 PROJECT CONDITIONS

1. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing material manufacturer or when joint substrates are wet due to rain, condensation or other causes.

PART 2 PRODUCTS

2.1 MANUFACTURERS

1. Subject to compliance with requirements, provide products of one of the following:
   a. Manufacturers of Monolithic Glass:
      1) Cardinal Glass Industries
      2) Guardian Industries Corp.
      3) PPG Industries, Inc.
      4) Versalux Glass.

2.2 FIRE-RATED GLAZING

1. Manufacturers
   a. Glaverbel S.A., distributed by AGC InterEdge Technologies
   b. Oldcastle Glass
   c. Pilkington Building Products North America
   d. SAFTI *FIRST*
   e. Schott North America Inc.
   f. Nippon Electric Gass Co., LTD.
   g. Vetrotech Saint-Gobain North America Inc.

2. Fire-Protection Rating: As required for the assembly in which glazing material is installed.
   a. Glazing for Fire-Rated Door and Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA.
3. Impact Safety Rating: As required for the assembly in which glazing material is installed.
   a. Glazing products shall be permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.

4. Temperature-Rise Rating: As required for the assembly in which glazing material is installed.
5. Glazing Sealants for Fire-Resistive Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.
6. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.3 GLASS PRODUCTS-GENERAL

1. Primary Glass Standard: Glazing is to be 1/4” single-pane (non-insulated).
   a. G lazing for use in exterior openings shall have a U-Factor (rate of heat transfer) of less than 0.60 and SHG (solar heat gain coefficient) of less than 0.27.
   b. Provide primary glass, which complies with ASTM C 1036 requirements, including those indicated by reference to type, class, quality, and, if applicable, form, finish, mesh and pattern.

2. Laminated Glass Performance Criteria:
   a. Maximum Solar Heat Gain Coefficient: 0.27.
   b. Minimum Visible Light Transmittance: 40%.
3. Heat-Treated Glass Standard: Provide heat-treated glass which complies with ASTM C 1048 requirements, including those indicated by reference to kind, condition, type, quality, class, and, if applicable form and finish.
4. Sizes: Fabricate glass to sizes required for glazing openings indicated with edge clearances and tolerances complying with recommendations of glass manufacturer. Provide thickness indicated or, if not otherwise indicated, as recommended by glass manufacturer for application indicated.

2.4 ELASTOMERIC GLAZING SEALANTS AND PREFORMED GLAZING TAPES

1. General: Provide products of type indicated and complying with the following requirements:

2. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials with which they will come into contact, including glass products and glazing channel substrates, under conditions of installation and service as demonstrated by testing and field experience.

3. Suitability: Comply with recommendations of sealant and glass manufacturers for selection of glazing sealants and tapes, which have performance characteristics suitable for applications indicated and conditions at time of installation.

4. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealant of base polymer indicated which complies with ASTM C 920 requirements, including those for Type, Grade, Class and Uses.

5. Colors: Provide color of exposed sealants indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

6. One-Part Acid-Curing Silicone Glazing Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and as applicable to uses indicated O.

7. Performed Butyl-Polyisobutylene Glazing Tape: Provide manufacturer's standard solvent-free Butyl-Polysobutylene formulation with a solids content of 100 percent complying with AAMA A 804.1; in extruded tape form; non-standing and non-migrating in contact with nonporous surfaces; packaged on rolls with a release paper on one side; with or without continuous spacer rod as recommended by manufacturers of tape and glass for application indicated. Install each side of glass.

8. Products: Subject to compliance with requirements, provide one of the following:
   a. One-Part Acid-Curing Silicone Glazing Sealant.
      1) "Tremsil 600", Tremco, Inc.
      2) "Chem-Calk 200", Bostik Construction Products Div.
      3) "Dow Corning 999", Dow Corning Corp.
      4) "SCS 1200", General Electric Corp.
      5) "863", Pecora Corp.
   b. Performed Butyl-Polysiobutylene Glazing Tape Without Spacer Rod:
      1) "Chem-Tape QO", Bostik Construction Products Div.
      2) "Shim-Seal", Pecora Corp.
      3) "Tremco-440 Tape", Tremco, Inc.
   c. Performed Butyl-Polysiobutylene Glazing Tape With Spacer Rod:
      1) "Chem-Tape 60", Bostik Construction Products Div.
      2) "Shim-Seal", Pecora Corp.
      3) "Pre-Shimmed Tremco 440 Tape", Tremco Inc.,

2.5 GLAZING GASKETS

1. Dense Elastomeric Compression Seal Gaskets: Molded or extruded gaskets of neoprene, EPDM, or thermoplastic polyolefin rubber, complying with ASTM C 864, of profile and hardness required to maintain watertight seal. Install each side of glass.

2. Cellular Elastomeric Preformed Gaskets: Extruded or molded closed cell, intergral-skinned neoprene of profile and hardness required to maintain watertight seal; complying with ASTM C 509, Type II; black. Install each side of glass.

3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work include, but are not limited to, the following:

a. Manufacturers of Preformed Gaskets:
   1) D.S. Brown Co.
   2) Maloney Precision Products Co.
   3) Tremco.

2.6 MISCELLANEOUS GLAZING MATERIALS

1. Compatibility: Provide Materials with proven record of compatibility with surfaces contacted in installation.

2. Cleaner, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

3. Setting Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealants, 80 to 90 Shore A durometer hardness. Located at ¼ points of glass panels.

4. Spacers: Neoprene, EPDM or silicone blocks, or continuous extrusions, as required for compatibility with glazing sealant, of size, shape and hardness recommended by glass and sealant manufacturers for application indicated.

5. Edge Blocks: Neoprene, EPDM or silicone blocks as required for compatibility with glazing sealant, of size and hardness required to limit lateral movement (side-walking) of glass.

6. Compressible Filler Rods: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, flexible and resilient, with 5-10 psi compression strength of 25 percent deflection.

PART 3 EXECUTION

3.1 EXAMINATION

1. Require glazier to inspect work of glass framing erector for compliance with manufacturing and installation tolerances, including those for size, squareness, offsets at corners; for presence and functioning of weep system; for existence of minimum required face of edge clearances; and for effective sealing of joinery. Obtain Glazier's written report, listing conditions detrimental to performance of glazing work. Do not allow glazing work to proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

1. Pre-Installation Meeting: At Contractor's direction, Glazier, sealant and gasket manufacturer's technical representatives, glass framing erector and other trades whose work affects glass and glazing shall meet at project site to review procedures and time schedule proposed for glazing and coordination with other work.

2. Clean glazing channels and other framing members to receive glass, immediately before glazing. Remove coatings, which are not firmly bonded to substrates. Remove lacquer from metal surfaces where elastomeric sealants are indicated for use.

3. Finish paint all substrates prior to glazing installations.

3.3 GLAZING-GENERAL

1. Comply with combined printed recommendations of glass manufacturers, of manufacturers of sealants, gaskets and other glazing materials, except where more stringent requirements are indicated, including those of referenced glazing standards.

2. Glazing channel dimensions as indicated in details are intended to provide for necessary bite on glass, minimum edge and face clearances and adequate sealant thicknesses, with reasonable tolerances. Adjusts as required by job conditions at time of installation.

3. Protect glass from edge damage during handling and installation; use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raised or drift glass with a pry bar. Rotate glass with flares or bevels along one horizontal edge, which would occur in vicinity of setting blocks so that these are located at top of opening. Remove from project and dispose of glass units with edge damage or other imperfections of a kind that when installed, weakens glass and impairs performance and appearance.

4. Apply primers to joint surfaces where required for adhesion of sealants, as determined by pre-construction sealant-substrate testing.

3.4 GLAZING

1. Install setting blocks of proper size in sill rabbet, located one quarter of glass width from each corner, but with edge nearest corner not closer than 6 inches from corner, unless otherwise required. Set blocks in thin course of sealant, which is acceptable for heel bead use.

2. Provide spacer inside and out, of correct size and spacing to preserve required face clearances, for glass sizes larger than 50 united inches (length plus height), except where gaskets or glazing tapes with continuous spacer rods are used for glazing. Provide 1/8 inch minimum bite of spacers on glass and use thickness equal to sealant width, except with sealant tape use thickness slightly less than final compressed thickness of tape.

3. Provide edge blocking to comply with requirements of referenced glazing standard, except where otherwise required by glass unit manufacturer.

4. Set units of glass in each series with uniformity of pattern, draw, bow and similar characteristics.

5. Provide compressible filler rods or equivalent back-up material, as recommended by sealant and glass manufacturers, to prevent sealant from extruding into glass channel weep systems and form adhering to joints back surface as well as to control depth of sealant for optimum performance, unless otherwise indicated.

6. Force sealants into glazing channels to eliminate voids and to ensure complete “wetting” or bond of sealant to glass and channel surfaces.

7. Tool exposed surfaces of sealants to provide a substantial “wash” away from glass. Install pressurized tapes and gaskets to protrude slightly out of channel, so as to eliminate dirt and moisture pockets.

8. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage to ensure that gasket will not “walk” out when installation is subject to movement.

