SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 DESCRIPTION

A. Work included: Provide all labor, material, equipment and services to complete all cast-in-place concrete work and related items required by the Project, shown on the Drawings or herein specified, including but not limited to the following:
   1. All concrete Work shown on the Drawings, including, but not limited to, foundations, trench footings, column footings, piers, foundation walls, slab-on-grade, wall & column footings, frost walls, stoops, thickened slabs.
   2. Housekeeping pads, mechanical pads and curbs in equipment rooms, pipe guard and tube steel column concrete fills.
   3. Exterior slabs (stoops and aprons) at entryways, equipment pads, concrete fill, etc.
   4. Reinforcing steel and welded wire fabric.
   5. Concrete accessories including vapor barrier, curing, patching, sealing, hardening.
   6. Built-in work furnished under other Sections, including setting and placing unless otherwise specified.
   7. Openings, chases, pockets, blockouts required for work of other Sections.
   8. Construction, contraction, crack control, shrinkage control, and isolation joints.
   9. Forming, stripping, finishing, curing, and patching.

B. Provide grouting of structural steel and equipment bearing on foundations. Install embedded items furnished under other sections such as, but not limited to: miscellaneous metals and accessories, anchor bolts, sleeves, anchors, bearing plates and inserts.

1.2 RELATED SECTIONS

A. Section 02220 - Excavation and Backfilling.
B. Section 02222 - Under Slab Fill.
C. Section 02520 - Concrete Paving, Curbs and Walks.
D. Section 03360 -
E. Section 03366 -
F. Section 04300 - Unit Masonry System.
G. Section 05120 - Structural Steel.
H. Section 07900 - Joint Sealants.
I. Concrete items for work under Divisions 15 and 16 unless otherwise referenced.
J. Setting of sleeves, bolts and embedded items for work under Division 15 and 16.

1.3 STANDARDS

A. Standard Specifications: The "Specifications for Structural Concrete for Buildings" ACI 301 including all modifications as hereinafter specified are hereby incorporated as a part of these Specifications and are as much a part of the Contract Documents as if reproduced herein. Modifications shall take precedence over items specified in ACI 301 and as

incorporated below are preceded by the relative ACI 301 designations. All ACI 301 items unless so modified below are incorporated as written. When any part of any item is modified or voided by these modifications, the unaltered provisions of that part shall apply as written. Copy of ACI 301 shall be kept in the project field office at all times. No work shall proceed until persons directly responsible for the project representing the contractors, subcontractors, suppliers and testing agencies have a copy of this specification and an understanding of the provisions therein.

B. Codes and Standards, conform to the following latest Ed. of referenced documents:
   1. ACI 318 Building Code Requirements for Reinforced Concrete.
   2. Governing Building Code. Comply with all requirements of the governing building code that are more stringent than the above referenced codes, standards and specifications.
   3. Concrete shall conform to all provisions of the latest edition of the (ASTM) American Society for Testing and Materials and the (ACI) American Concrete Institute noted within this specification, except as modified by the Supplemental Requirements contained herein.
   4. ACI 117, 117R Standard Specs for Tolerances for Concrete Construction & Materials with Commentary; 302.1R Guide for Concrete Floor Slab Constr.; and ASTM E1155 Standard Test Method for Determination of Flatness/Levelness of Floorslabs (F_F/F_L).
   5. Ohio Building Code - 2007

1.4 SUBMITTALS

A. Provide the following submittals in accordance with ACI-301.
   1. Concrete Mix Designs.
   2. Aggregate certification.
   3. Admixture certification. Chloride ion content must be included.
   4. Laboratory tests on concrete.
   5. Testing Agency to perform services required in ACI 301, Section 16.7.
   6. Delivery tickets as required by ACI-301, 7.1 amended.
   7. Construction and control joints not shown on Drawings.
   8. Method of developing bond at joints.
   9. Materials and methods for curing.

B. Shop Drawings for reinforcing steel and accessories prepared in accordance with "Details and Detailing of Concrete Reinforcement", ACI 315.
   1. Indicate all sizes, bending, and placement.
   2. Show visual method of field identification (CRSI) of rebar steel strengths.
   3. This contractor shall submit to the architect, for review, checked shop drawings showing details, dimension and schedules for the fabrication and placing of reinforcing and accessories. Fabrication of items shown in the shop drawings shall not begin until the architect has completed his review.
   4. The shop drawings are interpretations of and are supplemental to the design drawings and specifications. Their intent is to demonstrate to the architect that this contractor has understood the design concept, and to provide the detailed information necessary for the fabrication, assembly and installation of the products

or materials specified. Neither the shop drawings nor comments placed on them by the architect shall be construed as being change orders. If any deviations, discrepancies or conflicts between the shop drawings and the design drawings and specifications are discovered, either prior to or after the shop drawings have been reviewed, the design drawings and specifications shall control and be followed.

C. Manufacturer's Data: For information only, submit two copies of manufacturer's data with application and installation instructions for all proprietary materials.

D. Submittals to be in accordance with Section 01300

E. Reports and Tests (Concrete, Materials): Submit mix design and test data for all proposed concrete materials.
   1. Section 3.8 - Submit data to support method 2.
   2. Aggregates - Submit test data for fine and coarse aggregates.
   3. ACI Chapter 16 - Submit test reports for air content, slump and strength, as well as inspection reports.
   4. Section 3.10 is not permitted.

F. Substitutions: Any request for product substitution must be submitted for review, with all necessary documentation, prior to time of bid. No requests for substitutions will be considered after bid has been received.

PART 2 PRODUCTS

2.01 MATERIALS (ACI 301, CHAPTER 2)

A. The following modifies and supplements ACI 301 :
   1. Cement to be Portland Cement, ASTM C150, Type I. Type III, high early strength may be used with written approval and at Contractor's expense. All cement for concrete exposed to public view to be from same mill.
   2. Air entraining admixture for air-entrained concrete shall comply w/ ASTM C260.
   3. No additives may be used in concrete flatwork or slabs on grade without written approval of the Architect and the concrete staining contractor. The following are listed for reference only.

B. Aggregates:
   1. Provide No. 57 crushed stone aggregates. Smooth, or otherwise unfractured aggregate from river gravel pits shall not be permitted.

C. Grouts: Nonshrinking grout for the bearing of structural steel, or structural bearing plates and base plates shall conform to CRD C-621, "Corps of Engineers Specification for Non-Shrink Grout". The grout manufacturer shall furnish test date from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95% bearing under a 12" x 12" base plate.
   Metallic "Euco Hi-Mod"; The Euclid Chemical Company,
   "Embeco 636"; Master Builders

Non-Metallic (Provide where there is any possibility of corrosion, rust, etc.) staining.)

"Euco-NS"; Euclid Chemical Company
"Masterflow 713"; Master Builders
"Five Star Grout" by U.S. Grout Corp.

2.2 PROPORTIONING (ACI 301, CHAPTER 3)

A. Strength:

1. For all Footings, walls, piers, pilasters, & all other concrete below grade F'c3500psi
2. For all Interior slabs on grade, topping, and all flatwork (not air-entrained) F'c4000psi
3. And all Concrete subjected to freezing and thawing (air-entrained) F'c4000psi

B. Refer to General Notes, foundation constructions of the working drawings (Cat "2") for class/strength/description of all concrete required for the project.

C. Weight:

1. All concrete shall be normal weight and density based on aggregates conforming to ASTM C33.

2.3 SLUMP

1. All concrete containing the high range water reducing admixture (superplasticizer) shall have a maximum slump of 6" unless otherwise approved by the Architect. The concrete shall arrive at the job site at a slump of 2" to 3", be verified, then the high range water reducing admixture added to increase the slump to the approved level. All other concrete shall have a slump of 4" (+ 1" or -1") for slabs and 5" for other members (ASTM C143). Any concrete mix lacking adequate workability shall not be adjusted by modifying the slump with water; Contractor may opt for superplasticizer admixture to gain workability; admixtures only as specified in Part 2.01A of this specification.

2.4 ADMIXTURES

A. Calcium chloride shall not be used in any concrete on the project.

B. All concrete shall contain a standard specified water reducing admixture, water reducing retarding admixture and/or high range water reducing admixture (super-plasticizer). All concrete slabs, placed at air temperatures below 50°F. shall contain the specified non-chloride accelerator. All concrete required to be air entrained shall contain an approved air entraining admixture. All pumped concrete, concrete for industrial slabs, concrete required to be watertight, and concrete with a water-cement ratio below 0.50 shall contain the specified high range water reducing admixture (superplasticizer.)

C. Fly ash shall not be used in any concrete placed as flat- work. Fly ash mix is permitted in non-exposed foundation.

D. Proportions for concrete mixes shall be selected by ACI 301, Section 3.9. All mixes must be approved by the architect prior to use on the job. No deviations from the approved mixes

will be permitted without prior approval of the architect. Where the concrete production facility can establish the uniformity of its production for concrete of similar strength and materials based on recent test data, the average strength used as a basis for determining mix design proportions shall exceed the specified design strength by the requirements of ACI-318, Section 4.3 or ACI-301, Section 3.9. When a concrete production facility does not have field test records for calculation of standard deviation, the required average strength shall be at least 1200 psi greater than the specified design strength.

E. Fiberglass form tie rods and system will be acceptable alternative to metal ties.

2.5 VAPOR BARRIER

A. Vapor barrier: 6 mil thick clear polyethylene film type recommended for below grade application.

2.6 CRACK REPAIR

A. Slab-on-grade structural and non-structural fractures, cracking, edge curl or similar defects to be corrected at no cost to the Owner at time of substantial completion.

1. Pressure inject cracks and fractures using "Sikadur 35 HI-MOD LV" high modulus, low viscosity, high strength epoxy or "Sikadur 52" super low-viscosity moisture - insensitive epoxy injection adhesive. Apply according to the manufacturer's recommendation.
2. Manufacturer: SIKA Corporation, Lyndhurst, NH 07071 (1-201-933-8800)
3. SIKADUR 35
    a. Surface Preparation: Surface must be clean and sound. It may be dry or damp, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials.
    b. Mixing: Pre-mix each component. Proportion 1 part Component 'B' to 2 parts Component 'A' by volume into a clean pail. Mix thoroughly for 3 minutes with Sika Paddle on low-speed (400-600-rpm) drill until uniformly blended. Mix only that quantity that can be used within its pot life.
    c. Application: To gravity feed cracks - Pour neat Sikadur 35, Hi-Mod LV, into vee-notched crack. Continue placement until completely filled. Seal underside of slab prior to filling if cracks reflect through.
    To pressure-inject cracks - Use automated injection equip- ment or manual method. Set appropriate injection ports based on system used. Seal ports and crack with Sikadur 31, Hi-Mod Gel, or Sikadur 33. When the epoxy adhesive seal has cured, inject Sikadur 35, Hi-Mod LV, with steady pressure. Consult Technical Service for additional information.

4. SIKADUR 52
    a. Surface Preparation: Crack must be clean and sound. It may be dry or damp, but free of standing water. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles, and disintegrated materials.
    Preparation Work: Concrete - Sandblast or use other approved mechanical means.

Steel - Sandblast to white-metal finish.

b. Mixing: Pre-mix each component. Proportion 1 part Component B to 2 parts Component A by volume into a clean pail. Mix thoroughly for 3 minutes with Sika Paddle on low-speed (400-600-rpm) drill until uniformly blended. Mix only that quantity that can be used within its pot life.

c. Application: To gravity feed cracks - Pour neat Sikadur 52 into vee-notched crack. Continue placement until cracks are completely filled. Prior to filling, seal underside of slab if cracks reflect through.
To pressure inject cracks - Use automated inject equipment or manual method. Set appropriate injection ports based on system used. Seal ports and crack with Sikadur 31, Hi-Mod Gel, or Sikadur 33.
When the epoxy adhesive seal has cured, inject Sikadur 52 with steady pressure. Consult Technical Service for additional information.

PART 3 EXECUTION

3.01 FORMWORK (ACI 301, Chapter 4)

A. General:

1. Formwork shall conform to ACI 347 - "Recommended Practice for Concrete Formwork".
2. Forms may be removed when the concrete reaches the specified 28 day strength, or when the concrete reaches 74% of the specified 28 day strength and is no less than 7 days old. The 7 day minimum age requirement may be waived pending review of the proposed mix designs, forming systems, and reshoring procedures.
3. When the average daily temperature has been below 50 degrees F. for the duration of the curing period, forms may not be removed until the actual in-place strength of the concrete is demonstrated by two field-cured test cylinders or by Windsor Penetrometer, regardless of the results of tests of laboratory-cured cylinders.

3.02 REINFORCEMENT (ACI 301, CHAPTER 5)

A. Materials

1. All bars to be deformed and 40,000 psi yield for stirrups and bars requiring field bending or welding; all other bars shall be 60,000 psi yield.
2. Weld wire fabric to conform to ASTM A185.

3.03 JOINTS AND EMBEDDED ITEMS (ACI 301, CHAPTER 6)

A. Expansion Joints:

1. Delete subparagraphs 6.1.4.1, 6.1.4.2, & 6.4.1.3, and substitute the following:
2. The use of the herein specified bonding agent (adhesive), except for slabs-on-grade.
3. Premolded asphalt impregnated fiber expansion joint fillers shall conform to ASTM 1751-78 and the following:
4. Perimeter joints in exterior slabs shall be 1/4" wide and recessed 3/8" below the level of finish floor.