9. Miter cut wedge-shaped gaskets at corners and install gaskets in manner recommended by gasket manufacturer to prevent pull away at corners; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.5 PROTECTION AND CLEANING

1. Protect exterior glass from breakage immediately upon installation by use of crossed steamers attached to framing and held away from glass. Do not apply markers to surfaces of glass. Remove nonpermanent labels and clean surfaces.

2. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove immediately by method recommended by glass manufacturer.

3. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits and staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

4. Remove and replace glass which is broken, chipped, cracked, abraded or damaged in other ways during construction period, including natural causes, accidents and vandalism.

5. Wash glass on both faces not more than 4 days prior to date scheduled for inspections intended to establish date of substantial completion in each area of project. Wash glass by method recommended by glass manufacture.

END of 08 80 00

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

GENERAL

1.1 SECTION INCLUDES

A. Gypsum wallboard.

B. Metal stud wall framing.

C. Metal channel ceiling framing.

D. Joint treatment and accessories.

E. Drywall Accessories.

1.2 RELATED SECTIONS

A. Section 061000-Rough Carpentry.

B. Section 072100-Thermal Insulation.

C. Section 079200-Joint Sealants.

D. Section 081100-Steel Frames.

E. Section 099000-Painting.

1.3 REFERENCES

A. ANSI (American National Standards Institute).
1. A118.9-Test Methods and Specifications for Cementitious Backer Unit (CBU).
2. 108.11Interior Installation of Cementitious Backer Unit (CBU).

B. ASTM (American Society for Testing and Materials):
1. A641/A641M-Zinc-Coated (Galvanized) Carbon Steel Wire.
2. C442-Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board.
3. C475-Joint Compound and Joint Tape for Finishing Gypsum Board.
4. C645-Nonstructural Steel Framing Members.
5. C840-Nonstructural Steel Framing Members.
6. C931-Exterior Gypsum Soffit Board.
7. C954-Steel Drill Screws for Application of Gypsum Board or Metal Plaster Bases to Steel Studs.
8. C1002-Steel Drill Screws for Application of Gypsum Board.
9. C1047-Accessories for Gypsum Wallboard and Gypsum Veneer Base.
10. C1147-Determining the Short Term Tensile Weld Strength of Chemical-Resistant Thermoplastics.
11. C1178-Glass Mat Water-Resistant Gypsum Backing Panel.
12. C1278-Fiber-Reinforced Gypsum Panel.
13. C1325-Non-Asbestos Fiber-Mat Reinforced Cement Interior Substrate Sheets.
14. C1396-Gypsum Wallboard.
15. C1629- Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

16. E119-Fire Tests of Building Construction and Materials.

C. GREENGUARD Product Emission Standard for Children & Schools.

D. Gypsum Association (GA):
1. GA-214-Recommended Levels of Gypsum Board Finish.
2. GA-216-Recommended Specification for the Application and Finishing of Gypsum Board.
3. GA-600-Fire Resistance Design Manual (for fire protection and sound control).

E. Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services.

F. Steel Stud Manufacturer's Association (SSMA)

G. Underwriters Laboratory (UL)-Fire Resistance Directory.

1.4 SUBMITTALS

A. Submit manufacturer's product data for each type of product specified.

1.5 QUALITY ASSURANCE

A. Fire Resistance Rating: Where indicated, provide materials and construction which are identical to those of assemblies whose fire resistance rating has been determined per ASTM E 119 by a testing and inspecting organization acceptable to authorities having jurisdiction.
1. By reference to Gypsum Association-Fire Resistance Design Manual GA-600 or to design designations in U.L.-Fire Resistance Directory as testing agencies acceptable to jurisdictional authorities.

B. Single Source Responsibility: Obtain each type of gypsum-board and related joint treatment materials from a single manufacturer.

C. Finish Work shall be subject to inspection using a lighting level of not less than 50 foot candles at the surface of the gypsum board. Surfaces judged to be unsuitable for finishing, even if finish has been applied, will be rejected.

D. The A/E will direct repair or replacement of rejected work.

1.6 PROJECT CONDITIONS

A. Environmental Requirements: Proceed with installation of gypsum board materials only after building is weathertight. Any weather/water-damaged drywall will be replaced, (full height of wall panel), at the Contractors expense to the sole satisfaction of the Owner. No weather damaged wallboard will be accepted.

B. Maintain temperature in areas receiving gypsum board materials between 55 Degrees Fahrenheit and 90 Degrees Fahrenheit during and after installation and provide adequate ventilation.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Gypsum Board: Subject to compliance with specified requirements, provide products and materials by one of the following manufacturers.
1. Georgia Pacific.
2. National Gypsum Company.
3. U.S. Gypsum Co.

2.2 MATERIALS

A. Toxicity/IEQ: All gypsum board products, joint compound, adhesive, and texture coating materials are to comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

B. Fire-rated Gypsum Board: 5/8 inch thick, Type “C” or Type “X”, ASTM C1396, tapered edge, 5/8 inch thick x 48 inches wide x longest stock length to fit available dimensions.
1. Type “X” board shall carry the U.L. classification mark for 15, 15, 0 surface burning characteristics.

C. Moisture/Mold Resistant Wallboard (formerly Moisture Resistant M.R. Gypsum Board): Type “X”, 5/8 thick
1. National Gypsum “XP Wallboard”.
2. Georgia-Pacific “DensArmor Plus”.
3. USG “Mold Tough”.

D. Impact Gypsum Panels, comply with ASTM C1629:
1. Georgia-Pacific ”Dens Armor Plus”.
2. National Gypsum “Hi-Impact XP”, ASTM C1396, gypsum core wall panel with additives to enhance fire resistance, fiber mesh surface indentation resistance and impact resistance of core and surfaced with abrasion, moisture/mold/mildew resistant paper on front, back and long edges.
3. USG “Fiberock VHI”, ASTM C1278, high-density paperless gypsum and cellulose wall panels.
4. Type: Type “X”.
5. Thickness: 5/8 inch.

E. Abuse Gypsum Panels:
1. Georgia-Pacific “Dens-Armor Plus Abuse Guard”, ASTM C1396, fire-resistant, noncombustible dense gypsum core with abuse resistant coated glass mat facings.
2. National Gypsum “Hi-Abuse XP”, ASTM C1396, gypsum core wall panel with additives to enhance fire resistance, surface indentation resistance and impact resistance of core and surfaced with abrasion, moisture/mold/mildew resistant paper on front, back and long edges.
3. USG “Mold Tough AR”, ASTM C1396, moisture and mold resistant core with moisture and mold resistant recycled face and back paper.
4. Type: Type “X”.
5. Thickness: 5/8 inch.

F. Drywall Framing Members: Studs, furring channels, floor and ceiling tracks, connecting accessories and clips as required for a complete framing system. Comply with SSMA and ASTM C 465, galvanized steel, of size and properties necessary to comply with ASTM C754. Members designed

for screw-on application of board, fabricated by 1 manufacturer, and meeting or exceeding the following requirements:

1. Stud: 20 gage/30 mils roll formed, channels in required widths, having not less than 1-1/4 inch wide flanges, pierced webs and section properties equal to or exceeding Clark Steel Framing.
   (a) If stud height exceeds manufacturer's recommendations for indicated size, spacing or surface material, provide heavier gage studs in conformance with the manufacturer's published recommendations.
   (b) Provide 20 gage/30 mils studs at partitions receiving abuse and impact resistant gypsum board, cementitious board, and walls receiving a tile finish. Provide double studs, 20 gage/30 mils each, at each side of door openings, and at each side of partition openings exceeding 32 inches in width. Screw fasten studs together with 6 inch long pieces of channel runners at 1/4 points of floor to ceiling height. Four screws minimum.
   (c) All studs shall be placed at 16 inches o.c., max.
   (d) Runner Track for Metal Studs: U-shaped 25 gage/18 mils minimum, sized to receive the studs, in not less than 10 foot lengths. Ensure track gage match stud gage.
2. Substitutions:
   (a) Will be considered by the A/E and Owner when submitted per requirements of Division-0 and Division-1 Product Substitution Procedures.
3. Z-Furring Channels: 25 gage/18 mils galvanized "Z" channels in 8'-6" foot lengths, 1 inch, 1-1/2 inch furring depth.
4. Metal Furring Channels: 25 gage/18 mils, hat-shaped channels in 12 foot lengths, 7/8 inch depth.
5. Resilient Channels: 12 foot lengths, 2-1/2 inches width, 1/2 inches depth.
6. 1-5/8 inch studs: 20 gage/30 mils.

G. Fasteners:
1. For gypsum panels to steel framing:
   (a) One inch long type S screw for 1/2 inches and 5/8 inches thick single layer panels to steel studs, power channels.
   (b) 1-5/8 inch type S screws for 1/2 inches and 5/8 inches thick double layer panels to steel studs, runners, channels.
2. For gypsum panels to steel framing (20 gage/30 mils and heavier):
   (a) One inch long type S-12 screw for 1/2 inch and 5/8 inches thick single layer panels to steel studs, runners up to 14 gage.
   (b) 1-5/8 inch type S screws and longer for multi layer gypsum board applications.
3. For steel studs to runners and door frames:
   (a) 7/16 type S pan head screws for steel studs to runners, furring, resilient channels.
   (b) 7/16 inch type S-12 pan head for steel studs to door frame jamb anchor clips; steel studs to runners; other metal to metal attachment up to 14 gage/68 mils.
4. For steel floor runner tracks to concrete:
   (a) Powder actuated ("shot") fasteners, minimum 1 inch length, 24 inches o.c.

H. Adhesive: Embedding type joint compound or laminating adhesive as recommended by gypsum board manufacturer.
1. All adhesive materials are to comply with Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, including 2004 Addenda. California Department of Health Services or GREENGUARD Product Emission Standard for Children & Schools.

I. Joint Treatment Material:
1. Ensure materials comply with ASTM C475, ASTM C840 and recommendations of manufacturer.
2. Joint Tape: Paper reinforcing tape; use pressure sensitive with compatible joint compound.

3. Setting-type joint compound, factory pre-packaged, job-mixed, chemical-hardening powder products formulated for uses indicated:
   (a) Where setting type joint compounds are indicated for use as taping compounds, use formulation which develops greatest bond strength and crack resistance and is compatible with other joint compounds applied over it.
   (b) For pre-filling gypsum board joints, use formulation recommended by gypsum board manufacturer for this purpose.
   (c) For filling joints and treating fasteners of water-resistant gypsum backing board behind for ceramic tile, use formulation recommended by manufacturer.
4. Drying-type Joint: Factory-prepackaged vinyl based products complying with the following requirements for formulation and intended use:
   (a) Ready-Mix Formulation: Factory per-mix product.
   (b) Topping compound formulated for finish (or third) coats.

J. Gypsum Board Ceiling Components (minimum):
1. Carrying Channels: 1-1/2 inch web, cold rolled steel, having rust-inhibitive coating; or drywall suspension system main tee.
2. Furring Channels: 3/4 inch web, cold rolled steel, rust-inhibitive coating; or drywall suspension system cross tee.
3. Wire: ASTM A641/A641M Class I galvanized steel, soft temper. Minimum 8-gage hanger wire and minimum 18-gage tie wire.

OR

4. Grid Suspension System for Ceilings: Comply with ASTM C645, direct-hung system composed of main beams and cross-furring members that interlock.

K. Drywall Accessories; comply with ASTM C1047, provide the following items fabricated completely of heavy gage galvanized sheet steel and distributed by the gypsum board manufacturer.
1. Corner Bead: Gypsum Association Type CB 114 x 114 having 1-1/4 inch or wider flanges.
2. Casing: Gypsum Association Type LC in size necessary to receive board and designed for finishing with Joint Treatment.
3. Casing with vinyl gasket having 1/4 inch vinyl foam tape.
4. Reveal Casing: Extruded aluminum accessory. Designed to form a 3/4 inch wide reveal. 1/2 inch or 5/8 inch size as required by gypsum board thickness.
   (a) Fry Reglet Corporation-Type “F” FDM-50-75 or 625-75 Type “W” WDM-625-75 as required by conditions, or equivalent.
   (b) Substitutions:
      (1) Will be considered by the A/E and Owner when submitted per requirements of Division-0, Division-1, and Section 01630-Product Substitution Procedures.
5. Control Joint: “V” shaped with 7/8 inch flanges.

L. Glass Fiber Tape: Federal Specification HH-C-00466 having 20 x 10 thread count.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS:

A. Standards: Unless modified or exceeded by the requirements of this Specification, conform to framing system manufacturer’s recommendations and then to the following specifications of the Gypsum Association:
1. For Framing: “Installation of Screw-Type Steel Framing Members to Receive Gypsum Board”.

B. For gypsum board application and finishing: Must comply with GA-214-Recommended Levels of Gypsum Board Finish and GA-216-Recommended Specification for the Application and Finishing of Gypsum Board.

C. Coordination with other Trades:
1. Reinforcing: Reinforce partitions as necessary to accommodate work of other trades that will be attached to bear on drywall construction. Reinforcing shall conform to drywall component manufacturer's recommendations. Provide back-up members to reinforce framing and provide support at surface mounted items. Verify requirements in Sections where surface mounted work is specified. In the absence of specific requirements, provide minimum 2 inch x 4 inch wood ground/nailer in sufficient width to accommodate the required fastenings. Fasten the ground/nailer rigidly to the drywall framing with 2 screws each side to each stud and close against the drywall facing.
2. Building in other Work: Cut, frame and fit this work around recessed, built into or penetrating work such as fixtures, outlet boxes, fittings, pipes, conduit, etc., and supports.
3. Finishes: Leave surfaces of this work in acceptable condition to receive applied finishes as scheduled. Review applicable Specification Sections and coordinate with appropriate other trades to determine requirements. Unless specifically scheduled or specified, no texture coat will be used on painted surfaces, therefore the quality of drywall workmanship must be acceptable for application of smooth finishes of the required sheen without evidence of joints, unevenness and surface defects.
4. Mechanical and Electrical: Cooperate with these trades for location requirements for other work to be installed or located on surfaces provided under this Section. Fit gypsum wall board work close around penetrating work.

D. Temperature: Maintain continuous controlled interior temperature of at least 55 Degrees Fahrenheit 24 hours before and during application of this work and until building is occupied. Provide adequate ventilation to eliminate excessive moisture.

E. Workmanship: Test vertical framing with a straight edge both ways to establish that planes are true, plumb and level. If so directed, check the plane of ceiling suspension with a water level and unacceptable areas adjusted until they are satisfactory. Do not cover framing or suspension until it is approved.

3.2 FRAMING FOR FURRED CEILINGS, SOFFITS

A. Provide Runner Channels to support furred ceilings and soffits. Unless otherwise required by time-design of referenced authority for fire-rated assemblies, space runners at 16 inches on center and within 6 inches of abutting vertical surfaces or other interruption of runners. Tie runners to bar joists or beams with wire.

3.3 PARTITION FRAMING

A. General: Where drywall studs are required, provide system of type, width and spacing necessary to form partition of required construction and thickness.
1. Special Requirement: Where 1 side of a partition is drywall, provide metal framing required for the partition regardless of the material required on the opposite side.

B. Tracks: Accurately align tracks under provisions of partition layout. Fasten tracks at 24 inches on center but not less than 2 fasteners per section. Conform to details for sound seal where partitions abut each other and dissimilar surfaces. Tracks shall be continuous. Stop/start type of installation at floor piping penetrations shall not be allowed. Punch tracks around floor pipes.

C. Studs
1. Screw studs to tracks through both flanges at jambs of openings, partition intersections and corners.
2. Provide an additional stud within 2 inches of end stud where partition abuts a dissimilar surface.
3. At control joints provide double studs spaced 1/2 inch between and fasten board on each side of joint to a separate support.
4. Provide horizontal members behind for work of other trades.
5. Place the studs web-to-web.
6. Locate the short stud over the head member of the opening.
7. Where control joint is required above opening and aligned with jamb, space studs with 1/2 inch between them.
8. Provide a track across head of opening to receive the short studs.
9. Fasten 20 gage jamb stud to each opening frame anchor with 2 fasteners.
10. In addition provide a full length 20 gage stud with 2 inches of each jamb stud.
11. Construct framing above opening as directed by gypsum board manufacturer.
12. Studs shall extend full height from floor to underside of floor or roof.
13. Studs shall be one-piece; no splices shall be accepted.

D. Ground/Nailer: Where top track is located more than 1 foot above the finish ceiling line, provide ground/nailer in the space between studs at the ceiling line for solid backing for gypsum board facing. Use length of track cut and coped tight between stud webs. Fasten track to each stud each side. Provide similar ground/nailer behind horizontal joints in the first layer of gypsum board applied to the studs vertically.

E. Bracing: Where partitions are not braced from both sides by abutting or continuous completed ceiling systems, brace partition framing as necessary to align and hold it for application of the finish, and provide rigidity. Completed ceilings that do not provide bracing for partitions include direct suspension acoustic systems, and any other system that is discontinuous, ceiling-to-ceiling across the partition or discontinuous from ceiling to wall at the partition. Conform to the following minimum requirements:
1. Partition that extends above ceiling: When partition is not tied to framing for abutting ceilings, provide bracing.
2. Partition between ceilings of 2 different heights: When the distance to the lower abutting ceiling measured from the top of the partition is more than 1/3 the maximum partition height, provide bracing.
3. Method: For braces use lengths of studs, single or boxed as required by their length. Locate the diagonal braces 4 feet on center. For partitions short of structure high, fasten braces to the top track. For structure high partitions, fasten braces to a rack fastened across the face of the studs over the facing material and close above abutting ceiling. Extend braces diagonally and fasten them to the structure above. Unless continuous obstructions interfere, ensure braces for partitions having ceilings on both sides extend alternately from opposite sides of the partition. Other methods of bracing may be submitted for approval prior to use.

3.4 VERTICAL FURRING

A. General: Vertical furring shall consist of galvanized “Hat-shaped” metal furring channels, 7/8 inch deep at locations shown on the drawings and details. Furring shall be installed at 16 inches on centers unless noted otherwise.

3.5 GYPSUM BOARD APPLICATION

A. Installation: Use wall boards of maximum practical length to reduce end joints. Ensure edges and ends of boards are in contact but not forced into placed. Stagger end joints, ensure joints on opposite sides of a partition do not occur on the same stud, unless fire test states otherwise.