B. Other Embedded Items:

1. Perimeter isolation joints shall be provided with premolded asphalt impregnated fiber filler (ASTM D 1751); 1/4" thick material.
2. Prior to placing concrete for slab-on-grade construction, verify that vapor barrier is in proper installation, holes and tears sealed, joints complete and sealed, and perimeter turned-up and secured on all wall surfaces. Repair vapor barrier damaged during placement of concrete reinforcing.
3. All concrete shall be ready-mixed, not field batched. Furnish two delivery tickets with each load containing the following information:
    a. Producer and plant
    b. Job name, location, and date.
    c. Truck number and location
    d. Concrete designation and cement type
    e. Admixtures designation and cement type
    f. Time discharge started and completed
    g. Amount of concrete in load

4. Standard cylinder samples (4) must be taken before addition of water. The method of measuring water and the person(s) authorized to add water and make samples must be mutually responsible for cost of addition sampling and testing concrete requiring a slump change of more than 2", except when the HRWR admixture is being used, will be rejected.

5. Whenever the mean daily temperature falls below 40 degrees F. or is expected to fall below 40 degrees F., the procedures recommended in ACI 306, Cold Weather Concreting" and ACI 306, these specifications shall govern.

3.04 PLACING (ACI 301, CHAPTER 8)

A. Preparation Before Placing:
1. Use of salts or deicers applied to formwork to remove ice is prohibited.
2. Prior to placing concrete for slab-on-grade construction, verify that underslab fill has been certified for compaction, is the correct elevation and thickness, and has been finished along lines corresponding to slopes required on finished concrete surfaces. Completed surface of underslab fill shall be pitched parallel to requirements of finished floor lines.
4. Concrete shall not be placed when free water, muddy conditions, soft substrate, or debris is existing within the placement area.
5. Thoroughly inspect all conditions of reinforcing, remove mud and other substances which reduce bonding.
6. Notify the Architect not less than 24 hours in advance of the placing of any concrete.
7. Cooperate with other trades to provide openings and chases as shown or as required for installation of equipment. Verify sizes and locations before placement of concrete.
8. Place anchors, bolts, plates, and the like to accurate elevations and levels. Verify bolt projection and other details with trade requiring anchorage and be responsible for accuracy.
9. Verify dimensions and details with trades involved before casting concrete for all

interior and exterior equipment bases or foundations.

10. Prior to placing slab-on-grade, verify column and wall isolation joint filler has been correctly placed. Do not place slab unless all column bases have been completely grouted solid.

B. Depositing:

1. Concrete shall be discharged to job within 1-1/2 hours after water has been added (addition of water to mix after same has left the batch plant may only occur with producer's written permission stating controlling conditions) to the cement and aggregates, or cement batched with the aggregates.
2. During hot weather and under other conditions contributing to quick stiffening of concrete, or when high early strength cement is being used, reduce this elapsed time to one hour maximum.
3. Do not drop concrete by free-fall from end of conveyer, chute, or buggy, unless it can be demonstrated that no aggregate segregation occurs during placement.

C. Protection:

1. When ambient temperatures are expected to be below 40^{o} F during or within 24 hours following the placement of concrete, follow the detailed recommendations of ACI 306 "Cold Weather Concreting".
2. When ambient temperatures are expected to be above 85^{o} F during or within 24 hours following the placement of concrete, follow the detailed recommendations of ACI 305 "Hot Weather Concreting".

3.05 REPAIR AND BONDING (ACI 301, CHAPTER 9)

A. Bonding:

1. Repair of Surface Defects. All voids, damaged areas, fins, projections, honeycomb areas, and tiered holes shall be removed down to sound concrete and shall be repaired immediately after form removal and after a concrete curing compound is applied. The specified bonding agent shall be used for all patching and the specified epoxy adhesive and/or epoxy mortar shall be used for all structural repairs. All patching and repairs shall have prior approval of the architect as to method and procedure. Any concrete which has not been formed as shown on the contract drawings, is out of alignment or level or indicated a defective surface or unsoundness of any nature shall be removed and replaced to the limits required by the architect unless grants permission to patch or otherwise correct the defective work. Permission to patch or attempt the correction shall not be construed to be a waive of the architect's right to require complete removal of the defective work should the patching or correction prove to be, in the opinion of the architect, unsatisfactory either as to structure or appearance.

2. The specified bonding compound shall be used.

3. All structural repairs shall be made with prior approval of the Engineer, using the specified epoxy adhesive and/or epoxy mortar.

a. Structural Bonding Compound: (Epoxy adhesive, 100% solids, two component material suitable for use on dry or damp surface). Euco Epoxy #452 MV or #620 by The Euclid Chemical Company. Sikadur Hi-Mod by Sika Chemical Co. Epoxtite 2390 by A.C. Horn, Inc.

b. Patching Compound: (epoxy type) (100% solids, suitable for use on dry or damp surface) Euco Epoxy #456 mortar by Euclid Chemical Co. Sikadur Lo-Mod mortar by Sika Chemical Co. Epoxtite 2390 mortar by A.C. Horn, Inc.

c. Patching Compound: (cementitious type) Thin Coat by Euclid Chemical Co. Patchwell by Kaufman Company Sikatop 122 by Sika Chemical Co.

d. Bonding Compound: (polyvinyl acetate, rewettable type)
Use only in areas not subject to moisture.

Euco Weld	by Euclid Chemical Co.
Weldcrete	by Larson Products
Sonocrete	by Sonneborn-Contech
Daraweld	by A.C. Horn, Inc.

e. Bonding Admixture: The compound shall be a latex, non-wettable type, "SBR Latex" or "Flex-Con" by The Euclid Chemical Company or "Daraweld C" by W.R. Grace.

3.06 SLABS (ACI 301, CHAPTER 11)

A. Reinforcing:
1. Welded wire fabric is hereby designated as load-carrying reinforcement and shall be supported or placed no deeper than 1/2 the slab thickness nor shallower than 3/4".

B. Placement:
1. Retarding admixture in concrete placed in temperatures of 78°F or above shall be provided in lieu of any slump adjustment. Control rate of hardening with retarding admixture, not added water, when temperature and/or atmospheric conditions cause accelerated set or difficult finishing of the slab.

C. Jointing:
1. Locate sawed crack control joints (CJ's) indicated on the foundation and slab plans and as follows:
    a. At all sections subject to high shrinkage and/or temperature stress such as inside corners, openings, and mass changes where restraint to shrinkage occurs.
    b. At all open, uninterrupted expanse of slab work, provide CJ's not to exceed 15 ft. centers.

2. Sawed control joints shall be 1/8" wide and equal in depth to 25-30% of the slab depth.
3. Sawed control joints shall be started immediately but not later than 12 hours after final troweling.
4. Terminate 50% of welded wire reinforcing mesh at control joints. Construction joints in interior work are permitted but not required. Unless otherwise indicated, key all

construction joints using permanent metal or temporary wood forms. Construction joints in exterior work are not permitted. Place concrete continuously between construction joints. At all construction joints of slabs on grade, discontinue slab reinforcement, provide dowels per details. Unless otherwise indicated, seal all exterior expansion and contraction joints with the specified joint sealing compound.

D. Finishes:
   1. Provide troweled finish on all interior flatwork.
   2. Provide broomed finish on all exterior flatwork.
   3. Unless finish is specified on drawings, in finish schedules, or noted, provide finish as required per 11.8.

3.07 CURING AND PROTECTION (ACI 301, CHAPTER 12)

A. Refer to Section 03366

B. Temperature, Wind, and Humidity:
   1. When concrete above grade is placed in the open and ambient temperature exceeds 75°F, curing for the first 48 hours shall be by methods as described in Sections 12.2.1.1 through 12.2.1.6. Balance of curing shall be in accord with 12.2.3.

C. Application of Additional Protection:
   1. Refer to Section 03366

3.08 TESTING (ACI 301, CHAPTER 16)

A. Testing Agencies:
   1. The required testing services of 16.3, 16.4 and 16.5 shall be performed by an independent testing agency selected by and paid for by the Contractor, and acceptable to the Owner.
   2. Keep complete record at the job site of every concrete pour, itemizing date, location, quantity of pour, weather data, number of test cylinders taken and other tests performed.

3.09 ACCEPTANCE (ACI 301, CHAPTER 18)

A. Appearance:
   1. Exposed concrete surfaces that are "dusting", "spalling", “delaminating”, or showing other signs of an incomplete or unsatisfactory cure shall receive further applications of sealing or hardening chemicals, or shall be replaced, or ground smooth, or shall be covered with a topping or other material as shall be required to correct the defective surface condition. Any corrective measures attempted must be approved by the Architect and must provide the desired results at no cost to the Owner.

B. The presence of serious honeycomb, surface delaminations, or evidence of misalignment of forms, shall be sufficient cause for the Architect to require the entire section of concrete affected to be removed and replaced properly so as to provide the desired results at no cost to the Owner.

C. Maximum Tolerances Allowed:

1. Variation of formed portions of footing section dimensions or alignment shall not exceed 1/4" in 10'-0" (not cumulative).
2. Required floor finish surface(s) Flatness / Levelness (same shall be provided per the following Face Co. “F” – Numbers) :

   a) F_F/F_L = 28 / 20 *Overall*

   b) F_F/F_L = 23 / 18 *Local minimum*

   where F_F No. represents Finishing, F_L No. represents screed, Level strikeoff

   c) Flatness required on all Sloped-to-Drain surfaces shall be finished to an equivalent of a non-sloped surface as specified per the above given F_F/F_L Nos.

D. Crack Repair:
1. Slab-on-grade acceptance: Interior slab-on-grade shall be acceptable only after all fractures, cracking, edge-curl and similar defects have been corrected at no additional cost to the Owner.
2. Any fracture or cracking, which is in evidence at time of substantial completion of the project, shall be repaired such that the respective slab is made unbroken between indicated and intentional joints.
3. Injected epoxy adhesive and grinding, where required, shall be provided to accomplish the smooth, continuous slab surfaces; the Contractor shall provide any/all required materials, installation, and labor to rebond and make whole all slabs which have been rejected due to cracking at no additional cost to Owner.

3.10 CONCRETE ACCESSORIES

A. Bond all curbs and equipment pads to base slabs with bonding agent in accordance with manufacturer.

B. All column base plates, equipment bases and other locations noted on the structural drawings shall be grouted with non-shrink grout. All grout shall be F'C 8000 PSI non-metallic type.

++ END OF SECTION ++

SECTION 07900
JOINT SEALANTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparing substrate surfaces.

B. Sealant and joint backing.

1.2 RELATED SECTIONS

A. Section 07213 - Batt and Blanket Insulation and Firestopping: Sealants required in conjunction with firestopping.

B. Section 09260 - Gypsum Board: Sealants required in conjunction with acoustic treatment.

1.3 REFERENCES

A. ASTM C790 - Use of Latex Sealing Compounds.

B. ASTM C804 - Use of Solvent-Release Type Sealants.

C. ASTM C834 - Latex Sealing Compounds.

D. ASTM C919 - Use of Sealants in Acoustical Applications.

E. ASTM C920 - Elastomeric Joint Sealants.

F. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

G. ASTM D1565 - Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Open-Cell Foam).

H. SWRI (Sealant, Waterproofing and Restoration Institute) - Sealant and Caulking Guide Specification.

1.4 SUBMITTALS

A. Submit under provisions of Division 1.

B. Product Data: Provide data indicating sealant chemical characteristics, performance criteria, substrate preparation, limitations, and color availability.

C. Samples: Submit two samples, 6 inches in length illustrating sealant colors for selection.

D. Manufacturer's Installation Instructions: Indicate special procedures, surface preparation, perimeter conditions requiring special attention, and acceptable environmental conditions for installation.

E. Unless noted otherwise, color to match adjacent surface color.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform acoustical sealant application work in accordance with ASTM C919.

C. Maintain one copy of each document on site.

1.6 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Applicator: Company specializing in performing the work of this section with minimum five years documented experience approved by manufacturer.

1.7 MOCK-UP

A. Provide mock-up to include sealant joints in conjunction with windows and storefront systems under provisions of Division 1. Coordinate with brick sample panel.

B. Construct mock-up with specified sealant types and with other components noted.

C. Locate where directed by Architect.

D. Mock-up may not remain as part of the Work.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation. Sling psychrometer must be available during installation of the work to monitor temperature and humidity conditions.

1.9 COORDINATION

A. Coordinate work under provisions of Division 1.

B. Coordinate the Work with all sections referencing this Section.

1.10 WARRANTY

A. Provide two year notarized guarantee from the applicator and the manufacturer stating that the sealants shall remain watertight for the guarantee period or they shall be removed and replaced at no cost to the Owner. Warranty to be provided under the provisions of Division 1.

B. Warranty: Include coverage for installed sealants and accessories which fail to achieve water tight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.1 ELASTOMERIC SEALANTS

A. Polyurethane Sealant: (No. 1) One part elastomeric, complying with FS TT-S-00230C, Type I, Class, ASTM C920, Color to match adjacent materials.
   1. **Locations: Concrete floor saw cuts.**
   2. Acceptable Manufacturers
      a) Sonneborn - Sonolastic SL-1.
      b) Pecora Corporation UREXPAN. NR-201
      c) Tremco. to match above.