B. Erect single-layer standard and fire rated gypsum boards in parallel application with vertical edges located over framing members.

C. Double Layer Application: Use gypsum backing board for first layer, placed parallel to framing or furring members. Place second layer perpendicular to first layer. Ensure that joints of first layer do not occur over joints of first.

D. Screws: Spaced not less than 3/8 inch from ends and edges of wallboard. Spaced not over 12 inches apart on sidewalls. Ensure wallboard is held in from contact with the member while the screws are being driven. Recess the heads slightly below the surface of the wallboard with the final drive. Care must be taken not to break the paper face.

E. Gypsum panel products applied to walls shall be applied with bottom edge spaced above the floor and seal for fire protection and sound control. Refer to GA-216, applicable fire protection requirements and sound control requirements for amount of space above the floor

3.6 DRYWALL ACCESSORIES

A. Corner Beads: Required at external corners of face board, continuous in 1 piece from floor to ceiling.

B. Casings: Required at visible edges of boards and where face board abuts a dissimilar material. Use casing in long lengths with tight butt joints and mitered corners.

C. Control Joints: Unless noted otherwise on the drawings, provide control joints where a wall or partition runs in an uninterrupted straight plane exceeding 30 feet, provide at 30 feet on center maximum spacing.

D. Edge Trim: Shapes as required under provisions of ASTM C1047.

E. Material: Formed metal complying with sheet steel zinc-coated by hot-dipped process.

3.7 GYPSUM BOARD FINISHING

A. Standards: Finish visible drywall work smooth. Flush and even to a level consistent with Level 4 work as described by Gypsum Associations “GA-214” Recommended Levels of Gypsum Board Finish”. Any work not conforming to this standard shall be made acceptable as directed by Project Consultant at no additional cost to the owner.

B. General:
1. Pre-fill open joints with setting-type joint compound. Allow joint compound to completely harden.
2. Treat joints and fastener heads at all board surfaces. Where board is required to extend above finish ceiling, or is concealed by permanent construction (or equipment), treat joints and fastener heads using full number of joint compound coats, final sanding may be omitted.

C. Embedded Tape: Apply a uniformly thin 4 inch wide layer of joint compound over each joint. Center joint tape over the joint and embed it into the compound leaving sufficient material under the tape to provide a proper bond. While embedding, apply a thin coat of joint compound over the tape. At inside corners reinforce inside corner angles with the tape folded to conform to the angle and embed into compound. Allow to dry completely.

D. Full Coat Application (Floating): Cover the tape with a coat of joint compound extending approximately 3 inches on each side of the tape and feathered out at the edges. Allow to dry completely. Apply a second coat of all-purpose compound fill coat 10 inches wide over taped joints,

bead and trim feather edge of second coat approximately 2 inches beyond edge of first coat. Spot fasteners with second coat allow to dry completely.

E. Finish Coat Application: After second coat is dry smooth tool marks and other protrusions with a finishing knife. Apply a thin finish (third) coat of ready-mixed topping or all-purpose compound over joints, fasteners, beads and trim. Feather edges of third coat at least 2 inches wider than second coat.

F. Dry Sanding: Sand joint compounds to prepare gypsum drywall surfaces for painting. Sand as necessary to remove excess joint compound from tool marks, lap marks and high crowned joints. Scratches and craters and nicks shall be filled with joint compound, then sanded. Do not remove these depressions by sanding only.

END OF 09 21 16

SECTION 09 24 00 - PORTLAND CEMENT PLASTERING

A. PERFORMANCE REQUIREMENTS

1. Purpose: Portland cement plaster is used on exterior building surfaces to resist wind, rain penetration and deterioration from thermal changes in the geographical area where school facilities are constructed.
2. Stucco is a generic term used to describe Portland cement plaster applied to exterior surfaces.
3. Structural Performance: Provide Portland cement plaster work capable of withstanding the effects of the following loads and stresses within limits and under conditions indicated.
   a. Wind Loads: In accordance with Florida Building Code (current edition).
      1) Basic Wind Speed:
         a) 110 mph – West of the east line of Range 31.
         b) 119 mph - East of the east line of Range 31.
      2) Importance Factor:
         a) III.
      3) Exposure Category: C.
      4) Wind Factor: 1.15.
   b. Portland Cement Plaster Standards
      1) ASTM C 926: Specification for Application of Portland Cement Plaster
      2) ASTM C 1063: Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster

B. QUALITY ASSURANCE

1. Installer Qualifications: When used with an entity, "experienced" means having successfully completed a minimum of 5 projects similar in size and scope to this Project; being familiar with special requirements indicated.
2. Mockups:
   a. Size: 4-feet by 4-feet by full thickness with finish specified, using materials specified including all metal support systems and built on site.
   b. Obtain Architect's approval of mockups prior to installation of Portland cement plaster work.
3. Fire-Test-Response Characteristics: ASTM E 119.

C. SUBMITTALS DURING CONSTRUCTION

1. Product Data and Samples: For each type of product specified.
2. Shop Drawings: Show locations and installation of control and expansion joints including plans, elevations, sections, details of components and attachments to other work.
3. Samples for Verification: For each type of finish coat indicated; 12 by 12 inches and prepared on rigid backing.

D. MATERIALS, PRODUCTS, EQUIPMENT, MANUFACTURED UNITS

1. Product Performance:
   a. Nonstructural Steel Framing Members, General: ASTM C 1063.
   b. Steel Framing for Ceilings: ASTM C 1063 and ASTM A 645, G60.
   c. Metal Lath: ASTM C 847 and ASTM A 653, G60.
   d. Accessories: ASTM C 1063, Zinc Alloy or PVC Plastic.

e. Portland Cement: ASTM C 150.
f. Masonry Cement: ASTM C 91.
g. Sand Aggregate: ASTM C 897.
h. Water: Potable.

E. FINISHES

1. Portland Cement Plaster work shall be 3-coat work, sand-finish texture.
2. Plaster proportions and mixtures, and requirements for bases to receive plaster shall comply with ASTM C 926.

F. ERECTION TOLERANCES

1. Location and Plane: Installation tolerances shall be ¼-inch in 10 feet.
2. Alignment: Control joints shall be placed as follows: Vertical surfaces – 144 sq.ft. maximum; horizontal and other non-vertical surfaces – 100 sq.ft. maximum.

G. FIELD QUALITY CONTROL

H. COORDINATION / EXHIBITS

1. Drawing Items: In addition to general requirements for coordinating Drawings with Specifications, Drawings should indicate the following:
   a. Locations and dimensions of Portland cement plaster work.
2. Specification Items: Related Design Criteria include the following
   a. Division 07 Design Criteria "Joint Sealants".

END OF 09 24 00

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 GENERAL

1.1 PERFORMANCE REQUIREMENTS

A. Performance: Selection shall be based upon acoustical characteristics, durability, plenum access, light reflectance, fire resistance, sag resistance, impact resistance, scratch resistance, type of grid support, scrubability, washability, soil resistance, cost, surface texture and color.

B. Anchoring Criteria: Size for 5 times design load indicated in ASTM Direct Hung. Suspension wires shall not be attached to or through steel roof decks. Nothing shall be suspended from the steel deck.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
2. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire.
3. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
4. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method.
5. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.
6. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.
7. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
8. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum.
9. ASTM E 1111 Standard Test Method for Measuring the Interzone Attenuation of Ceilings Systems.
10. ASTM E 1264 Classification for Acoustical Ceiling Products.
11. ASTM E 1477 Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers.
12. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

1.3 SUBMITTALS DURING CONSTRUCTION

A. Product Data and Samples: Product data for each type of product specified including Ceiling Attenuation Class (CAC minimum of 35), Ceiling Sound Absorption (ASTM; NRC minimum of 0.50), surface Burn Characteristics per ASTM for Class A products sample of each type of exposed finish required.

B. Reflected Ceiling Plans: To-scale showing ceiling suspension members, method of hanger attachment, size and location of initial access modules, ceiling mounted items including light fixtures, air outlets and inlets, speakers, sprinkler heads, special moldings at walls, columns penetrations and other junctures with adjoining construction.

C. Extra Materials: Deliver extra materials to Owner. Furnish extra materials described below that match products installed. Packaged with protective covering for storage and identified with appropriate labels.
1. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Employ only licensed sub-contractors skilled in successful installations of the acoustical ceiling systems on comparable projects for a minimum of 5 years.

B. Manufacturer Qualifications: Employ only manufacturers making acoustical ceiling systems as a regular and current production item. Obtain single source responsibility to provide consistent quality in appearance and physical properties for panels and suspension system.
C. Source Limitations:

1. Ceiling Panels: Obtain through one source from a single manufacturer.
2. Suspension System: Obtain each type through one source from a single manufacturer.

D. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:

A. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84:

1) Smoke-Developed Index: 450 or less.

E. Pre-installation Conference: The Contractor, Ceiling Sub-Contractor and Architect shall meet to coordinate the layout and installation of the ceiling system. All elements necessary to complete the above-ceiling installation shall be noted and all deficiencies corrected prior to grid installation. Meeting minutes shall be submitted.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.

C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

D. Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

E. Coordinate layout and installation of acoustical panels and suspension system with other construction that penetrates ceilings or is supported by them, including light fixtures, HVAC equipment, fire-suppression system, and partition assemblies.

1.6 WARRANTY

A. General Warranty: Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
   a. Acoustical Panels: Sagging and warping
   b. Grid System: Rusting and manufacturer's defects

B. Special Warranty: Provide manufacturer’s warranty for the ceiling panel/ suspension system that it shall be free from sagging or warping for a minimum period of 15 years from the date of Substantial Completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 PRODUCTS

2.1 MATERIALS, PRODUCTS, EQUIPMENT, MANUFACTURED UNITS

A. Abuse Resistance: where specified panels shall be held in place with hold-down clips.
B. Panels shall meet Federal Specifications, Class A, and carry UL label. Tile shall carry the humidity resistance performance characteristics.
C. Panel Clips: Provide clips spaced 24" on center on all cross tees in areas subject to excessive room positive pressure, rooms subject to vandalism, vestibules smaller than 200 sq.ft.
D. Grid: Snap grid with 15/16" exposed face at Panel Types I and 3 locations. Double web aluminum with 15/16" pre-painted white aluminum cap at Panel Type 2, 4 and 5 locations.
E. Attachment devices shall include cast-in place anchors, chemical anchors, expansion anchors and undercut anchors fabricated from corrosion-resistant materials; powder-actuated fasteners in concrete with clips and other accessory devices for attachment of hangers shall sustain a load equal to 10 times that imposed by ceiling construction as determined by ASTM.
F. Acceptable Ceiling Panel Manufacturers:

a. Armstrong World Industries (AWI)
b. CertainTeed Corp. (CTC)
c. USG Interior Systems (USG)

G. Ceiling Panel Basis of Design:
a. Cortega 704 as manufactured by Armstrong World Industries
b. Composition: Mineral Fiber
c. Surface Texture: Medium
d. Color: White
e. Edge Profile: Angled Tegular 15/16IN for interface with PRELUDE ML 15/16" Exposed Tee grid.
f. Size: 24IN x 24IN

H. Ceiling panels shall have factory applied finish. Color shall be white, unless specifically noted otherwise.
J. Standard Size of panel: 2' x 2'.

2.2 METAL SUSPENSION SYSTEMS

A. Acceptable Suspension System Manufacturers:

1. Armstrong World Industries.
2. CertainTeed Corp.
3. Chicago Metallic, (In conjunction with CTC ceiling panels)
4. USG Interior Systems

B. Metal Suspension System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635.

1. Classification: Intermediate Duty or Heavy Duty as required.

C. Metal channel runners shall be 15/16" Exposed Tee cold rolled painted channels.

D. Hanger and tie wire shall be not less than 12 gauge galvanized soft annealed steel

E. Finishes and Colors, General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Provide manufacturer's standard factory-applied washable finish for type of system indicated.

1. Color: To match ceiling panel color.

F. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for

attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing per ASTM E 488 or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Postinstalled expansion anchors.
b. Corrosion Protection: Carbon-steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5 (0.005 mm) for Class SC 1 service condition.

2. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hangers of type indicated, and with capability to sustain, without failure, a load equal to 10 times that imposed by ceiling construction, as determined by testing per ASTM E 1190, conducted by a qualified testing and inspecting agency.

G. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- diameter wire.

2.3 METAL EDGE MOLDINGS AND TRIM

A. Acceptable Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Armstrong World Industries, Inc.
2. Chicago Metallic Corporation.
3. Fry Reglet Corporation.
4. MM Systems, Inc.
5. USG Interiors, Inc.

B. Roll-Formed Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit acoustical panel edge details and suspension systems indicated; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension system runners.

1. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.

3.02 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.
   1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.03 INSTALLATION

A. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

B. Suspend main beam from overhead construction with hanger wires spaced 4-0 on center along the length of the main runner. Install hanger wires plumb and straight.

C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

D. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces.

E. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces. Support edges by wall moldings.

3.04 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF 09 51 13

SECTION 09 90 00 - PAINTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Surface preparation.

B. Field application of primers, paints, stains, and other coatings for exterior and interior items and surfaces.

1.2 SYSTEM DESCRIPTION

A. Paint exposed surfaces, except where these Specifications indicate that the surface or material is not to be painted or is to remain natural. If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces. If a color of finish is not indicated, Project Consultant will select from standard colors and finishes available.
   1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.
   2. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
   1. Prefinished items include the following factory-finished components:
      (a) Architectural woodwork.
      (b) Acoustical wall panels.
      (c) Toilet enclosures.
      (d) Metal lockers.
      (e) Prefinished folding or accordion walls.
      (f) Elevator entrance doors and frames.
      (g) Elevator equipment.
      (h) Finished mechanical and electrical equipment.
      (i) Light fixtures.
   2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
      (a) Foundation spaces.
      (b) Furred areas.
      (c) Ceiling plenums.
      (d) Utility tunnels.
      (e) Pipe spaces.
      (f) Duct shafts.
      (g) Elevator shafts.
   3. Finished metal surfaces include the following:
      (a) Anodized aluminum.
      (b) Stainless steel.
      (c) Chromium plate.
      (d) Copper and copper alloys.
      (e) Bronze and brass.
   4. Operating parts include moving parts of operating equipment and the following:
      (a) Valve and damper operators.
      (b) Linkages.
      (c) Sensing devices.
      (d) Motor and fan shafts.
   5. Labels: Do not paint over UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

1.3 REFERENCES

A. American Society for Materials and Testing (ASTM).
   1. D16-Terminology for Paint, Related Coatings, Materials, and Applications.
   2. D3960-Determining Volatile Organic Compound (VOC) Content of Paints and Related Coatings.
   3. D4262-pH of Chemically Cleaned or Etched Concrete Surfaces.
   4. D4263-Indicating Moisture in Concrete by the Plastic Sheet Method.

B. Environmental Protection Agency (EPA).

C. Factory Mutual Global (FMG).

D. NACE International the Corrosion Society.

E. GREENGUARD Product Emission Standard for Children & Schools.

F. Green Seal Standard GS-11, Paints Edition 3.2, October 26, 2015.

G. National Fire Protection Association (NFPA): NFPA 30-Flammable and Combustible Liquids Code.

H. Painting and Decorating Contractors Association (PDCA) P4-Responsibility for Inspection and Acceptance of Surfaces Prior to Painting and Decorating.

I. Society of Protective Coatings (SSPC) SP6-Commercial Abrasion Blast.

J. Standard Practice for The Testing Of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers, Version 1.1. California Department of Health Services. Steel Structures Painting Council.

K. Underwriter’s Laboratory (UL).

1.4 DEFINITIONS

A. General: Standard coating terms defined in ASTM D16 apply to this Section.
   1. Flat: Lusterless or matte finish with a gloss range below 15 when measured at an 85 degree meter.
   2. Eggshell: Low-sheen finish with a gloss range between 20 and 35 when measured at a 60 degree meter.
   3. Semi-gloss: Medium-sheen finish with a gloss range between 35 and 70 when measured at a 60 degree meter.
   4. Full gloss: High-sheen finish with a gloss range more than 70 when measured at a 60 degree meter.

1.5 SUBMITTALS

A. Product Data: For each paint system indicated. Include block fillers and primers.
   1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
   2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material.
   3. Low Emitting Materials:
      (a) Submit manufacturer’s Material Safety Data Sheet Indicating VOC limits of all products.

(b) Submit manufacturer's for all products that comply with GREENGUARD Product Emission Standard for Children & Schools.
(c) Submit manufacturer's certification for all architectural paint, coating, and primer products applied to interior walls and ceilings that comply with the Green Seal Certification standard GS-11, Paints Edition 3.2, October 26, 2015.

B. Samples for Verification: For each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
1. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
2. Provide a list of materials and applications for each coat of each Sample. Label each Sample for location and application.
3. Submit Samples on the following substrates for Architect's review of color and texture only:
(a) Concrete: 4 inch square samples for each color and finish.
(b) Concrete Unit Masonry: 4 by 8-inch samples of masonry, with mortar joint in the center, for each finish and color.
(c) Painted Wood: 8 inch square samples for each color and material on hardboard.
(d) Stained or Natural Wood: 4 by 8 inch samples of natural or stained-wood finish on representative wood surfaces.
(e) Ferrous Metal: 3 inch square samples of flat metal and 6-inch long samples of solid metal for each color and finish.

C. Warranty.

1.6 QUALITY ASSURANCE

A. Applicator Qualifications: Paint applicator shall be licensed in the State of Florida or in Indian River County and use state or county journeymen. Provide a legible copy of license and, when applicable a journeyman's certification attesting to qualification requirements.
1. Certifications: Paint applicator shall provide a certification attesting to having worked on projects similar in scope to this project for a minimum of 5 years. Paint applicator not providing such documentation or not having the required experience will be removed from the project and replaced by the Contractor.

B. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

C. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample for each type of coating and substrate required. Comply with procedures specified in PDCA P5. Duplicate finish of approved sample Submittals.
1. Architect will select one room or surface to represent surfaces and conditions for application of each type of coating and substrate.
(a) Wall Surfaces: Provide samples on at least 100 sq. ft.
(b) Small Areas and Items: Project Consultant will designate items or areas required.
2. Apply benchmark samples, according to requirements for the completed Work, after permanent lighting and other environmental services have been activated. Provide required sheen, color, and texture on each surface.
(a) After finishes are accepted, Project Consultant will use the room or surface to evaluate coating systems of a similar nature.