B. Polyurethane Sealant: (No. 2) Two-part elastomeric sealant complying with FS TT-S-00227E Class A Type 1 (self-leveling) and Type II vertical grade recommended by manufacturer for application shown and ASTM C-920, Color to match adjacent materials.
   1. **Locations: Concrete sawcuts, masonry control joints, exterior perimeter at all doors, windows and joints subject to pedestrian traffic.**
   2. Acceptable Manufacturers:
      a) Tremco THC-900 - Type 1; Dymeric 240- Type II
      b) Pecora to match above.
      c) Sonneborn, Sonnolastic SL-2 Type I and NP-2 Type II.

2.2 NON-ELASTOMERIC SEALANTS (No. 3)

A. Acrylic-Latex Sealant complying with FS TT-S-00230 and ASTM C834, paintable non-staining, gungrade.
   1. **Locations: All interior general caulking. Color to match adjacent materials.**
   2. Acceptable Manufacturers:
      a) Tremco, Tremflex 834
      b) Pecora, Enduracrylic 336
      c) Dap, Acrylic Latex

2.3 SANITARY SEALANTS (No. 4)

A. Silicone rubber based sealant, one part, mildew resistant, non-nutrient surface, conforming to FS TT-S-001543 and ANSI A 136.1 Section 6. Color - clear.
   1. **Locations: Toilet Rooms, Kitchens and other high moisture locations.**
   2. Acceptable Manufactures:
      a) General Electric 1700
      b) Tremco - Spectrem 1

2.4 STRUCTURAL SEALANTS (No. 5)

2.5 ACOUSTIC SEALANT (No. 6)

A. Non-hardening, non-drying, non-bleeding rubber based sound sealant conforming to ASTM D217, Color to match adjacent materials.
   1. **Locations: At all metal framed drywall partitions.**
   2. Acceptable Manufacturers:
      a) USG Sheetrock Brand Acoustical Sealant
      b) Tremco Acoustical Sealant

2.6 ACCESSORIES

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: ANSI/ASTM D1056; round, closed cell polyethylene foam rod; oversized 30 to 50 percent larger than joint width; Ethafoam manufactured by Dow; or Sonofoam manufactured by Sonneborn.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

E. Expansion joint metal backup plate - 15 gage galvanized.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that surfaces and joint openings are ready to receive Work and field measurements are as shown on drawings and recommended by the manufacturer.

B. Beginning of installation means installer accepts existing surfaces and substrate.

3.2 PREPARATION

A. Clean and prime joints in accordance with manufacturer's instructions.

B. Remove loose materials and foreign matter which might impair adhesion of sealant.

C. Verify that joint backing and release tapes are compatible with sealant.

D. Perform preparation in accordance with ASTM C804 for solvent release or C790 for latex base sealants.

E. Protect elements surrounding the Work of this Section from damage or disfiguration.

3.3 INSTALLATION

A. Install sealant in accordance with manufacturer's instructions.

B. Measure joint dimensions and size materials to achieve required width/depth ratios.

C. Install joint backing to achieve a neck dimension no greater than 1/3 the joint width.

D. Install bond breaker where joint backing is not used.

E. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

F. Install sealant free of air pockets, foreign embedded matter, ridges and sags.

G. Tool joints concave.

H. Install sealant No. 3 at all door frame joints with wall and door frame joints with floor.

3.4 CLEANING AND REPAIRING

A. Clean Work under provisions of Division 1.

B. Clean adjacent soiled surfaces.

C. Repair or replace defaced or disfigured finishes caused by Work of this Section.

3.5 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Division 1.

B. Protect sealants until cured.

+ END OF SECTION ++

SECTION 08110
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Standard Grade hollow metal doors and frames.

B. Related Sections:
1. Division 01 Section "LEED Requirements" for additional LEED requirements.
2. Division 04 Section "Unit Masonry" for embedding anchors for hollow metal work into masonry construction.
3. Division 08 Section “Wood Doors” for wood doors in hollow metal frames.
4. Division 08 Section "Glazing" for glass view panels in hollow metal doors.
5. Division 08 Section "Door Hardware" for door hardware for hollow metal doors and frames.
6. Division 09 Sections "Exterior Painting" and "Interior Painting" for field painting hollow metal doors and frames.
7. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators installed on frames with factory installed electrical knock out boxes.

C. References:

1. ANSI/SDI A250.8 (2003) - Recommended Specifications for Standard Steel Doors and Frames.
2. ANSI/SDI A250.4 (2001) -Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames, Frames Anchors and Hardware Reinforcing.
3. ANSI/SDI A250.6 (1997) - Recommended Practice for Hardware Reinforcing on Standard Steel Doors and Frames.
4. ANSI/SDI A250.10 (1998) - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.
5. ANSI/SDI A250.11 (2001) - Recommended Erection Instructions for Steel Frames.
6. ASTM A1008 (2003) - Standard Specification for Steel Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.

7. ASTM A653 (2002) - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
8. SDI 115 (1993) - Recommended Specifications for Steel Doors and Frames for Hardware Preparation.
9. ANSI/NFPA 80 (1999) - Standard for Fire Doors and Fire Windows; National Fire Protection Association.
10. ANSI/UL 10C (1998) - Positive Pressure Fire Tests of Door Assemblies.
11. ANSI/NAMM HMMA 867-06 (2006) – Guide Specifications for Commercial Laminated Core Hollow Metal Doors and Frames.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings.

B. Standard Hollow Metal Work: Hollow metal work fabricated according to ANSI/SDI A250.8 (2003).

1.4 SUBMITTALS

A. LEED Submittals:

1. Steel doors content for up to 60% recycled & recovered content.

B. Product Data: For each type of product indicated. Include construction details, material descriptions, core descriptions, hardware reinforcements, profiles, anchors, fire-resistance rating, and finishes.

C. Shop Drawings: Include the following:

1. Elevations of each door design.
2. Details of doors, including vertical and horizontal edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

D. Samples for Verification:

1. Samples are only required by request of the architect and for manufactures that are not current members of the Steel Door Institute.

E. Other Action Submittals:

1. Schedule: Provide a schedule of hollow metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with door hardware schedule.

F. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source and single manufacturer.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 (neutral pressure at 40" above sill) or UL 10C.

1. Stairwell Openings: Provide 450 degree temperature rise labels on stairways where required.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

C. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 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 257. Label each individual glazed lite.

D. Smoke-Control Door Assemblies: Comply with NFPA 105.

E. Exterior Openings: Comply with minimum thermal ratings, based on ASTM C518.

F. Pre-Installation Conference: Conduct conference at Project site for hollow metal frames with electrical knockout boxes to verify installation of conduit on frames (Division 26).

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work palletized, wrapped, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow metal work under cover at Project site. Place in stacks of five units maximum in a vertical position with heads up, spaced by blocking, on minimum 4-inch- (102-mm-) high wood blocking. Do not store in a manner that traps excess humidity.

1. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation. Door and frames to be stacked in a vertical upright position.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.8 COORDINATION

A. Coordinate installation of anchorages for hollow metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. CECO Door Products.
2. Curries Company.
3. Steelcraft
4. Substitutions: Material from custom hollow metal door and frame fabricators will not be accepted on jobsite without prior written approval in accordance with requirements specified in Division 1.

2.2 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

C. Frame Anchors: ASTM A 653/A 653M, Commercial Steel (CS), Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

D. Glazing: Comply with requirements in Division 08 Section "Glazing."

2.3 HOLLOW METAL DOORS

A. General: Provide 1-3/4 inch doors of design indicated, not less than thickness indicated; fabricated with smooth surfaces, without visible joints or seams on exposed faces unless otherwise indicated. Comply with ANSI/NAAMM HMMA 867 and ANSI/SDI A250.8.

B. Exterior Doors: Face sheets fabricated of commercial quality hot-dipped zinc coated steel that complies with ASTM A924 A60. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level, and HMMA 867 for door construction.

1. Design: Flush.

2. Core Construction: Bonded in place polyurethane.

3. Level/Model: Level 3 and Physical Performance Level A (Extra Heavy Duty), Minimum 16 gage (0.053 inch – 1.3-mm) thick steel, Model 2.

4. Vertical Edges: Vertical to be mechanically interlocked with seamless stile

    a. Seamless design shall be of continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth.

    b. Vertical Edges for Single-Acting Doors: Beveled Edge, 1/8 inch in 2 inches (3 mm in 50 mm).

5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gage, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel welded in place with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
6. Hinge Reinforcement: Minimum 7 gage (3/16") plate 1-1/4" x 9".
7. Acceptable Manufacturers:
    a. CECO Door Products – Imperial 6 panel Series (A60).
    b. Curries Company – 707 E6 Series (A60)
    c. Steelcraft – CE Series (A60)

C. Interior Doors: Face sheets fabricated of commercial quality cold rolled steel that complies with ASTM A366 or 620. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:

1. Design: Flush panel.
2. Core Construction: Manufacturer's standard one piece honeycomb or polystyrene core securely bonded to both face sheets.

    a. Fire Door Core: As required to provide fire-protection ratings indicated.

3. Level/Model: Level 2 and Physical Performance Level B (Heavy Duty), Minimum 18 gage (0.042-inch - 1.0-mm) thick steel, Model 2 (Fully welded, seamless face and edges).
4. Vertical Edges: Vertical edges to have the face sheets joined by a continuous weld extending the full height of the door. Welds are to be ground, filled and dressed smooth.

    a. Vertical Edges for Single-Acting Doors: Beveled Edge, 1/8 inch in 2 inches (3 mm in 50 mm).

5. Top and Bottom Edges: Reinforce tops and bottoms of doors with a continuous steel channel not less than 16 gage, extending the full width of the door and welded to the face sheet. Doors with an inverted top channel to include a steel closure channel welded in place with the web of the channel flush with the face sheets of the door. Plastic or composite channel fillers are not acceptable.
6. Hinge Reinforcement: Minimum 7 gage (3/16") plate 1-1/4" x 9".
7. Acceptable Manufacturers:
    a. CECO Door Products - Regent Series.
    b. Curries Company – 707N Series with flush top closure and 12 gage hinge channel.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 with reinforcing plates from same material as door face sheets.

2.4 HOLLOW METAL FRAMES

A. General: Comply with ANSI/SDI A250.8 and with details indicated for type and profile.

B. Exterior Frames: Fabricated of hot-dipped zinc coated steel that complies with ASTM designations A924 A60.

1. Fabricate frames with mitered or coped corners.
2. Fabricate exterior frames with "closed and tight" miter seams continuously welded on face and back joints, finished smooth with no visible seam unless otherwise indicated.
3. Fabricate exterior frames with built in thermal break profile even if not indicated in the door frame details on drawings.
4. Frames for Level 3 Steel Doors: Minimum 14 gage (0.067-inch -1.7-mm) thick steel sheet.
5. Acceptable Manufacturers:
    a. CECO Door Products – SQ-Thermal Break Series.
    b. Curries Company – M-Thermal Break Series.

C. Interior Frames: Fabricated from cold-rolled steel sheet that complies with ASTM A366-68 or ASTM A569-66T

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames with "closed and tight" miter seams continuously welded on face and back joints, finished smooth with no visible seam unless otherwise indicated.
3. Frames for Level 2 Steel Doors (up to 48 inches in width): Minimum 16 gage (0.053-inch -1.3-mm) thick steel sheet.

4. Frames for Level 2 Steel Doors (48 inches and up in width): Minimum 14 gage (0.067-inch -1.7-mm) thick steel sheet.
5. Frames for Borrowed Lights: Minimum 16 gage (0.053-inch -1.3-mm) thick steel sheet.
6. Acceptable Manufacturers:
    a. CECO Door Products - SQ Series.
    b. Curries Company - M Series.
    c. Steelcraft – F Series.

D. Hardware Reinforcement: Fabricate according to ANSI/SDI A250.6 Table 4 with reinforcement plates from same material as frames.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (50 mm) wide by 10 inches (250 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Floor anchors are to be provided at each frame, formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
2. Separate Topping Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

2.6 HOLLOW METAL PANELS

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

2.7 STOPS AND GLAZED LITES

A. Moldings for Glazed Lites in Doors: Flush steel glazing, minimum 16 gage (0.053-inch -1.3-mm) galvanized, butted at the corner joints and secured to the frame with countersunk cadmium or zinc-plated screws.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

2.8 ACCESSORIES

A. Mullions and Transom Bars: Join to adjacent members by welding or rigid mechanical anchors.

B. Grout Guards: Formed from same material as frames, not less than 0.016 inches (0.4 mm) thick.

2.9 FABRICATION

A. Fabricate hollow metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. Tolerances: Fabricate hollow metal work to tolerances indicated in ANSI/SDI A250.8.

C. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors to permit moisture to escape.
2. Glazed Lites: Factory cut openings in doors with applied flush trim kit to fit.
3. Astragals: Provide overlapping astragal as noted in door hardware sets in Division 08 “Door Hardware” on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.
4. Continuous Hinge Reinforcement: Provide welded continuous 12 gage strap for continuous hinges provided at exterior door openings.
5. Electrical Wiring: Provide hollow metal doors receiving electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on both ends to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electrified hardware and the electric thru wire hinge or pivot specified in hardware sets in Division 08, "Door Hardware".

D. Hollow Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face and back joints continuously; grind, fill, dress, and make smooth, flush, and invisible.

    a. Welded frames are to be provided with a steel spreader temporarily attached to the bottom of both jambs to serve as a brace during shipping and handling. Spreader bars are for bracing only and are not to be used to size the frame opening.

2. Sidelight and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
3. Equal Rabbet Frames: Provide frames with equal rabbet dimensions unless glazing and removable stops require wider dimensions on glass side of frame.
4. High Frequency Hinge Reinforcement: Provide high frequency hinge reinforcements at door openings 48-inches and wider with mortise/butt type hinges at top hinge locations.

5. Continuous Hinge Reinforcement: Provide welded continuous 12 gage straps for continuous hinges provided at exterior door openings.
6. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops, provide security screws at exterior locations.
7. Grout Guards: Weld guard boxes to frame at back of hardware mortises in frames at all hinges and strike preps regardless of grouting requirements.
8. Electrical Wiring: Provide hollow metal frames receiving electrified hardware with concealed wiring harness and standardized Molex™ plug connectors on one end to accommodate up to twelve wires. Coordinate connectors on end of the wiring harness to plug directly into the electric thru wire hinge or pivot specified in hardware sets in Division 08 "Door Hardware".
9. Electrical Knock Out Boxes: Factory weld 18 gage electrical knock out boxes to frame for electrical hardware preps; this includes but not limited to electric thru wire hinges and pivots, electrical wiring harnesses, door position switches, electric strikes and magnetic locks as noted in door hardware sets in Division 08, “Door Hardware”.

    a. Provide electrical knock out boxes with a dual 1/2-inch and 3/4-inch knockouts.
    b. Conduit to be coordinated and installed in the field (Division 16) from middle hinge box and strike box to door position box.
    c. Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08, “Door Hardware”.
    d. Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.

10. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
11. Jamb Anchors: Provide number and spacing of anchors as follows:

    a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) on and as follows:

        1) Two anchors per jamb up to 60 inches (1524 mm) high.
        2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
        4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.

    b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) on center and as follows:

        1) Three anchors per jamb up to 60 inches (1524 mm) high.
        2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
        3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
        4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.

5) Two anchors per head for frames above 42 inches (1066 mm) wide and mounted in metal-stud partitions.

12. Door Silencers: Except on weather-stripped or gasketed doors, drill stops to receive door silencers as follows. Keep holes clear during construction. Silencers to be supplied by frame manufacturer.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

E. Hardware Preparation: Factory prepare hollow metal work to receive template mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to the Door Hardware Schedule in Division 08 Section "Door Hardware."

1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
2. Reinforce doors and frames to receive non-template, mortised and surface-mounted door hardware.
3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 Sections.

2.10 STEEL FINISHES

A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Prior to installation, adjust and securely brace welded hollow metal frames for squareness, alignment, twist, and plumbness to the following tolerances:

1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.

C. Drill and tap doors and frames to receive non-template, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. General: Install hollow metal work plumb, rigid, properly aligned, and securely fastened in place; comply with Drawings and manufacturer's written instructions.

B. Hollow Metal Frames: Install hollow metal frames of size and profile indicated. Comply with ANSI/SDI A250.11.

1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.

    a. At fire-protection-rated openings, install frames according to NFPA 80.
    b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    c. Install frames with removable glazing stops located on secure side of opening.
    d. Install door silencers in frames before grouting.
    e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.

2. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
3. Grout Requirements: Do not grout head of frames unless reinforcing has been installed in head of frame. Do not grout vertical or horizontal closed mullion members.

C. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

D. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) on center and not more than 2 inches (50 mm) on center from each corner.

a. Secure exterior removable stops with security head screws.

3.4 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08110

SECTION 09111
METAL STUD FRAMING SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Formed metal stud framing at soffit and wall locations.

B. Framing accessories.

1.2 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Metal support to attach stud framing.

B. Section 06114 - Rough Carpentry: Rough wood blocking within stud framing.

C. Section 07213 - Batt and Blanket Insulation and Firestopping: Insulation within stud framing.

D. Section 07900 - Joint Sealants.

E. Section 09260 - Gypsum Board.

1.3 REFERENCES

A. ASTM A525 - General Requirements for Steel Sheet, Zinc- Coated (Galvanized) by the Hot-Dip Process.

B. ANSI/ASTM A591 - Steel Sheet, Cold-Rolled, Electrolytic Zinc-Coated.

C. ASTM C645 - Non-Load (Axial) Bearing Steel Studs, Runners (Track) and Rigid Furring Channels for Screw Application of Gypsum Board.

D. ASTM C 754 - Installation of Steel Framing Members to Receive Screw-Attached Gypsum Wallboard, Backing Board, or Water-Resistant Backing Board.

E. GA 201 - Part II, Supporting Construction.

1.4 SYSTEM DESCRIPTION

A. Metal stud framing system for soffits and walls, with batt type acoustic insulation specified in Section 07213, gypsum board specified in Section 09260.

B. Maximum Allowable Deflection: 1/360 span.

C. Design system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

1.5 SUBMITTALS

A. Submit shop drawings, Product Data, under provisions set forth in Vol. I (Project Manuals) .

B. Submit shop drawings, indicating component details, anchorage to structure, type and location of fasteners, and accessories or items required of other related work.

C. Describe method for securing studs to tracks, and for blocking and reinforcement to framing connections.

1.6 QUALITY ASSURANCE

A. Perform work in accordance with ASTM C754.

B. Provide all work installed according to standards and practice as published by United States Gypsum "Gypsum Construction Handbook".

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. United States Gypsum, Chicago, Ill., 800-950-3839.

B. National Gypsum Co. (Gold Bond), Central Area 800-252-1065.

C. Dietrich Industries Inc., Pittsburgh, PA., 412-281-2805.

D. Substitutions: Under provisions set forth in Vol. I (Project Manuals).

2.2 FRAMING MATERIALS

A. Studs: ASTM C645, ASTM A525, galvanized to G90 coating class, ANSI/ASTM A591, electrogalvanized, non-load bearing rolled steel, channel shaped, punched for utility access, as follows:

1. Full height walls and soffit framing:
studs 3-5/8" & 4” (358 ST25) 25 gage.
runner 3-5/8" & 4” (358CR22) 22 gage.
studs 2-1/2" (212 ST20) 20 gage.
runner 2-1/2" (212 CR22) 22 gage.

B. Studs: ASTM A570, ASTM A446, galvanized channel shaped wall bracing studs at 8'-0" o.c., diagonal bracing to structure, and studs in walls supporting wall cabinets: studs 2-1/2" 16 gage structural studs.

C. Curved Runners: 2x 4 and 2x 6 Flex-C Plate as manufactured by Flex-C Trac. www.flexc.com.

D. Furring Channels: 1-1/4" width, 7/8" deep.

E. Bracing Members: Of same material and finish as studs, thickness to suit purpose as indicated on drawings.

F. Fasteners: GA 201 Self-drilling, self-tapping screws.

G. Anchorage Devices into concrete:
   1. Metal stud wall runners - 1/4" dia. Tapcon concrete screws by ITW Buildex.
   2. In the event that Tapcon does not tighten properly, use 1/4" Blue Max anchor.

H. Primer: FSTT-P-645, for touch-up of galvanized surfaces.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that conditions are ready to receive work.

B. Verify field measurements are as shown on Shop Drawings.

C. Verify that rough-in utilities are in proper location.

D. Beginning of installation means installer accepts existing conditions.

3.2 ERECTION

A. Align and secure top and bottom runners at 24 inches o.c. Secure “Flex-C Plate” in accordance with manufacturer’s recommendations.

B. Fit runners under and above openings; secure intermediate studs at spacing of wall studs.

C. Install studs vertically at 16 inches o.c.

A. Connect studs to tracks using self-tapping metal screws.

E. Stud splicing not permissible.

F. Construct corners using minimum three studs.

G. Double studs at wall openings, door and window jambs, and not more than 2 inches each side of openings.

H. Brace stud framing soffit system and make rigid.

I. Coordinate erection of studs with requirements of door and window frame supports and attachments.

J. Align stud web openings.

K. Coordinate installation of bucks, anchors, and blocking with electrical and mechanical work to be placed in or behind stud framing.

L. Space furring channels horizontally or vertically 16" on center. Secure to studs on substrate wall.

M. Blocking: Secure wood blocking to studs as required.

N. Provide 12' long stud at 8'-0" o.c. and diagonally brace top to structure wall sound rating of 45 STC required.

O. Coordinate placement of insulation in multiple stud spaces made inaccessible after stud framing erection.

3.3 TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation of any Member from Plane: 1/4 inch.

3.4 SCHEDULE

A. Typical walls and soffit framing :
- 6” metal studs at 16” o.c.
- 3-5/8" metal studs at 16" o.c.
- 1-1/2" metal studs at 16" o.c.

B. Wall bracing studs: 2-1/2" 16 gage at 8'-0" o.c.

C. Interior Kitchen walls supporting cabinets: All studs 2-1/2" 16 gauge at 16" o.c.

D. Wall types are shown on Drawing Sheet 3.1 and as indicated on drawings.

++ END OF SECTION ++

SECTION 09260
GYPSUM BOARD

PART 1 GENERAL

1.1 WORK INCLUDED

A. Gypsum board.

B. Taped and sanded joint treatment.

C. Accessories

1.2 RELATED WORK

A. Section 06114 - Rough Carpentry: Wood blocking for support of accessories and equipment.

B. Section 07213 - Batt and Blanket Insulation: Within Stud Framing.

C. Section 09111 - Metal Stud Framing System.

D. Section 09900 - Painting: Surface finish.

E. Section 07900 - Joint Sealant: Sealant at base of all sound walls.

1.3 REFERENCES

A. ANSI/ASTM C36 - Gypsum Wallboard.

B. ANSI/ASTM C475 - Joint Treatment Materials for Gypsum Wallboard Construction.

C. ANSI/ASTM E119 - Fire Tests of Building Construction and Materials.

D. GA-201 - Gypsum Board for Walls and Ceilings.

E. GA-216 - Recommended Specifications for the Application and Finishing of Gypsum Board.

F. ASTM C473 - Humidified deflection; inches.

G. ASTM C754 - Installation of framing members to receive screw attached boards.

1.4 QUALITY ASSURANCE

A. Applicator: Company specializing in gypsum board systems work with 10 years documented experience.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS - GYPSUM BOARD SYSTEM

A. United States Gypsum., Chicago, Ill., 800-950-3839

B. Other acceptable manufacturers offering equivalent products:
1. National Gypsum Co. (Gold Bond), Central Area 800-252-1065.
D. G-P Gypsum (A Georgia Pacific company), Midwest 800-876-4746.

C. Substitutions: Under provisions of Division 1.

2.2 GYPSUM BOARD MATERIALS

A. Standard Fire Code and Non Rated Gypsum Board: ANSI/ASTM C36; both 5/8 inch and 1/2 inch thick, maximum permissible length; ends square cut, tapered and beveled edges depending on location or details. See wall types on Sheet 3.1.

B. Provide & Install new concrete board at bathroom areas. (or tile backer board)

2.3 ACCESSORIES

A. Corner Beads: Metal. USG Durabead or #800 corner bead.

B. Edge Trim: USG 200A or 200B.

C. Joint Materials: ANSI/ASTM C475; GA 201 and GA 216; reinforcing tape, joint compound, adhesive, water, and fasteners.

D. Fasteners: Type "S" screws to attach gypsum board to metal framing; Type "W" screws to attach gypsum board to wood framing.

2.4 EXPANSION JOINT

A. Control joint USG #093 across joints in large ceiling and wall areas; min. spacing 12' to max. of 20'. Coordinate exact location with Architect before installation.

PART 3 EXECUTION

3.1 CEILING AND SOFFIT FRAMING INSTALLATION

A. Install in accordance with ANSI/ASTM C754, GA 201 and GA 216.

B. Coordinate location of support hangers or metal studs with other work.

C. Install ceiling framing independent of walls, columns, and above-ceiling work.

D. Reinforce openings in ceiling suspension system which interrupt main carrying supports or furring channels, with lateral channel bracing. Extend bracing minimum 24 inches past each end of openings.

E. Laterally brace entire suspension system.

3.2 GYPSUM BOARD INSTALLATION

A. Install gypsum board in accordance with GA 201 and GA 216.

B. Erect single layer standard gypsum board in most economical direction, with ends and edges occurring over firm bearing. Provide multiple layers where required for fire rating. Note: On curved walls gypsum board to be erected in horizontal direction.

C. Use screws when fastening gypsum board to metal furring or framing.

D. Place corner beads at external corners. Use longest practical length. Place edge trim where gypsum board abuts dissimilar materials.

E. Coordinate control joints with the structure and aesthetics. Verify locations with the Architect.

3.3 CEILING FRAMING INSTALLATION

A. Install in accordance with GA201 and GA216.

B. Install on stud framing supported or suspended from structure above. If ceiling area is small (under 16 square feet), the stud framing can frame into walls and be a clear span.

C. Provide multiple layers where required for fire rating.

3.4 JOINT TREATMENT

A. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.

B. Feather coats onto adjoining surfaces so that camber is maximum 1/32 inch.

3.5 TOLERANCES

A. Maximum Variation from True Flatness: 1/8 inch in 10 feet in any direction.

3.6 FINISHES

A. Refer to Section 09900, Painting, for all required surface preparation prior to final finishing.

++ END OF SECTION ++

SECTION 09900
PAINTING

PART 1 GENERAL

1.1 DESCRIPTION

A. Paint and finish work according to schedules and specifications.
   1. Paint and finish all surfaces in those rooms scheduled for finishing, including walls and ceilings, accessories, equipment, and other exposed parts of the project which are not prefinished.
   2. Paint and finish all surfaces where finishing is not specified under other sections of the Work.
   3. Paint or finish, unless otherwise indicated, all alcoves, recesses, and closets with same treatments as indicated for similar parts in the adjoining room.
   4. Paint or finish wall surfaces behind such items as open shelving and exposed heating units, the same as balance of wall.
   5. Paint all new panel boards for circuit breakers etc. to match existing.