D. Final approval of colors will be from benchmark samples.

E. Conform to ASTM for interpretation of terms used in this Section.

F. Labels: Do not paint over Underwriter's Laboratories (UL), Factory Mutual (FM) or other code required labels or equipment name, identification, performance rating, or nomenclature plates.

G. Regulatory Requirements: Conform to applicable code for flame/fuel/smoke rating requirements for finishes.

H. Single Source Responsibility: Provide primers, paints, stains and other coatings for exterior and interior items and surfaces by the same manufacturer.

I. Lead Safety: Beginning April 22, 2010, federal law (EPA's Final Rule 40 CFR Part 745) shall require that contractors and renovators performing renovation, repair, and painting projects that disturb lead based paint in homes, child care facilities, and schools built before 1978 that a child under age 6 visits regularly, to be certified and follow lead-safe work practices to prevent lead contamination. Contractors and renovators must be EPA Certified and projects must comply with the EPA manual "Renovate Right, Important Lead Hazard Information for Families, Child Care Providers and Schools".

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:
1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 degrees F and a maximum temperature of 90 degrees F. Maintain storage containers in a clean condition, free of foreign materials and residue.
1. Keep storage area neat and orderly. Remove oily rags and waste daily.

C. Container Labeling: Include manufacturer's name, type of paint, brand name, brand code, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing.

D. Store and mix materials in 1 area only.

E. Comply with health and fire regulations. Take precautionary measures to prevent fire hazards and spontaneous combustion.

1.8 PROJECT CONDITIONS

A. Comply with manufacturer's recommendations as to environmental conditions under which coatings and coating systems can be applied.

B. Do not do any painting if the relative humidity exceeds 90 percent.

C. Do not apply finish in areas where dust is being generated.

D. Cover or otherwise protect finished work of other trades and surfaces not being painted concurrently or not to be painted.

E. Do not apply paint in snow, rain, fog, or mist; or when relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F above the dew point; or to damp or wet surfaces.
   1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

F. Provide continuous ventilation to maintain surface and ambient temperatures 24 hours before, during and 48 hours after painting.

G. Provide lighting levels of 50 foot candles at mid-height at substrate surface.

1.9 WARRANTY

A. Provide a written guarantee, co-signed jointly and severalty by the Contractor, painting subcontractor, and materials manufacturers, against cracking, peeling flaking, chalking and mildew on interior surfaces, and additionally against erosion and unreasonable fading or exterior surfaces, for 6 years; agreeing to repair and repaint surfaces affected by such defects, at no cost to the Owner, including necessary removal or protection of other work, without limit, within 30 days after notification by the Owner, and to perform such work based on the provisions of this section, including extension of the guarantee to cover new work.

1.10 EXTRA STOCK

A. Provide “Home Store” data (where painter purchased the paints used on the project) include all paint records and the following Home Store information:
   1. Name.
   2. Address.
   3. Telephone number.
   4. Store manager name.
   5. List of paints purchased by name and type.

B. Provide a 1 gallon container of each color and surface texture of respective finish paints used on the project.

C. Label each container with color, texture and room locations, in addition to the manufacturer’s label.

D. Deliver and store extra stock at the time of substantial completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. The Florida School Plant Management Association’s Certified Products List shall serve as a minimum guideline.

B. Subject to compliance with the specified requirements, provide products by one of the following manufacturers:
   1. Benjamin Moore & Co.
   2. Coronado Paint Co.
   3. Duron, Inc.
   4. ICI Paint Stores, Inc.
   5. MAB Paints.
   6. PPG Architectural Finishes, Inc.
   7. (Basis of Design) Sherwin-Williams Company.

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: Provide block fillers, primers, and finish-coat materials that are compatible with one another and with the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
   1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.

C. Colors: As selected by Project Consultant from manufacturer's full range.

D. Millage noted below is minimum acceptable dry film thickness per coat application.

E. Toxicity/IEQ: All interior paint and coating products are to comply with the GREENGUARD Product Emission Standard for Children & Schools or any of the following which apply:
   1. All architectural paints, coatings, and primers applied to interior walls and ceilings are to comply with the Green Seal Standard GS-11, First Edition, May 20, 1993.
   2. All anti-corrosive and anti-rust paints applied to interior metal ferrous surfaces are to comply with Green Seal Standard GS-03, Second Edition, January 7, 1997.

2.3 VOC CONTENT

A. Products are specified must not exceed the following:
   1. Interior Coatings (weight in grams/liter of product):
      (a) Non-Flat: 150.
      (b) Flat: 50.
   2. Exterior Coatings weight in grams/liter of product minus water):
      (a) Non-Flat: 200.
      (b) Flat: 100.

2.4 CONCRETE UNIT MASONRY BLOCK FILLERS

A. Concrete Unit Masonry Block Filler: Factory-formulated high-performance latex block fillers.
   1. Sherwin-Williams; PrepRite Block Filler (B25W25): Applied at a dry film thickness of not less than 8 mils per coat.
      (a) Meets GS-11.
      (b) Meets FSPMA MP-33.1 Block Filler, Latex-Base, Interior-Exterior Flat, White.

2.5 EXTERIOR PRIMERS

A. Exterior Concrete and Masonry Primer-New Construction: Factory-formulated alkali-resistant acrylic-latex primer for exterior application.
   1. Sherwin-Williams; Loxon Acrylic Primer (A24W300): Applied at a dry film thickness of not less than 3.2 mils per coat.

B. Exterior Concrete and Masonry Primer-for Elastomeric Coatings: Factory–formulated alkali-resistant acrylic-latex primer for exterior application
   1. Sherwin-Williams; Loxon Acrylic Primer (A24W300): Applied at a dry film thickness of not less than 3.2 mils per coat.

C. Exterior Concrete and Masonry Primer-for Existing Construction: Factory–formulated alkali-resistant Acrylic primer for exterior application
   1. Sherwin-Williams; Loxan Conditioner (A24W100): Applied at a spread rate of 200-300 square feet per gallon.

D. Exterior Wood Primer for Acrylic Enamels: Factory-formulated alkyd or latex wood primer for exterior application.
   1. Sherwin-Williams; A-100 Exterior Oil Stain Blocking Primer (Y24W20): Applied at a dry film thickness of not less than 2.3 mils per coat.
      or
   2. Sherwin-Williams; A-100 Exterior Latex Primer (B42W41/B42W43): Applied at a dry film thickness of not less than 1.4 mils per coat.

E. Exterior Ferrous-Metal Primer: Factory-formulated rust-inhibitive metal primer for exterior application.
   1. Sherwin-Williams; Pro-Cryl Universal Primer (B66-310 Series): Applied at a dry film thickness of not less than 2.0 mils per coat (acrylic-based).
      (a) Meets GS-11.
      (b) Meets FSPMA MP-26.3 “Recommended Primer” under Sherwin-Williams DTM Acrylic Gloss Coating (B66 Series).

F. Exterior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer for exterior application.
   1. Sherwin-Williams; Pro-Cryl Universal Primer (B66-310 Series): Applied at a dry film thickness of not less than 2.0 mils per coat.
      (a) Meets GS-11.
      (b) Meets FSPMA MP-26.3 “Recommended Primer” under Sherwin-Williams DTM Acrylic Gloss Coating (B66 Series).

G. Exterior Aluminum Primer under Acrylic Finishes: Factory-formulated acrylic-based metal primer for exterior application.
   1. Sherwin-Williams; Pro-Cryl Universal Primer (B66-310 Series): Applied at a dry film thickness of not less than 2.0 mils per coat.
      (a) Meets GS-11.
      (b) Meets FSPMA MP-26.3 “Recommended Primer” under Sherwin-Williams DTM Acrylic Gloss Coating (B66 Series).

2.6 INTERIOR PRIMERS

A. Interior Concrete, Masonry, and Brick Primer: Factory-formulated alkali-resistant acrylic-latex interior primer for interior application.
   1. Sherwin-Williams; ProGreen 200 Low VOC Interior Latex Primer (B28W600): Applied at a dry film thickness of not less than 1.5 mils per coat.
      (a) Meets GS-11.

B. Interior Gypsum Board Primer: Factory-formulated latex-based primer for interior application.
   1. Sherwin-Williams; ProGreen 200 Low VOC Interior Latex Primer (B28W600): Applied at a dry film thickness of not less than 1.5 mils per coat.
      (a) Meets GS-11.

C. Interior Plaster Primer: Factory-formulated latex-based primer for interior application.
   1. Sherwin-Williams; ProGreen 200 Low VOC Interior Latex Primer (B28W600): Applied at a dry film thickness of not less than 1.5 mils per coat.
      (a) Meets GS-11.