B. Paint and finish is not required on the following:
   1. Where specifically omitted.
   2. Items permanently concealed in areas such as above ceilings and in crawl spaces, including pipes, pipe covering, hangers, and conduit.
      a. This does not include such areas as drawer and cabinet interiors. See Section 06200, Finish Carpentry and Millwork.
   3. Wall areas permanently concealed by attached accessories or equipment.
   4. Do not paint any moving parts of operating units; mechanical or electrical parts such as valve operators, linkages, sensing devices, and motor shafts, unless otherwise indicated.
   5. Do not paint over any required labels or equipment identification, performance rating, name, or nomenclature plates.

C. Definitions:
   1. The term "paint", as used herein, means all coating systems materials including primers, emulsions, epoxy, enamels, sealers, fillers, and other applied materials whether used as prime, intermediate, or finish coats.

1.2 SUBMITTALS

A. Color Selector: Submit color chips of selected manufacturer's match of colors listed.

B. Samples: Submit duplicate 4" x 12" samples of site-finish woodwork.
   1. Obtain material samples from supplier.
   2. Finish sample:
      a. 1/2 sample shall show final finish.
      b. 1/2 sample shall show successive steps taken to produce final finish.
   3. Approved sample shall be standard of finish and color to be accepted.

C. Revised Schedule: Upon completion, submit an updated, revised color schedule showing actual color used and locations.

D. Extra Stock: Provide Owner with unopened gallon of paint of each color used, properly identified and coordinated with final schedule.

1.3 QUALITY ASSURANCE

A. Do no work until samples are approved.
   1. Approved samples shall be strictly duplicated in the Work.
   2. Any additional coats required to reproduce approved samples shall be applied at no additional cost to Owner.

B. Prior to commencing the painting and finishing work, one room for each general wall color will be selected by the Architect for complete finishing and, following approval, will be used as a workmanship standard for all subsequent work.

C. All accent walls and graphics shall be inspected and approved prior to application of finish coat.

D. The Architect will inspect and approve each coat of materials before application of the succeeding coat.
   1. Any coat covered by a succeeding coat before being approved shall be reapplied at no additional cost to Owner. Notify the Architect when each coat is completed for inspection.
   2. The Architect reserves the right to make minor color changes from 2nd to final coat upon inspection of 2nd coat.
   3. Do not purchase paint for final coat until 2nd base coat in sample room is approved by the Architect unless paint can be exchanged for another color.

E. Qualification of workmen:
   1. Provide at least one person who shall be present at all times during execution of the Work of this Section, who shall be thoroughly familiar with the specified requirements and the materials and methods needed for their execution, and who shall direct all Work performed under this Section.

   2. Provide adequate numbers of workmen skilled in the necessary crafts and properly informed of the methods and materials to be used.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in unopened containers premixed and packaged by the manufacturer, or his authorized distributor, bearing the manufacturer's standard label, showing trade name and number, formula, contents by volume, thinning instructions, and directions for use.
   1. Do not open containers until contents are to be used.

B. Store materials where directed, keep storage space clean and accessible.

C. Place oil or paint-soaked rags and waste in tight-covered metal containers or remove from the premises at close of each day's work.
   1. Take every precaution to avoid damage by fire.
   2. In no case shall amount of materials stored exceed that permitted by local ordinances, state laws, or fire underwriter regulations.

D. Upon completion of work, leave storage area clean and in same condition as remainder of work.

1.5 JOB CONDITIONS

A. Use no plumbing fixture, open waste or vent pipe, or other pipe of any kind, to dispose of paint materials, used rags, waste, or other materials.

B. Do not use water closets, or other fixtures of any kind, as supports for planking, and thoroughly protect these items from damage at all times.

C. Provide clean drop cloths, and other protection as approved, to protect floors, doors, windows, and other parts from damage.
   1. Where any work is accidentally splattered, clean promptly and leave in satisfactory condition.

PART 2 PRODUCTS

2.1 MATERIALS

A. All materials shall be of the quality specified, premixed, and products of one manufacturer.
   1. Only materials specified by Architect shall be brought to the project.

B. All auxiliary materials, such as linseed oil, shellac, turpentine, etc., shall be pure and of highest quality.
   1. Such materials shall bear identifying labels on containers.

C. Provide finishes as indicated.
   1. Use materials on list of approved manufacturers corresponding to those indicated for finish requirements.
   2. Only those manufacturers listed will be acceptable.

2.2 REQUIREMENTS

A. The following list of surfaces is intended to be comprehensive; refer to Drawings and other sections of the Specifications for project materials specified.

B. Interior Finish Requirements: Reference indications ("F" and "P" prefixes, followed by numbers) refer to similarly indexed products listed on approved manufacturer's list.

SURFACE	PRIMER FINISH	FIRST COAT	SECOND COAT

(-) No coat required

Wood and Plywood	P-5	F-5	F-5
Stain/Varnish Wood	P-7/P-8	F-7	F-8
Concrete Masonry Units (Exterior)	P-9	F-6	F-6
Concrete, Masonry Units (Interior)	P-3/P-4	F-2/F-3	F-2/F-3
Gypsum Wallboard (Walls, Ceilings, Etc.)	P-6	F-5	F-5
Ferrous Metal	P-2	F-5	F-5
Galvanized Metal		F-5	F-5
Drawer and Cabinet Interiors (Unless laminated)		F-9	F-9
Uncovered Pipes/Conduits (Exposed To View) (Not Containing Heat)	P-2	F-5	F-5
Asphalt / Concrete		F-4	

2.3 APPROVED MANUFACTURERS

A. Sherwin-Williams Co.
(or equivalent by Pittsburgh Paints & Benjamin Moore & Co.)

Ref. Product Description, Primers, Preparation Materials, & Stains

P-1 A-100 Alkyd Exterior Wood Primer Y24W20
P-2 Kem Kromik Metal Primer B50N2/B50W1 B50NZ6-Brown, B50WZ1-White
P-3 Kem Cati Coat HS Epoxy Filler Sealer Off White, B42W00400
P-4 Kem Cati Coat HS Epoxy Filler Sealer Hardener, B42V00401
P-5 Prep Rite Wall & Wood Primer B49W
P-6 Prep Rite 200 Latex Primer B28W200 1.1 Mils
P-7 Interior Wood Stain A-49-200 Series
P-8 Sherwood 100 Fast Dry Semi-paste Filler D70T1
P-9 Loxon Block Surfacer, White, A24W00200

Paint & Varnish Finishes

F-1 A-100 Latex Satin A82 Series 1.5 Mils
F-2 Macropoxy 646 Fast Cure Epoxy, White, B58W00610
F-3 Macropoxy 646 Fast Cure Epoxy Hardener , B58V00600

F-4 Set Fast Acrylic Traffic Marking TM 226 White
F-5 ProMar 200 Latex Eg-Shel B20W200 Series 1.5 Mils
F-6 Acrylic Latex Super Paint
F-7 Oil Base Gloss Varnish A66V91 Wood Classics Oil Varnish A66 V391 Gloss
F-8 Oil Base Satin Varnish A66F90 Wood Classics Oil Varnish A66F390 Satin
F-9 ProMar Sanding Sealer B26V3 Wood Classics Sanding Sealer B26V43

2.4 MISCELLANEOUS MATERIALS AND FINISH REQUIREMENTS

A. On interior of convector cabinets, duct throat surfaces, and other surfaces which are visible (back of grilles, registers, louvers, etc.):
   1. Prepare surfaces and prime-coat same as metal work.
   2. Apply one coat flat black, oil base metal paint.

B. Pretreat galvanized or zinc coated metals, except hollow metal doors and frames, with one coat of:
   1. American Chemical Paint Company's "Lithoform".
   2. Neilson Chemical Company's "Gavaprep No. 5".
   3. Pratt & Lambert's "Galvanized Metal Latex Primer".

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Before commencing work on any surface, carefully inspect and ascertain that surface is dry and suitable in all respects to receive the indicated treatment.
   1. Determine dryness of moisture-holding materials by use of an accurate electronic moisture meter.

B. The following surface preparation requirements are minimum requirements. Follow paint manufacturers written surface preparation procedures. Prepare all surfaces to receive the particular treatment specified. Employ all usual preparatory measures common to painting work, and any special measures required.

C. Prime-Coated Miscellaneous Ornamental Ferrous Metal
   1. Prepare surfaces of miscellaneous and ornamental ferrous metal items, such as hollow metal frames and doors, exposed lintels, edge angles, brackets, etc., as specified for exposed-to-view structural steel parts.
   2. Fill any open joints or deep abrasions in manufacturer's prime coat with mineral filler, sand smooth, and spot prime.

D. Metals, Galvanized or otherwise Zinc-Coated
   1. Unless the prime coat material to be used is recommended by its manufacturer for application over zinc-coated surfaces of the type at hand, pretreat surfaces prior to application of prime coat with phosphate treatment.
      a. Usual vinegar etch, or acid pretreatment wash will not be permitted.
      b. Strictly follow manufacturer's directions as to cleaning prior to treatment, application of treatment, and after-rinse.

2. Thoroughly clean all surfaces receiving directly applied prime coat with mineral spirits, naptha, or other approved solvent.
    a. Completely remove all oil, grease, and other film.
    b. Roughen with steel wool as necessary to remove gloss.

E. Wood Parts:
1. Painted Finish:
    a. Seal knots, pitch streaks, and sappy spots in wood surfaces.
    b. Remove any accumulated pitch residue before applying first coat.
    c. Use shellac on interior work.
    d. Apply in thin coats. Sand smooth when dry.
2. Putty nail holes and similar face voids in wood surfaces after prime sealer coat is dry.
    a. Tint putty to match previously applied coat (match wood color for clear finish).
    b. Bring putty flush with the surface in a neat, workmanlike manner.

3. Back prime all wood trim, hook strips, peg board, and other finished wood items prior to installation of materials.
4. Unless specifically approved by the Architect, do not proceed with painting of wood surfaces until the moisture content of the wood is 12% or less as measured by a moisture meter.

F. Plaster/Drywall Surfaces:
1. Rake out all cracks in an inverted "V" a minimum of 1/8" deep.
2. Fill all cracks and holes with ready mixed joint compounds.

3.2 APPLICATION

A. Following surface preparation as specified, apply coats or treatments as listed under the respective headings for the several kinds of surfaces required to be treated.

B. Thin no coating more than specifically recommended by the manufacturer.
1. Use thinner of the type recommended.
2. Thin no ready-prepared coating, and add no driers at the job, unless approved by the Architect.

C. All work shall be done by skilled mechanics in a workmanlike manner with all coats flowed on, or brushed out, to a uniform film.
1. Completed work shall be free of runs, sags, block angles, raised grain, and all other evidence of poor or careless workmanship.
D. Tint all undercoats toward the final color, with shade of each coat sufficiently different from that of work in place to permit easy identification.
E. Allow sufficient time before recoating to insure proper drying of the preceding coat.

F. For finishes on wood or metal, sand original (or shop prime) surface, and between coats, with fine sandpaper, and remove all resulting grit and dust before application of each coat.
1. Sand wood surfaces only with the grain.

G. Apply all coatings by brush or roller, unless spray application is specifically named as acceptable in description of required treatment.

H. Thoroughly stir coatings and keep at a uniform consistency during application.

I. No work shall be done on damp surfaces unless printed instructions on label so recommend for the particular coating being used.

J. Do no exterior painting during or immediately following rainy or frosty weather, or when the temperature is below 50°F., or likely to drop to freezing.
   1. Avoid application of treatments while surfaces are exposed to hot sun, or when temperature is above 90°F, or likely to be, during the drying period.

K. Do interior work only when the building work area is properly heated and ventilated and as nearly clean and dust-free as possible.
   1. Apply interior finishes only when a room temperature of at least 60°F, can be maintained during application of treatments, and until coatings are dry.
   2. For application of stains and similar treatments, a temperature of at least 75°F, shall be maintained.

L. Apply the first and final coats of treatment specified to top and bottom of metal doors.
   1. To paint bottom edge, take down doors, rehang after drying.

M. If the completed finish, or any of the successive coats used in producing it, blisters, checks, peels, or otherwise fails, remove the applied treatment and refinish the surfaces affected.

N. Do not paint over sealants in control joints.

++ END OF SECTION ++

SECTION 10522
FIRE EXTINGUISHERS, CABINETS AND ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fire extinguishers.

B. Cabinets.

C. Accessories.

1.2 RELATED SECTIONS

A. Section 04300 - Unit Masonry System: Roughed-in wall openings.

B. Section 09111 - Metal Stud Framing System.

1.3 REFERENCES

A. ANSI/NFPA 10 - Portable Fire Extinguishers.

B. ANSI/UL 92 - Fire Extinguisher and Booster Hose.

C. ANSI/UL 711 - Rating and Fire Testing of Fire Extinguishers.

D. UL 299 - Dry Chemical Fire Extinguishers.

1.4 SUBMITTALS

A. Submit under provisions of Division 1.

B. Shop Drawings: Indicate cabinet physical dimensions, rough-in measurements for recessed cabinets, wall bracket mounted measurements, and location.

C. Product Data: Provide extinguisher operational features, color, and finish.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements of NFPA and UL.

1.5 OPERATION AND MAINTENANCE DATA

A. Submit under provisions of Division 1.

B. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.6 QUALITY ASSURANCE

A. Provide units conforming with ANSI/UL 711 and ANSI/UL 92.

1.7 REGULATORY REQUIREMENTS

A. Conform to applicable code and ANSI/NFPA 10 for requirements for extinguishers.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. J.L. Industries, Inc., Bloomington, MN. 952-835-6850.

B. Potter Roemer, Wood Dale, IL, 800-547-3473.

C. Larsen's Manufacturing Co., Minneapolis, MN. 763-571-1181.

2.2 EXTINGUISHERS

A. ABC Dry Chemical Type: UL 4A-60BC, Model Number Cosmic 10E, (J.L. Industries). Cast steel tank, with pressure gage. Color: Red. Approved for Class A, B and C fires.

2.3 CABINETS (Only required to use fire extinguisher cabinetry in the classroom areas- the “back of house areas” and lab may be wall bracketed.)

A. Metal: Panorama Series Model Number 1036-C -70 (J.L. Industries) Formed sheet steel, primed. **The finish may be #180 clear anodized**.

B. Configuration: Recessed type, sized to accommodate accessories and coordinate rough openings with Masonry Contractor.

C. Returned to wall surface.

D. Door: Clear acrylic with no lettering -continuous hinge.

E. Cabinet Mounting Hardware: Appropriate to cabinet.

2.4 ACCESSORIES

A. Wall Mounted Extinguisher Brackets: Model Numbers MB846 (Cosmic 10E). Formed steel, black enamel finish.

2.5 FABRICATION

A. Form cabinet enclosure with right angle inside corners and seams. Form perimeter trim.

B. Pre-drill for anchors.

C. Hinge doors for 180 degree opening with continuous piano hinge. Provide manufacturers standard catch.

D. Weld, fill, and grind components smooth.

2.6 FINISHES

A. Extinguisher: Steel, enamel to be "red" color.

B. Cabinet Exterior Trim and Door:
1. Cabinets recessed : #180 clear anodized frame.

C. Cabinet Interior: White epoxy coated steel box.

PART 3 EXECUTION

3.1 EXAMINATION

A. Coordinate wall openings under provisions of Section 01039.

B. Verify rough openings for cabinet are correctly sized and located.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cabinets plumb and level in wall openings, 36 inches from finished floor to inside bottom of cabinet.

C. Secure rigidly in place.

D. Place extinguishers in cabinets or on bracket as shown on the drawings.

3.3 SCHEDULES

A. All locations: Use 10 lb. extinguishers.

B. Drawing symbols F.E.C. = "Fire Extinguisher Cabinet" indicates scope of built-in cabinets with extinguishers. Drawing symbols F.E. = "Fire Extinguisher" indicates scope of wall mounted brackets with extinguishers.

++ END OF SECTION ++

SECTION 10800
TOILET ACCESSORIES

PART 1 GENERAL

1.1 DESCRIPTION

A. Provide toilet accessories as shown on Drawings and specified herein.

1.2 QUALITY ASSURANCE

A. Toilet Accessory Manufacturers: (Specifications are based on Bobrick)
   1. Bobrick Washroom Equipment, Inc., Los Angelos, CA., 800-553-1600.
   2. Bradley, Menomonee Falls, WI, 800-BRADLEY.
   3. Tubular Specialties Manufacturing, Inc., Los Angelos, CA, 800-GRABBAR

B. Provide products of the same manufacturer for all toilet accessories on the project. See sheet A2.3

C. Furnish proper type of anchoring devices for the installation of toilet accessories. Provide setting drawings, templates, instructions and directions for installation of anchorage devices.

1.3 SUBMITTALS

A. Submit manufacturer's catalog cuts and data sheets, complete parts list and installation instructions for each accessory item specified.

B. Submit maintenance data, operating instructions and keys required for each type of equipment and lock.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver accessories in manufacturer's original unopened protective packaging.

B. Store in packaging to prevent damage or soiling.

C. Maintain protective coverings on all units until installation is completed, remove at final clean-up.

1.5 GUARANTEE

A. Furnish manufacturer's standard guarantee against silver spoilage for all mirrors, minimum 10 years.

PART 2 PRODUCTS

2.1 MATERIALS

A. See sheet A2.3 for Washroom Equipment Schedule.

2.2 FABRICATION

A. Fabricate recessed units with seamless one-piece flange on exposed face.

B. Weld corners, leaving no open miters.

C. Stamped names or labels on exposed faces of units will not be permitted.

D. Provide locks where specified. Key locked units alike for all accessories.

PART 3 EXECUTION

3.1 INSTALLATION

A. Use concealed fastenings.

B. Provide anchors, bolts and other necessary fasteners, and attach accessories securely to walls in locations as shown.

C. Provide theft-resistant fasteners for all accessory mountings.

D. Clean and polish all exposed surfaces after installation.

++ END OF SECTION ++

SECTION 095100
ACOUSTICAL CEILINGS - USG

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Suspended metal grid ceiling systems.

B. Acoustical and nonacoustical units.

C. Supplementary acoustical insulation above ceiling.

D. Wall angles and shadow moldings.

1.02 RELATED REQUIREMENTS

A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 REFERENCE STANDARDS

A. ASTM A580/A580M - Standard Specification for Stainless Steel Wire; 2018.

B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.

C. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021a.

D. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2022.

E. ASTM C635/C635M - Standard Specification for Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2022.

F. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2019.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2022.

H. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2020.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate work of this section with installation of mechanical and electrical components and with other construction activities affected by work of this section.

1. Review with affected installers those locations of facility services lines and equipment within ceiling plenum that prevent installation of hangers at spacings compliant with limitations established in referenced standards. Arrange for each affected mechanical or electrical installer to provide necessary number of additional structural support points for ceiling installer.

B. Preinstallation Meeting: Convene one week before starting work of this section.

C. Sequencing: Schedule work of affected trades to minimize or eliminate installation conflicts and rework.

1. Supply hanger clips during steel deck erection. Supply additional hangers and inserts as required.
2. Ensure that acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved. Do not install acoustical units until after interior wet work is dry.

1.05 SUBMITTALS

A. See Section 013000 - Administrative Requirements for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Product Data: Provide data on suspension system components and acoustical units.

D. Samples: Two samples 24 by 48 inches in size indicating material and finish of acoustical units.

E. Samples: Two samples each, [____] inches ([____] mm) long of suspension system main runner, cross runner, and perimeter molding.

1.06 QUALITY ASSURANCE

A. Designer Qualifications for Seismic Design: Perform under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.07 FIELD CONDITIONS

A. Maintain uniform temperature of minimum 60 degrees F (16 degrees C), and maximum humidity of 40 percent before, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 CEILING ASSEMBLIES

A. Acoustical Ceiling Assembly Type APC-1:
   1. Acoustical Units: Radar High-NRC 7/8
   2. Item No. 22441
      a. Panel Size: 24 inches by 48 inches (2 by 4) panel
      b. Panel Edge: SQ edge.
      c. Color: Flat White 050
      d. Characteristics: Noise Reduction Coefficient = 0.70, Ceiling Attenuation Class = 40, Light Reflectance = 0.84 Recycled Content = 38%,
   3. Suspension Grid: Donn DXL 15/16-inch Suspension System
      a. Color: [Flat White 050].

2.02 CEILING PERFORMANCE REQUIREMENTS

A. Design for maximum deflection of 1/360 of span.

B. Fire-Resistance Rating: Determined in accordance with test procedures in ASTM E119 and complying with the following:

2.03 CEILING COMPONENT PRODUCTS

A. Acoustical Units:
   1. Acoustical Units - General: ASTM E1264, Fire Class A.
      a. VOC Content: As specified in Section 016116.
      b. VOC Content: Certified as Low Emission by one of the following:
         1) Product listing in UL (GGG).
         2) Product listing in CHPS (HPPD).
      c. Noise Reduction Coefficient (NRC) rating, Ceiling Attenuation Class (CAC) rating, and Light Reflectance Coefficient (LR) performance for each type of unit specified below, as determined in accordance with ASTM E1264.
      d. Fire Class / Surface Burning Characteristics: Determined in accordance with test method ASTM E84.
         1) Surface Burning Characteristics: Unless otherwise indicated, flame spread index of 25 or less, smoke developed index of 50 or less.
   2. Acoustical Panels: Painted mineral fiber, with the following characteristics:
      a. Application(s): [_____].
      b. Classification: ASTM E1264 Type III.
         1) Form(s): Includes the following, as applicable to each product specified.

(a) Form 2 - Water felted.
2) Pattern(s): Includes the following, as applicable to each product specified.
(a) C - Perforated, small holes.
(b) E - Lightly textured.
c. Thickness: As applicable to each product specified.
d. Recycled Content: As applicable to selected products.
e. Material Ingredients Transparency: Products included in the USG EcoBlueprint Program.
f. Low Emissions (VOC): Greenguard-certified products.
g. Products:
1) USG Corporation; Radar High-NRC Panels: www.usg.com/ceilings/#sle.
2) USG Corporation; Radar High-NRC/High-CAC Panels: www.usg.com/ceilings/#sle.
3) Substitutions: Not permitted.
3. Acoustical Panels: Painted mineral fiber, with the following characteristics:
a. Application(s): Fire-resistance-rated assemblies.
b. Classification: ASTM E1264 Type III.
1) Form(s): Includes the following, as applicable to each product specified.
(a) Form 2 - Water felted.
2) Pattern(s): Includes the following, as applicable to each product specified.
(a) C - Perforated, small holes.
(b) E - Lightly textured.
c. Thickness: As applicable to each product specified.
d. Recycled Content: As applicable to selected products.
e. Material Ingredients Transparency: Products included in the USG EcoBlueprint Program.
f. Low Emissions (VOC): Greenguard-certified products.
g. Products:
1) USG Corporation; Radar High-CAC FIRECODE 5/8" Panels: www.usg.com/ceilings/#sle.
2) USG Corporation; Radar High-NRC FIRECODE 3/4" Panels: www.usg.com/ceilings/#sle.
3) USG Corporation; Radar High-NRC/High-CAC FIRECODE 3/4" Panels: www.usg.com/ceilings/#sle.
4) Substitutions: Not permitted.

B. Suspension Systems:
1. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with [curtain pockets],[splices],[wall angles and moldings] as required.
a. Materials:
1) Steel Grid: ASTM A653/A653M [G30] coating, unless otherwise indicated.
2. Exposed Acoustical Suspension System: Hot-dipped galvanized steel grid and cap.
a. Application(s): [Fire-resistance-rated assemblies].
b. Structural Classification: [Intermediate-duty], when tested in accordance with ASTM C635/C635M.
c. Recycled Materials Content: Classified as containing greater than 50 percent total recycled content. Available for specific sizes and lengths.
d. Profile: Tee; 15/16 inch (24 mm) face width.
e. Finish: [Baked enamel].
f. Color: [White].
g. Products:

1) USG Corporation; [DX],[DXL] 15/16 Inch Suspension System: www.usg.com/ceilings/#sle.
2) Substitutions: [Not permitted].

3. Exposed Acoustical Suspension System: Hot-dipped galvanized steel grid and cap.
   a. Application(s): Fire-resistance-rated assemblies.
   b. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
   c. Recycled Materials Content: Classified as containing greater than 50 percent total recycled content. Available for specific sizes and lengths.
   d. Profile: Tee; 9/16 inch (14 mm) face width.
   e. Finish: Baked enamel.
   f. Color: White.
   g. Products:
      1) USG Corporation; Centricitee [DXT] [DXLT] 9/16 Inch Suspension System: www.usg.com/ceilings/#sle.
      2) Substitutions: Not permitted.
4. Exposed Acoustical Suspension System: Hot-dipped galvanized steel grid.
   a. Application(s): [Fire-resistance-rated assemblies].
   b. Structural Classification: [Intermediate-duty], when tested in accordance with ASTM C635/C635M.
   c. Recycled Materials Content: Classified as containing greater than 50 percent total recycled content. Available for specific sizes and lengths.
   d. Profile: Slotted Reveal Tee; 9/16 inch (14 mm) face width, with 1/4 inch (6.35 mm) wide center reveal.
   e. Intersections: Mitered.
   f. Finish: [Baked enamel].
   g. Color: [White].
   h. Products:
      1) USG Corporation Fineline [DXF],[DXLF] Suspension System: www.usg.com/ceilings/#sle.
      2) Substitutions: [Not permitted].
5. Exposed Acoustical Suspension System: Hot-dipped galvanized steel grid.
   a. Application(s): Seismic.
   b. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
   c. Recycled Materials Content: Classified as containing greater than 50 percent total recycled content.
   d. Profile: Slotted Reveal Tee; 9/16 inch (14 mm) face width, with 1/8 inch (3.2 mm) wide center reveal.
   e. Intersections: Mitered.
   f. Finish: Baked enamel.
   g. Color: White.
   h. Products:
      1) USG Corporation; Fineline DXFF Suspension System: www.usg.com/ceilings/#sle.
      2) Substitutions: Not permitted.
6. Exposed Suspension System: Hot-dipped galvanized steel grid and cap.
   a. Application(s): Seismic.
   b. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
   c. Recycled Materials Content: Classified as containing greater than 50 percent total recycled content.
   d. Profile: Double reveal Tee; 9/16 inch (14 mm) face width.

e. Intersections: Seamless reveal.
f. Finish: Baked enamel.
g. Color: White.
h. Products:
1) USG Corporation; Identitee DXI Suspension System: www.usg.com/ceilings/#sle.
2) Substitutions: Not permitted.