D. Interior Wood Primer for Acrylic-Enamel: Factory-formulated acrylic-latex-based interior wood primer.

1. Sherwin-Williams; Harmony Interior Latex Primer (B11W900): Applied at a dry film thickness of not less than 1.3 mils per coat.
   (a) Meets GS-11.
   or
2. ~~Sherwin-Williams; PrepRite Wall and Wood Interior Oil Primer/Undercoater B49W2): Applied at a dry film thickness of not less than 1.9 mils per coat.~~S-W PrepRite ProBlock Latex Primer, B51 Series (4 milswet, 1.4 mils dry).

E. Interior Ferrous-Metal Primer: Factory-formulated quick-drying rust-inhibitive alkyd-based metal primer.
   ~~1. Sherwin-Williams; Kem Kromik Universal Metal Primer (B50WZ1): Applied at a dry film thickness of not less than 3.0 mils per coat.~~
   ~~2.~~1. Sherwin-Williams; ProCryl Universal Primer (B66-310 Series): Applied at a dry film thickness of not less than 2.0 mils per coat.

F. Interior Zinc-Coated Metal Primer: Factory-formulated galvanized metal primer.
   1. Sherwin-Williams; ProCryl Universal Primer (B66-310 Series): Applied at a dry film thickness of not less than 2.0 mils per coat.
      (a) Meets GS-11.

G. Interior Unit Masonry, Gypsum Board and Plaster: Factory-formulated primer for Epoxy finish.
   1. Sherwin-Williams; ProGreen 200 Low VOC Interior Latex Primer (B28W600): Applied at a dry film thickness of not less than 1.5 mils per coat.
      (a) Meets GS-11.

2.7 EXTERIOR FINISH COATS

A. Exterior Low-Luster Acrylic Elastomeric: Factory-formulated low sheen 100% Acrylic Elastomeric coating for exterior application. **Note: Use elastomerics only after receiving approval in writing from the Owner.**
   1. Sherwin-Williams; SherLastic Elastomeric Coating (A5-100 Series): Applied at a dry film thickness of not less than 6.0 mils per coat.

B. Exterior Low-Luster Acrylic Paint: Factory-formulated low-sheen (eggshell) acrylic-latex paint for exterior application.
   1. Sherwin-Williams; A-100 Exterior Latex Satin (A82 Series): Applied at a dry film thickness of not less than 1.3 mils per coat.

C. Exterior Semigloss Acrylic Enamel: Factory-formulated semigloss waterborne acrylic-latex enamel for exterior application.
   1. Sherwin-Williams; DTM Acrylic Coating (B66-200 Series–Semi-Gloss) Applied at a dry film thickness of not less than 2.5 mils per coat.

D. Exterior Full-Gloss Acrylic Enamel for Ferrous and Other Metals: Factory-formulated full-gloss waterborne acrylic-latex enamel for exterior application.
   1. Sherwin-Williams; DTM Acrylic Coating (B66-100 Series-Gloss): Applied at a dry film thickness of not less than 2.5 mils per coat.
      (a) Meets GS-11.
      (b) Meets FSPMA MP-26.3 Acrylic-Base Gloss Enamel, Metal Surfaces, Whites and Tints.

2.8 INTERIOR FINISH COATS

A. Interior Flat Acrylic Paint: Factory-formulated flat acrylic-emulsion latex paint for interior application.
   1. Sherwin-Williams; ProGreen 200 Low VOC Interior Latex Flat (B30-600 Series): Applied at a dry film thickness of not less than 1.3 mils per coat.

(a) Meets GS-11.

B. Interior Flat Latex-Emulsion Size: Factory-formulated flat latex-based interior paint.
1. Sherwin-Williams; Harmony Interior Latex Flat (B5 Series): Applied at a dry film thickness of not less than 1.7 mils per coat.
(a) Meets GS-11.

C. Interior Low Luster Latex Paint: Factory-formulated eggshell latex based interior paint.
1. Sherwin-Williams; Harmony Interior Latex Eg-Shel (B9 Series): Applied at a dry film thickness of not less than 1.6 mils per coat.
(a) Meets GS-11.

D. Interior Low-Luster Acrylic Enamel:
1. Sherwin-Williams; ProGreen 200 Low VOC Interior Latex Eg-Shel (B20-600 Series): Applied at a dry film thickness of not less than 1.7 mils per coat.
(a) Meets GS-11.

E. Interior Semi-gloss Acrylic Enamel: Factory-formulated semi-gloss acrylic-latex enamel for interior application.
1. Sherwin-Williams; ProGreen 200 Interior Latex Semi-Gloss (B31- 600 Series): Applied at a dry film thickness not less than 1.6 mils per coat.
(a) Meets GS-11.

F. Interior Full-Gloss Acrylic Enamel:
1. Sherwin-Williams; Pro Industrial Zero VOC Acrylic Gloss (B66W600): Applied at a dry film thickness of not less than 2.5 mils per coat.

G. Interior Semi-gloss Waterborne Acrylic Epoxy: Factory-formulated semi-gloss acrylic epoxy coating of interior application.
1. Sherwin-Williams; Water-Based Catalyzed Epoxy (Two Component) (B70W211/B60V15): Applied at a dry film thickness of not less than 2.5 mils per coat.
2. S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy, K46W150 Series.
(a) Meets GS-11.
3. Benjamin Moore: IMC Acrylic Epoxy Coating-Semi-Gloss (M43/M44-86). Applied at a dry film thickness of not less than 1.5 mils.

2.9 INTERIOR WOOD STAINS AND VARNISHES

A. Open-Grain Wood Filler: Factory-formulated paste wood filler applied at spreading rate recommended by manufacturer.
1. Sherwin-Williams; Sher-Wood Natural Filler (D70T1).

B. Interior Wood Stain: Factory-formulated alkyd-based penetrating wood stain for interior application applied at spreading rate recommended by manufacturer.
1. ~~Sherwin-Williams; Wood Classics Interior Oil Stain (A49-200 Series): Applied at 3-3.5 mils wet; no dry surface film.~~S-W Minwax 250 VOC Wood Stain

~~C. Clear Sanding Sealer: Factory-formulated fast-drying alkyd-based clear wood sealer applied at spreading rate recommended by manufacturer.~~

~~1.~~C. ~~Sherwin-Williams; Wood Classics FastDry Sanding Sealer (B26V43): Applied at a dry film thickness of not less than 1.0 mils per coat.~~

D. Interior Waterborne Clear Satin Varnish: Factory-formulated clear satin acrylic-based polyurethane varnish applied at spreading rate recommended by manufacturer.
   1. 2 Coats-Sherwin-Williams; Wood Classics Waterborne Polyurethane Varnish-Satin (A68 Series): Applied at a dry film thickness of not less than 0.8 mils per coat.

E. Interior Waterborne Stain Full-Gloss Varnish:
   1. 2 Coats-Sherwin-Williams; Wood Classics Waterborne Polyurethane Varnish-Gloss (A68 Series): Applied at a dry film thickness of not less than 0.8 mils per coat.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with applicator present, for compliance with requirements for paint application. Comply with procedures specified in PDCA P4.
   1. Proceed with paint application only after unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
   2. Start of painting will be construed as Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

3.2 PREPARATION

A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of size or weight of the item, provide surface-applied protection before surface preparation and painting.
   1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.

B. Cleaning: Before applying paint or other surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning.
   1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
   1. Provide pull tests on existing painted surfaces where a different coating will be applied. Verify with the manufacturer that the coatings are compatible.
   2. Provide barrier coats over incompatible primers or remove and reprime.
   3. Cementitious Materials: Prepare concrete, concrete unit masonry, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
      (a) Use abrasive blast-cleaning methods if recommended by paint manufacturer.
      (b) Determine alkalinity pH and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition by approved curing methods in Section 09220-Porland Cement (Stucco). Do not paint surfaces if moisture content exceeds that permitted in manufacturer's written instructions.

(c) Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.

4. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper, as required. Sand surfaces exposed to view smooth and dust off.
   (a) Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
   (b) Prime, stain, or seal wood to be painted immediately on delivery. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
   (c) If transparent finish is required, backprime with non-yellowing varnish.
   (d) Backprime paneling on interior partitions where masonry, plaster, or other wet wall construction occurs on backside.
   (e) Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
5. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Counsel's recommendations.
   (a) Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC-SP 6/NACE No. 3.
   (b) Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
   (c) Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.
6. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment or “passivators” from galvanized sheet metal fabricated from coil stock by mechanical methods SSPC-SP 7.

D. Material Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the paint schedules.
2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
3. Provide finish coats that are compatible with primers used.
4. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, grilles, convector covers, covers for finned-tube radiation, and similar components are in place. Extend coatings in these areas, as required, to maintain system integrity and provide desired protection.
5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Paint surfaces behind permanently fixed equipment and furniture with prime coat only.

6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.
10. Sand lightly between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
1. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer over metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure that edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.
1. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
2. Rollers: Use rollers of carpet, velvet-back, or high-pile sheep's wool as recommended by manufacturer for material and texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer.

E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces.

F. Mechanical items to be painted include, but are not limited to, the following:
1. Uninsulated metal piping.
2. Uninsulated plastic piping.
3. Pipe hangers and supports.
4. Tanks that do not have factory-applied final finishes.
5. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
6. Duct, equipment, and pipe insulation having "all-service jacket" or other paintable jacket material.
7. Mechanical equipment that is indicated to have a factory-primed finish for field painting.