7. Exposed Suspension System: Hot-dipped galvanized steel grid and cap.
a. Application(s): Seismic.
b. Structural Classification: Heavy-duty, when tested in accordance with ASTM C635/C635M.
c. Recycled Materials Content: Classified as containing greater than 50 percent total recycled content.
d. Profile: Tee; 1-1/2 inch (38 mm) face width.
e. Finish: Baked enamel.
f. Color: White.
g. Products:
1) USG Corporation; DXW 1-1/2 Inch Suspension System: www.usg.com/ceilings/#sle.
2) Substitutions: Not permitted.

C. Moldings and Trim:
1. Edge Molding, Expansion Joints, and Splices - General: Same material, thickness, and finish as metal pan panels, unless otherwise indicated.
2. Perimeter Wall Moldings: Same metal and finish as grid.
a. Size: As required for installation conditions.
b. Angle Moldings: L-shaped, for mounting at same elevation as face of grid.

D. Gypsum Board and Framing Materials: See Section 092116.

E. Touch-Up Paint for Exposed Surfaces: Type and color to match acoustical units and suspension system grid and trim elements.

F. Touch-Up Paint For Concealed Items: Zinc rich type, as recommended by ceiling system manufacturer.

2.04 FABRICATION

A. Shop fabricate ceiling components to the greatest extent possible.

B. Fabricate components to allow access to ceiling plenum as required.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

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

D. Start of installation constitutes acceptance of project conditions.

3.02 PREPARATION

A. Coordinate the location of hangers with other work.

B. Provide hanger clips during steel deck erection. Provide for anticipated additional hangers and inserts as required.

C. Install ceiling system after major above-ceiling work is complete.

D. Acclimate wood ceiling materials by removing from packaging in installation area a minimum of 72 hours prior to installation.

3.03 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C636/C636M and manufacturer's instructions and as supplemented in this section.

B. Install hangers and inserts coordinated with overhead work. Provide additional hangers and supports as required.

C. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

D. Seismic Suspension System, Seismic Design Categories D, E, F: Hang suspension system with grid ends attached to the perimeter molding on two adjacent walls; on opposite walls, maintain a 3/4 inch (19 mm) clearance between grid ends and wall.

E. Where ducts, facility services, or equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

F. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

G. Support fixture loads using supplementary hangers located within 6 inches (152 mm) of each corner, or support components independently.

H. Do not eccentrically load system or induce rotation of runners.

I. Edge Moldings: Install at intersection of ceiling and vertical surfaces and penetrations, using components of maximum length; set level. Provide edge moldings at junction with other ceiling finishes. Miter corners. Provide preformed edge closures to match bullnosed cornered partitions.
   1. Install in bed of acoustical sealant.
   2. Use longest practical lengths.
   3. Overlap and rivet corners.

3.04 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit edge trim neatly against abutting surfaces.

D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

E. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.

F. Lay acoustical insulation for a distance of 48 inches (1219 mm) either side of acoustical partitions as indicated.

G. Install hold-down clips on acoustical units within 20 ft (6 m) of an exterior door.

END OF SECTION

INDOOR/OUTDOOR LIFT

Affordable Access

TRUS T LIFT

COMMERCIAL

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1-800-563-4382

RAM ELEVATORS + LIFTS

ANYWHERE ACCESSIBILITY

With its compact size and simple installation, the Trus-T-Lift's legacy of affordable mobility spans over 25 years.

A versatile accessibility lift for all conditions, the Trus-T-Lift overcomes daily accessibility challenges with ease. Engineered for use inside and outdoors, the Trus-T-Lift is compact, simple to install and can be quickly configured for almost any setting.

With easy-to-use controls and a design that prioritizes rider independence, the Trus-T-Lift is a safe and intuitive way for riders to travel up to 14ft.

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RAM ELEVATORS + LIFTS

THE HIGHLIGHTS

IDEAL FOR:

Indoor Use

Commercial Spaces

LIFTING CAPACITY:

750 LBS

TRAVEL SPEED:

8 FT/MIN

TRAVEL DISTANCE:

UP TO 14 FT

ENTRANCE/EXIT POINTS:

in-out same side, straight through, adjacent

MAX PLATFORM SIZE:

W42” x L60”
(18 square feet)

CUSTOMIZATION:

custom colours, trim, handrail, push button and entrance safety devices are available. Trus-T-Lifts can also be custom built to accommodate three-stops and/or atypical platform sizes to best meet your unique needs.

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RAM ELEVATORS + LIFTS

KEY FEATURES

Zero-Load Start Design

RAM's patented zero-load-start design allows the motor to reach full speed before lifting the load. This unique feature allows for full functionality during extreme weather and extends the life of all power & drive components.

Soft Touch Paddle

The patented RAM Soft Touch Paddle controls are oversized and responsive, allowing users to get moving with ease.

Total Customization

Customize your Trus-T-Lift's colours, trim, doors/gate, handrails and more. The lift can also be modified to accommodate three-stops and atypical platform sizes.

Easy to Install

The Trus-T-Lift comes with easy to manoeuvre components that can be assembled quickly with minimum site preparation.

All-Electric Drive System RA

RAM's field-proven electric drive system is reliable, powerful and whisper-quiet.

Plus, no hydraulic fluid = no harsh smells.

Limited or No Pit Required RA

Choose a pitless build with an 18" toe plate ramp, ideal for existing spaces, or a 2" pit for flush access.

RA = *RAM Advantage, an essential feature found in all of our products.*

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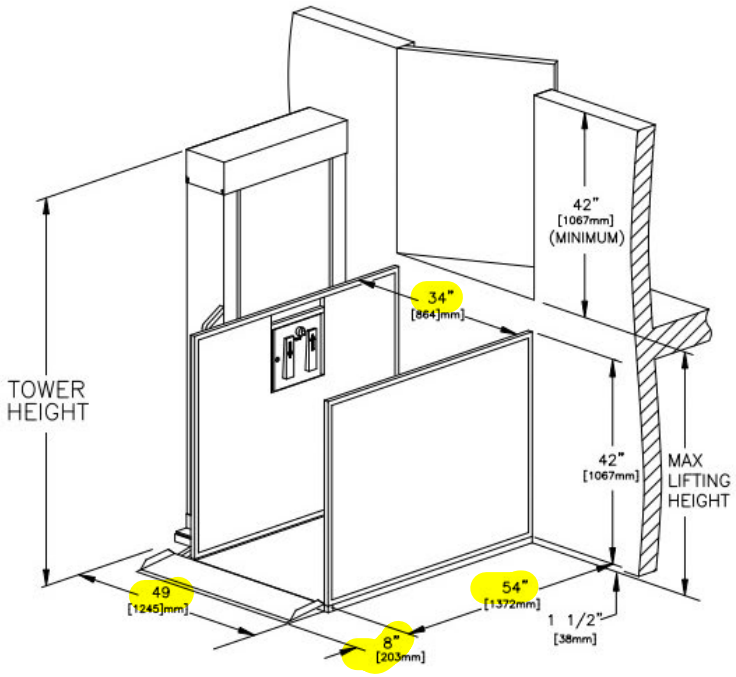
RAM ELEVATORS + LIFTS

Sizing

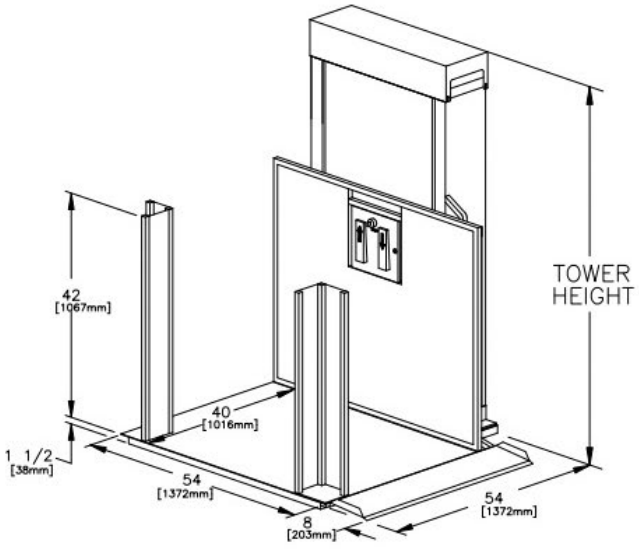
	Platform Size	Total Footprint (with tower)	Tower Heights	
			Lifting Height	Tower Height
Straight Through Access	W34" x L54"	W49" x L54"	28"	61.25"
			52"	85.25"
			72"	105.25"
Adjacent Access	W40" x L54"	W54" x L54"	96"	131.25"
			120"	155.25"
			138" 144"	179.25"
			168"	203.25"

*Custom platform sizes available upon request.

Straight Through Access



Adjacent Access



Gates

Landing Gate: The landing gate is typically 42" high for commercial applications and, for safety, is equipped with an interlock that will prevent the gate from being opened if the platform is not in its full "up" position.

Carriage Gate: This gate, which is typically 42" high, will travel with the platform as it moves up and down and is a key safety feature for taller lifts that are unenclosed.

Note: Any Trus-T-Lift with a rise of more than 8' in Canada or 60" in the United States needs to be fully enclosed.

Glass & Aluminum Gate: Glass can be an attractive architectural finish and RAM can offer glass & aluminum inserts for our gates as an optional upgrade.

Auto-Operators

Gates and doors come equipped with spring closing mechanisms as a standard, but in some applications, a powered auto-operator to open and close the gate may be required. Whether these options are required depends on the configuration and local authorities. A good rule of thumb is that all lifts with either the in-out same side, or adjacent entry-exit style should be equipped with auto-operators in commercial applications.

Superior Reliability

Three tiers of emergency auxiliary power are available for every RAM product:

1. Emergency manual crank (Standard)
2. Battery backup lowering will run the motor in the down direction during a power outage (Optional)
3. Full battery 40-cycle backup that will run the motor with full load for 40 cycles during a power outage (Optional)

Installation Considerations

Important things to consider for the installation location:

- Power availability – 15amp, 110V dedicated circuit no more than 8 feet away
- Mounting to a wall – especially for lifts with travel greater than 52in
- For exterior installations a secure footing – typically a concrete pad 5ft x 5ft

Code Relevance

Designed to meet ADA, ASME A18.1 and CSA B355 safety standards when properly equipped.

While RAM VPLs meet national standards, it is imperative to check State/Provincial and Local code requirements before installing to ensure compliance. All State/ Provincial and Local compliance is the responsibility of the purchaser. Some states may require fees for site preparation and permits.

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RAM ELEVATORS + LIFTS

SECTION 084113: ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

This suggested guide specification has been developed using the current edition of the Construction Specifications Institute (CSI) “Manual of Practice,” including the recommendations for the CSI three-part Section Format and the CSI Page Format. Additionally, the development concept and organizational arrangement of the American Institute of Architects (AIA) MasterSpec® Program has been recognized in the preparation of this guide specification. Neither CSI, AIA, USGBC, nor ILFI endorse specific manufacturers and products. The preparation of the guide specification assumes the use of standard contract documents and forms, including the “Conditions of the Contract,” published by the AIA.

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 covers Kawneer Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.

B. Types of Kawneer Aluminum Storefront Systems include:
   1. Trifab® VersaGlaze® 451 Framing System
      a. 2" x 4-1/2" (50.8 mm x 114.3 mm) nominal dimension
      b. Non-thermal
      c. Front, center, back, multi-plane, structural silicone or weatherseal (type B) glazed.
      d. Screw spline, shear block, stick, or punched opening.

1.3 DEFINITIONS

A. For fenestration industry standard terminology and definitions, refer to the Fenestration & Glazing Industry Alliance (FGIA) Glossary (AAMA AG-13).

1.4 PERFORMANCE REQUIREMENTS

A. General Performance:
   1. Product to comply with the specified performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction, as determined by testing of aluminum storefront systems representing those indicated for this project.
   2. Aluminum storefront systems shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   3. Failure includes any of these events:
      a. Thermal stresses transferring to building structure
      b. Glass breakage
      c. Loosening or weakening of fasteners, attachments, and other components

d. Failure of operating units

B. Delegated Design:
1. Design aluminum storefront systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Wind Loads:
1. The storefront system shall include anchorage that is capable of withstanding the following wind load design pressures:
a. Inward: (_____) psf or (_____) Pa
b. Outward: (_____) psf or (_____) Pa
2. The design pressures are based on the (Ohio) Building Code, (2024) Edition.

D. Air Leakage:
1. The test specimen shall be tested in accordance with ASTM E 283.
2. With interior seal, air leakage rate shall not exceed 0.06 cfm/ft^2 (0.3 l/s · m^2) at a static air pressure differential of 6.2 psf (300 Pa).
3. Without interior seal, air leakage rate shall not exceed 0.06 cfm/ft^2 (0.3 l/s · m^2) at a static air pressure differential of 1.6 psf (75 Pa).
4. CSA A440 Fixed Rating

E. Water Resistance:
1. The test specimen shall be tested in accordance with ASTM E 331.
2. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501.
3. There shall be no leakage at a minimum static air pressure differential of 8 psf (383 Pa) as defined in AAMA 501 with optional Air/Vapor Barrier Tie-in.
4. There shall be no leakage at a minimum static air pressure differential of 10 psf (479 Pa) as defined in AAMA 501 with optional sill flashing.

F. Uniform Load:
1. A static air design load of 35 psf (1680 Pa) shall be applied in the positive and negative direction in accordance with ASTM E 330.
2. There shall be no deflection in excess of L/175 of the span of any framing member.
3. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.

G. Seismic:
1. When tested to AAMA 501.4, system must meet design displacement (elastic) of 0.010 times the story height and ultimate displacement (inelastic) of 1.5 times the design displacement.

H. Thermal Movements:
1. Allow for thermal movements resulting from the following:
a. 0°F (-18 C) to 180°F (82 C) maximum change (range) in ambient and surface temperatures
b. 75°F (24 C) test interior ambient air temperature

2. Test performance shows no buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5 for a minimum 3 cycles.

I. Thermal Transmittance (U-factor):
1. Thermal transmittance test results are based upon 1" (25.4 mm) clear high-performance insulating glass [1/4" (e=0.035, #2), 1/2" warm edge spacer and argon fill gas, 1/4"].
2. When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
   a. Glass to exterior .47 (low-e) or 0.61 (clear) or project specific (____) Btu/hr/ft^2/°F per AAMA 507 or (____) Btu/hr/ft^2/°F per NFRC 100.
   b. Glass to center .44 (low-e) or 0.61 (clear) or project specific (____) Btu/hr/ft^2/°F per AAMA 507 or (____) Btu/hr/ft^2/°F per NFRC 100.
   c. Glass to interior .41 (low-e) or 0.56 (clear) or project specific (____) Btu/hr/ft^2/°F per AAMA 507 or (____) Btu/hr/ft^2/°F per NFRC 100.

J. Condensation Resistance Factor (CRF):
1. The glass to exterior CRF, when tested to AAMA Specification 1503, shall not be less than 70_{frame} and 69_{glass} (low-e) or 69_{frame} and 58_{glass} (clear)
2. The glass to center CRF, when tested to AAMA Specification 1503, shall not be less than 62_{frame} and 68_{glass} (low-e) or 63_{frame} and 56_{glass} (clear)
3. The glass to interior CRF, when tested to AAMA Specification 1503, shall not be less than 56_{frame} and 67_{glass} (low-e) or 54_{frame} and 58_{glass} (clear)

K. Sound Transmission Class (STC) and Outdoor-Indoor Transmission Class (OITC):
1. Sound transmission loss test results in accordance with AAMA 1801 are based upon 1" (25.4 mm) clear double laminated insulating glass with PVB interlayer (1/8", 0.030", 1/8", 1/2" AS, 1/8", 0.030", 1/8").
2. The glass to exterior ratings, when tested to ASTM E1425 and ASTM E90, shall not be less than STC 38 and OITC 31.
3. The glass to center ratings, when tested to ASTM E1425 and ASTM E90, shall not be less than STC 37 and OITC 30.
4. The glass to interior ratings, when tested to ASTM E1425 and ASTM E90, shall not be less than STC 38 and OITC 30.

L. Impact Resistance Performance:
1. The test specimen shall be tested in accordance with ASTM E 1886, information in ASTM E 1996 and TAS 201/203.
2. Large-Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade.
3. Small-Missile Impact: For aluminum-framed systems located above 30 feet (9.1 m) of grade.

1.5 SUBMITTALS

A. Product Data:
1. For each type of aluminum-framed storefront system indicated, include:
   a. Construction details
   b. Material descriptions

c. Dimensions of individual components and profiles
d. Hardware
e. Finishes
f. Installation instructions

B. Shop Drawings:
1. Plans
2. Elevations
3. Sections
4. Details
5. Hardware
6. Attachments to other work
7. Operational clearances
8. Installation details

1.6 QUALITY ASSURANCE

A. Installer Qualifications:
1. Installer must have successfully installed the same or similar units required for the project and other projects of similar size and scope.

B. Manufacturer Qualifications:
1. Manufacturer must be capable of providing aluminum-framed storefront systems that meet or exceed performance the stated performance requirements.
2. Manufacturer must be capable of fabricating exterior sunshades and glazed aluminum curtain walls and storefront systems that meet or exceed the stated performance requirements.
3. Manufacturer must document this performance by the inclusion of test reports and calculations.

C. Source Limitations:
1. Obtain aluminum-framed storefront system through one source from a single manufacturer.

D. Product Options:
1. Drawings indicate size, profiles, and dimensional requirements of aluminum-framed storefront system and are based on the specific system indicated. Refer to Division 01 Product Requirements Section. Do not modify size and dimensional requirements.
2. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

G. Structural-Sealant Glazing must comply with ASTM C 1401, “Guide for Structural Sealant Glazing” for design and installation of structural-sealant-glazed systems.

H. Structural-Sealant Joints: Design reviewed and approved by structural-sealant manufacturer.

1.7 PROJECT CONDITIONS

A. Field Measurements:
1. Verify actual dimensions of aluminum-framed storefront openings by field measurements before fabrication.
2. Indicate measurements on shop drawings.

1.8 WARRANTY

A. Submit manufacturer's standard warranty for owner's acceptance.

B. Warranty Period:
1. Two years from Date of Substantial Completion of the project provided however that in no event shall the Limited Warranty begin later than six months from date of shipment by manufacturer.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product:
1. Kawneer Company, Inc.
2. Trifab® VersaGlaze® 451 Framing System
a. 2" x 4-1/2" (50.8 mm x 114.3 mm) nominal dimension
b. Non-thermal
c. Front, center, back, multi-plane, structural silicone or weatherseal (type B) glazed
d. Screw spline, shear block, stick, or punched opening

B. Subject to compliance with requirements, provide a comparable product by the following:

C. Substitutions:
1. Refer to Division 01 Substitutions Section for procedures and submission requirements.
2. Pre-Contract (Bidding Period) Substitutions:
a. Submit written requests ten (10) days prior to bid date.
3. Post-Contract (Construction Period) Substitutions:
a. Submit written request in order to avoid installation and construction delays.
4. Product Literature and Drawings:
a. Submit product literature and drawings modified to suit specific project requirements and job conditions.
5. Certificates:
a. Submit certificate(s) certifying that the substitute manufacturer (1) attests to adherence to specification requirements for storefront system performance criteria, and (2) has been engaged in the design, manufacture, and fabrication of aluminum storefronts for a period of not less than ten (10) years. (*Company Name*)
6. Test Reports:

a. Submit test reports verifying compliance with each test requirement required by the project.

7. Samples:
   a. Provide samples of typical product sections and finish samples in manufacturer's standard sizes.

D. Substitution Acceptance:
1. Acceptance will be in written form, either as an addendum or modification.
2. Acceptance will be documented by a formal change order signed by the owner and contractor.

2.2 MATERIALS

A. Aluminum Extrusions:
1. Alloy and temper recommended by aluminum storefront manufacturer for strength, corrosion resistance, and application of required finish
2. Not less than 0.070" (1.8 mm) wall thickness at any location for the main frame
3. Complying with ASTM B221: 6063-T6 alloy and temper

B. Fasteners:
1. Nonmagnetic stainless steel or other materials must be non-corrosive and compatible with aluminum members, trim hardware, anchors, and other components.

C. Anchors, Clips, and Accessories:
1. Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating.
2. Anchors, clips, and accessories shall provide sufficient strength to withstand the design pressure indicated.

D. Reinforcing Members:
1. Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating.
2. Reinforcing members must provide sufficient strength to withstand the design pressure indicated.

E. Sealant:
1. For sealants required within fabricated storefront system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

F. Tolerances:
1. References to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

2.3 STOREFRONT FRAMING SYSTEM

A. Brackets and Reinforcements:

1. Manufacturer's standard high-strength aluminum with non-staining, non-ferrous shims for aligning system components.

B. Fasteners and Accessories:
   1. Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories must be compatible with adjacent materials.
   2. Where exposed, fasteners and accessories shall be stainless steel.

C. Perimeter Anchors:
   1. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

D. Packing, Shipping, Handling, and Unloading:
   1. Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

E. Storage and Protection:
   1. Store materials so that they are protected from exposure to harmful weather conditions.
   2. Handle material and components to avoid damage.
   3. Protect material against damage from elements, construction activities, and other hazards before, during, and after installation.

2.4 GLAZING SYSTEMS

A. Glazing to meet requirements in Division 08 Glazing Section.

B. Glazing Gaskets:
   1. Manufacturer's standard compression types
   2. Replaceable, extruded EPDM rubber

C. Spacers and Setting Blocks:
   1. Manufacturer's standard elastomeric type

D. Bond-Breaker Tape:
   1. Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants for structural-sealant-glazed systems as recommended by manufacturer for joint type, and as follows:
   1. Structural Sealant:
      a. ASTM C 1184
      b. Single-component neutral-curing silicone formulation that is compatible with the system components with which it comes in contact
      c. Specifically formulated and tested for use as structural sealant and approved by a structural-sealant manufacturer for use in the aluminum-framed systems indicated
      d. Color: Black
   2. Weatherseal sealant:

a. ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O
b. Single-component neutral-curing formulation that is compatible with the structural sealant and other system components with which it comes in contact
c. Recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use
d. Color: Matching structural sealant

2.6 ACCESSORY MATERIALS

C. Joint Sealants:
1. For installation at perimeter of aluminum-framed systems, as specified in Division 07 Joint Sealants Section.

D. Bituminous Paint:
1. Cold-applied asphalt-mastic paint
2. Complies with SSPC-Paint 12 requirements except containing no asbestos
3. Formulated for 30-mil (0.762 mm) thickness per coat

2.7 FABRICATION

A. Fabricate framing member components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations
2. Accurately fitted joints that are flush, hairline, and weatherproof
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior
4. Physical and thermal isolation of glazing from framing members
5. Accommodations for thermal and mechanical movements of glazing and framing that maintain required glazing edge clearances
6. Provisions for field replacement of glazing
7. Fasteners, anchors, and connection devices that are concealed from view to the greatest extent possible

B. Mechanically Glazed Framing Members:
1. Fabricate for flush glazing without projecting stops.

C. Structural-Sealant-Glazed Framing Members:
1. Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

D. Storefront Framing:
1. Fabricate components for assembly using manufacturer’s standard installation instructions.

E. After fabrication, clearly mark components to identify their locations in project according to shop drawings.

2.8 ALUMINUM FINISHES

A. Finish designations that are prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

B. Factory Finishing:
1. Kawneer Permanodic® AA-M10C21A44, AAMA 611, Architectural Class I Color Anodic Coating (Color _____)
2. Kawneer Permanodic® AA-M10C21A41, AAMA 611, Architectural Class I Clear Anodic Coating (Color #14 Clear) (Optional)
3. Kawneer Permanodic® AA-M10C21A31, AAMA 611, Architectural Class II Clear Anodic Coating (Color #17 Clear) (Standard)
4. Kawneer Permafluor™ (70% PVDF), AAMA 2605, Fluoropolymer Coating (Color _____)
5. Kawneer Permadize® (50% PVDF), AAMA 2604, Fluoropolymer Coating (Color _____)
6. Kawneer Permacoat™ AAMA 2604, Powder Coating (Color _____)
7. Other: Manufacturer_____ Type _____ (Color _____)

PART 3 EXECUTION

3.1 EXAMINATION

A. With installer present, examine openings, substrates, structural support, anchorage, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of work:
1. Verify rough opening dimensions.
2. Verify levelness of sill plate.
3. Verify operational clearances.
4. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components for proper water management.
5. Masonry Surfaces:
   a. Masonry surfaces must be visibly dry and free of excess mortar, sand, and other construction debris.
6. Wood Frame Walls:
   a. Wood frame walls must be dry, clean, sound, well nailed, free of voids, and without offsets at joints.
   b. Ensure that nail heads are driven flush with surfaces in opening and within 3" (76.2 mm) of opening.
7. Metal Surfaces:
   a. Metal surfaces must be dry and clean (free of grease, oil, dirt, rust, corrosion, and welding slag).
   b. Ensure that metal surfaces are without sharp edges or offsets at joints.

B. Proceed with installation only after correcting unsatisfactory conditions.

3.2 INSTALLATION

A. Comply with Drawings, Shop Drawings, and manufacturer's written instructions for installing aluminum-framed storefront system, accessories, and other components.

B. Install aluminum-framed storefront system so that components:
   1. Are level, plumb, square, and true to line
   2. Are without distortion and do not impede thermal movement
   3. Are anchored securely in place to structural support
   4. Are in proper relation to wall flashing and other adjacent construction

C. Set sill members in bed of sealant or with gaskets, as indicated, for weather-tight construction.

D. Install aluminum-framed storefront system and components to drain condensation, water penetrating joints, and moisture migrating within aluminum-framed storefront system to the exterior.

E. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

B. Manufacturer's Field Services:
   1. Upon owner’s written request, provide periodic site visit by manufacturer’s field service representative.

3.4 ADJUSTING, CLEANING, AND PROTECTION

A. Adjusting: Not applicable.

B. Protection:
   1. Protect installed product’s finish surfaces from damage during construction.

C. Cleaning:
   1. Clean glass immediately after installation.
      a. Comply with glass manufacturer's written recommendations for final cleaning and maintenance.
      b. Remove non-permanent labels and clean surfaces.
   2. Clean aluminum surfaces.
   3. Avoid damaging protective coatings and finishes.
   4. Remove excess sealants, glazing materials, dirt, and other substances.
   5. Repair or replace damaged installed products.
   6. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during the construction period.
   7. Remove construction debris from project site and legally dispose of debris.

END OF SECTION 084113

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