G. Electrical items to be painted include, but are not limited to, the following:
1. Switchgear.
2. Panelboards.
3. Electrical equipment that is indicated to have a factory-primed finish for field painting.

H. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

I. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no bleed-through or other defects due to insufficient application of sealer or primer.

J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

K. Transparent (Clear) Finishes: Use multiple coats to produce a glass-smooth surface film of even luster. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections.
1. Provide satin finish for final coats.

L. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.

M. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. Owner reserves the right to invoke the following test procedure at any time and as often as Owner deems necessary during the period when paint is being applied:
1. Owner will engage a qualified independent testing agency to sample paint material being used. Samples of material delivered to Project will be taken, identified, sealed, and certified in the presence of Contractor.
2. Testing agency will perform appropriate tests as required by Owner
3. Owner may direct Contractor to stop painting if test results show material being used does not comply with specified requirements. Contractor shall remove noncomplying paint from Project site, pay for testing, and repaint surfaces previously coated with the noncomplying paint. If necessary, Contractor may be required to remove noncomplying paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from Project site.
1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

B. Remove all spilled, splashed or splattered paint from all surfaces. Leave entire project in a clean condition.

C. Place scrapings, empty cans, consumed brushes, etc. in plastic bags and dispose of in the proper manner by the Contractor. Place used mineral spirits and other hazardous liquids in an appropriate container and is the responsibility of the Contractor to properly dispose of in full compliance of E.P.A. rules and regulations.

D. Do not mar surface finish by cleaning.

E. Leave entire project in a clean condition.

3.6 PROTECTION

A. Protect work of other trades, whether being painted or not, against damage from painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

B. Provide "Wet Paint" signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work.
   1. After work of other trades is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE (provide the following finish systems):

A. Concrete, Stucco, and Brick: Unless specialty finish is noted:
   1. Low-Luster Acrylic Paint:
      (a) Primer: Exterior concrete and masonry primer.
      (b) Finish: 2 coats Exterior low-luster acrylic paint.
   2. Semi-gloss Acrylic-Enamel:
      (a) Primer: Exterior concrete and masonry primer.
      (b) Finish: 2 coats Exterior semi-gloss acrylic enamel.
   3. Low Luster Acrylic Elastomeric:
      (a) Primer/Sealer: Latex masonry sealer
      (b) Finish: 2 coats Low luster Acrylic elastomeric waterproof coating.

B. Concrete Unit Masonry:
   1. Low-Luster Acrylic Paint:
      (a) Block Filler: Concrete unit masonry block filler.
      (b) Finish: 2 coats Exterior low-luster acrylic paint.
   2. Semi-gloss Acrylic-Enamel:
      (a) Block Filler: Concrete unit masonry block filler.
      (b) Finish: 2 coats Exterior semi-gloss acrylic enamel.
   3. Low Luster Acrylic Elastomeric:
      (a) Primer/Seaier: Alkyd masonry sealer
      (b) Finish: 2 coats Low luster Acrlyic elastomeric waterproof coating

C. Ferrous-Metal: Primer is not required on shop-primed items.
   1. Full-Gloss Acrylic-Enamel:
      (a) Primer: Exterior ferrous-metal primer.
      (b) Finish: 2 coats Exterior full-gloss acrylic enamel for ferrous and other metals.
   2. Semi-gloss Acrylic-Enamel:
      (a) Primer: Exterior ferrous-metal primer
      (b) Finish: 2 coats Exterior semi-gloss acrylic enamel for ferrous and other metals.

D. Zinc-Coated Metal:
   1. Full-Gloss Acrylic-Enamel:
      (a) Primer: Exterior galvanized metal primer.
      (b) Finish: 2 coats Exterior full-gloss acrylic enamel for ferrous and other metals.
   2. Semi-gloss Acrylic-Enamel:
      (a) Primer: Exterior ferrous-metal primer
      (b) Finish: 2 coats Exterior semi-gloss acrylic enamel for ferrous and other metals.

E. Aluminum: Provide the following finish systems over exterior aluminum surfaces:
   1. Full-Gloss Acrylic-Enamel Finish:
      (a) Primer: Exterior aluminum primer under acrylic finishes.
      (b) Finish: 2 coats Exterior full-gloss acrylic enamel for ferrous and other metals.
   2. Semi-gloss Acrylic-Enamel Finish:

(a) Primer: Exterior aluminum primer under acrylic finishes
(b) Finish: 2 coats Exterior semi-gloss acrylic enamel for ferrous and other metals.

F. Wood;
1. Low-Luster Acrylic Paint:
(a) Primer: Exterior concrete and masonry primer.
(b) Finish: 2 coats Exterior low-luster acrylic paint.
2. Low Luster Acrylic Elastomeric:
(a) Primer/Sealer: Latex masonry sealer
(b) Finish: 2 coats Low luster Acrlyic elastomeric waterproof coating.

3.8 INTERIOR PAINT SCHEDULE

A. Concrete and Brick:
1. Low-Luster Acrylic-Enamel: (ceilings and soffits).
(a) Primer: Interior concrete and masonry primer.
(b) Finish: 2 coats Interior low-luster acrylic enamel.
2. Semi-gloss Acrylic-Enamel:
(a) Primer: Interior concrete and masonry primer.
(b) Finish: 2 coats Interior semi-gloss acrylic enamel.

B. Concrete Unit Masonry:
1. Semi-gloss Acrylic-Enamel:
(a) Block Filler: Concrete unit masonry block filler.
(b) Finish: 2 coats Interior semi-gloss acrylic enamel.

C. Concrete Unit Masonry, Gypsum Board and Plaster:
1. Semi-gloss Waterborne Acrylic Epoxy:
(a) Primer: Epoxy primer.
(b) Finish: 2 coats Waterborne semi-gloss Acrylic Epoxy Coating.

D. Gypsum Board:
1. Low-Luster Acrylic-Enamel: (ceilings and soffits).
(a) Primer: Interior gypsum board primer.
(b) Finish: 2 coats Interior low-luster acrylic enamel.
2. Semi-gloss Acrylic-Enamel Finish:
(a) Primer: Interior gypsum board primer.
(b) Finish: 2 coats Interior semi-gloss acrylic enamel.

E. Plaster:
1. Low-Luster Acrylic-Enamel: (ceilings and soffits).
(a) Primer: Interior plaster primer.
(b) Finish: 2 coats Interior low-luster acrylic enamel.
2. Semi-gloss Acrylic-Enamel Finish:
(a) Primer: Interior plaster primer.
(b) Finish: 2 coats Interior semi-gloss acrylic enamel.

F. Acoustical Plaster:
1. Flat Acrylic-Latex Finish:
(a) Finish: 2 coats Interior flat acrylic paint.

G. Wood:
1. Semi-gloss Acrylic-Enamel:
(a) Primer: Interior wood primer for acrylic-enamel and semi-gloss alkyd-enamel finishes.
(b) Finish: 2 coats Interior semi-gloss acrylic enamel.

2. Full-Gloss Acrylic-Enamel:
   (a) Primer: Interior wood primer for acrylic-enamel and semi-gloss alkyd-enamel finishes.
   (b) Finish: 2 coats Interior full-gloss acrylic enamel.

H. Ferrous-Metal:
1. Full-Gloss Acrylic-Enamel:
   (a) Primer: Interior ferrous-metal primer.
   (b) Finish: 2 coats Interior full-gloss acrylic enamel.
2. Semi-gloss Acrylic-Enamel:
   (a) Primer: Interior ferrous-metal primer.
   (b) Finish: 2 coats Interior semi-gloss acrylic enamel.

I. Zinc-Coated Metal:
1. Full-Gloss Acrylic-Enamel:
   (a) Primer: Interior zinc-coated metal primer.
   (b) Finish: 2 coats Interior full-gloss acrylic enamel.
2. Semi-gloss Acrylic-Enamel:
   (a) Primer: Interior zinc-coated metal primer.
   (b) Finish: 2 coats Interior semi-gloss acrylic enamel.

J. All-Service Jacket over Insulation:
1. Flat Acrylic Finish: Add fungicidal agent to render fabric mildew proof.
   (a) Finish: 2 coats Interior flat latex-emulsion size.

3.9 INTERIOR STAIN AND NATURAL-FINISH WOODWORK SCHEDULE

A. Stained Woodwork:
1. Waterborne Clear Satin-Varnish: Wipe wood filler before applying stain.
   (a) Filler: Open-grain wood filler.
   (b) Stain: Interior wood stain.
   (c) Finish: 2 coats Interior waterborne clear satin varnish.
2. Waterborne Stain Full-Gloss Varnish Finish: Wipe filler before applying stain.
   (a) Filler: Open-grain wood filler.
   (b) Stain: Interior wood stain.
   (c) Finish: 2 coats Interior waterborne clear gloss varnish.

B. Natural-Finish Woodwork:
1. Waterborne Clear Satin-Varnish: Wipe wood filler before applying stain.
   (a) Filler: Open-grain wood filler.
   (b) Finish: 2 coats Interior waterborne clear satin varnish.
2. Waterborne Full-Gloss Varnish: Wipe filler before applying stain.
   (a) Filler: Open-grain wood filler.

Finish: 2 coats Interior waterborne clear gloss varnish.

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